

Regulatory heterogeneity as obstacle for international services trade

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Abstract

International trade in services is hampered by non-tariff barriers that originate from national regulations. Not only the level of regulation in home or export country matters, but also the inter-country differences in regulation for service markets. Regulatory measures tend to affect fixed costs rather than variable costs. The fact that regulations often differ by market, means that the fixed costs of complying with regulations in an export market are in fact sunk market-entry costs. We show policy heterogeneity between countries has a negative impact on bilateral service trade. We develop a new index of bilateral policy heterogeneity, and apply it in a gravity model for explaining service trade among EU countries. The empirical results support our theoretical prediction: the degree of regulatory heterogeneity is inversely related with the level of bilateral service trade. Simulations for the EU show that if countries make more use of mutual recognition, bilateral trade in commercial services among EU countries could increase by 42% to 96%.

Key words: regulatory barriers, policy heterogeneity, services trade, internal market EU

JEL codes: L1, L5, L8, F12, F14

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1 Introduction

The paper analyses how national product-market regulations function as non-tariff barriers in international services trade, and how changes in regulation could affect services trade.

Government regulation has a strong impact on international services trade. There are several reasons for that. Such regulation is sometimes motivated by protectionism, but more often applies to domestic producers as well. Product-market regulation is motivated by market failures like information asymmetry, externalities (e.g. safety aspects of building design), or monopolist positions. Service consumers tend to have more a priori uncertainty about product quality than holds for buyers of manufacturing goods. The information asymmetry can be serious for complex professional services using specialist knowledge inputs (e.g. medical services). These issues at least partly explain why there is such a long history of government-imposed regulations, operational restrictions, and market entry barriers for suppliers of services.¹

Many services can only be delivered through local presence of the service provider. In the case of merchandise trade the national border is crossed by the goods themselves. Services trade is more 'international' in the sense that the provider himself, his staff, his equipment and material may need to cross the border. Some or all stages of the business process take place in the country where the service is provided, thus becoming subject to national regulatory intervention in the export destination country. Each national authority uses its own system of quality safeguards and regulatory standards for service providers. Service exporters are thus confronted with different regulations and requirements in each destination country. Because of the country-specific character of regulations, service exporters incur sunk market-entry costs for each export market.

This paper focuses on the trade impact of regulatory heterogeneity by national authorities. Section 2 discusses the types of NTBs that affect international services trade. Regulatory non-tariff barriers typically have an impact upon fixed costs, and function as market entry barriers. In Section 3 we analyse formally in a monopolistic-competition model how international regulatory heterogeneity affects services trade. Before being able to test the theoretical predictions we had to develop an appropriate index for bilateral policy heterogeneity. Section 4 briefly describes our new indicator for bilateral regulatory heterogeneity between countries. Section 5 empirically tests the heterogeneity impact on bilateral trade in a gravity analysis of bilateral service trade among EU countries. The heterogeneity in regulation does indeed turn out to play a significant role. Section 6 brings together the most important conclusions. It also

¹ Quality-inspired regulations have, for instance, since ancient times been applied to the medical profession. The regulations formed one of the sources of the medieval guild system. The Royal College of Physicians of London received its charter in 1518 and got a monopoly over the practicing medicine in London, and the oversight of physicians throughout England. Fellows of the College were not allowed to engage in trade, practice surgery or compound or sell medicines. These 'pure physicians' were limited to examining patients, diagnosing disease, and prescribing (but not dispensing) medications (Carr-Saunders and Wilson, 1993).

illustrates the policy relevance of our findings by using them to simulate the trade effects of recent EU proposals that will reduce the intra-EU heterogeneity in regulation. Even though the proposals only partially eradicate the impact of policy differences in services markets, we find that the proposals may very substantially raise bilateral services trade in the European Union.

2 Non-tariff barriers in services trade

This section discusses the nature of non-tariff barriers (NTBs) for international trade in services. The variety in NTBs is large, so that some taxonomy must precede a discussion of their quantitative impact. Hoekman and Primo Braga (1997) distinguish several types of NTBs. The first group consists of quantitative-restrictive policies. An example are the bilateral agreements for air transportation services. Some countries do not allow foreign providers to operate in particular services industries. A variation on this business-restriction theme is formed by discriminatory access to distribution networks like railways, cable networks, telephone system, electricity distribution, and more in general communication systems.² A second group of NTBs consists of price-based policies, such as price controls for specific services (e.g. banking, insurance and telecommunication), or prices that discriminate between foreign origins or destinations (e.g. visa fees, entry or exit taxes, and post taxes). A third and very large group of NTBs is formed by licences, qualification and certification requirements, and operational restrictions for foreign services providers.

Some NTBs are obviously discriminatory for foreign service providers. Limited or denied access to distribution and communication networks is an example for that. The same holds for quantity restrictions or price-based policies. The third group (regulatory requirements) is, however, different. The simple fact that service providers have to meet regulatory standards is not in itself a trade barrier. Both domestic and foreign providers have to comply with such regulations. National regulatory standards can therefore be fully compatible with WTO principles of non-discrimination. The trade-hampering effect of these standards results from a systematic disregard by national governments for the fact that service providers more often than not have already qualified themselves in other countries. Service providers thus face additional regulation-compliance costs. The regulatory requirements come on top of regulatory qualifications that are already complied with in the home market and in other countries where the service firm operates. Such duplication of regulations creates a negative trade effect ('border effect') of which the implications will be further analysed in this paper.

² Hoekman and Primo Braga (1997) classify this as a separate group.

Measurement of NTB-related trade costs

Various quantification approaches have been applied to estimate the trade-cost impact of NTBs.³ Mostly used are frequency measures, price-based measures, and quantity-based measures.

Frequency measures use an inventory approach. The frequency index may be based on the percentage of rules that are established as discriminatory for foreign firms. Hoekman (1995) did a first comprehensive attempt in this line of research. The resulting frequency indices cannot be interpreted as tariff equivalents, as Brown and Stern (2001) show in their survey.

Price-based measures calculate the price or cost effect of the non-tariff barrier. This has been done for banking and maritime services (cf. Findlay and Warren, 2000). The tariff equivalent of the NTB can be calculated straightforwardly from its price effect.

Quantity-based measures often are derived by interpreting the effects of the non-tariff barriers as a "lacking trade" volume, compared to some counterfactual. The trade-volume effect of NTBs can be derived using gravity equations. Given the demand elasticity, the volume effect can subsequently be translated into a tariff equivalent. Anderson and Van Wincoop (2004) survey many studies using this approach.

All three methods have their drawbacks. Quite often the methods do not isolate the effects of the NTB from other trade-affecting factors, or trade measurement imperfections. NTB-frequency indices inevitably require arbitrary judgments by the researchers with regard to the categorisation of measures by the criterion of their discrimination for foreign firms. Despite these drawbacks, all quantification methods provide a proxy of the relative importance of NTBs and their differences between countries. As such they can be useful. The empirical results often show that NTBs are higher for developing countries than for the developed ones. In less-regulated countries, the NTBs are also lower.⁴

Variable costs versus fixed costs

The tariff equivalents derived from price measures and quantity-based estimates implicitly assume that the NTBs affect variable trade costs. This makes sense for manufacturing and commodity trade. In goods trade it holds that most border-related costs –like currency exchange, language and security costs– are in some way related to the trade volume, even though perhaps some trading costs like information costs can be interpreted as volume-independent.⁵ This is different for services. NTBs that affect the service exporter's variable costs just form a sub-set of all NTBs for service markets. Most other types of NTBs in service markets are not volume-dependent. This is illustrated in Table 2.1.

³ Cf. surveys by Deardorff and Stern (1998); Anderson and van Wincoop (2004); Messerlin (2001).

⁴ The estimates of NTBs in services range from a few percent of the import value to ten percent, or in some cases even hundred percent, such as in some transport services (e.g. Hoekman 1995; Findlay and Warren, 2000).

⁵ This does not necessarily imply that these costs are linear in the volume of trade. But these are certainly no fixed costs. It is very likely, that NTBs per unit of trade volume are lower for high volumes of trade.

Many trade barriers stem from national measures that primarily affect fixed costs of the service providers. Licences, qualification and certification requirements, and operational restrictions for (foreign) services providers tend to be one-off costs, and therefore impact on fixed costs. Many qualification costs are fixed-cost entry barriers. The firm must (re-)qualify itself before it has sold one single product. The foreign service provider has to fulfil these requirements before entering the market, but the effort and costs to fulfil them are often not related to the trade volume.

Table 2.1 National product-market regulations for service markets^{a)}

	Primary impact on:			
	Fixed costs	Variable costs	Import price	Import volume
Specific product-market regulations				
Restrictions on import quantity (entry prohibition, local content requirements, restricted network access)				X
Controlled import prices (reference, minimum or maximum price)			X	
Market access costs related to import volume (entry or exit taxes, visa costs, differentiated tariffs by firm origin, postal tariffs)		X		
Firm start-up licenses and associated authorisation requirements	X			
Service-providing personnel must have locally recognised professional qualifications (may necessitate re-qualification)	X			
Obligatory membership of local professional association	X			
Juridical requirements (owners or managers of service-providing firm must have local residence or nationality, firms must have a specific legal form)	X			
Requirement that service providers have nationally recognised liability insurance or professional indemnity insurance.	X			
All service activities in export destination country fully subject to regular administrative and tax procedures	X			
Limitations on inter-professional co-operation or on the variety of services provided by one firm (may require unbundling)	X			
Temporary service personnel from origin country fully subject to rules of the social security system of the destination country	X			
Impediments for material inputs, suppliers and personnel from origin country (may require a search for new local suppliers)	X			

^{a)} This table is for illustrative purposes. Studies that assess the relative frequency or incidence of the different types of regulatory trade barriers in this table are still lacking, or only cover a limited number of countries.

Recent literature⁶ has modelled the export decisions of manufacturing firms as a kind of investment decision with sunk costs. Firms do not only face per-unit costs such as transport

⁶ Examples are Bernard and Jensen (1999); Roberts and Tybout (1997); Melitz (2003); Baldwin (2005). Some of their arguments are already proposed by Baldwin and Krugman (1989).

costs, but also fixed costs that do not vary with the export volume Melitz (2003) argues that firms have to find and inform foreign buyers about their products, establish distribution channels, and adapt their products to the standards of that national market. Firms also have to learn the regulatory environment.

The existence of fixed market entry costs is confirmed in interviews with managers, but there are no statistics on the magnitude of these costs. Melitz (2003) and Roberts and Tybout (1997) find evidence that the decision of firms to export to a particular market is positively affected by the firms' export size in the previous period to that market. This could be explained by the existence of fixed market-entry costs.⁷

For studying the trade effect of regulatory asymmetries across countries it is useful to have a look at their 'counterpart' in manufacturing trade, i.e. the so-called technical barriers to trade. Brenton and Vancauteran (2001) and Chen (2004) find that the border effect in intra-European manufacturing trade is largest in those sectors where technical barriers to trade are most important. According to the first two authors, the 'border effect is smallest in those manufacturing sectors where European member states apply mutual recognition of national product standards.⁸ Turrini and Van Ypersele (2002) demonstrate that asymmetries in national law systems can also have a negative trade effect, because these asymmetries create additional transaction costs for international trade. This is confirmed – also for manufacturing– by the empirical results of Sousa and Disdier (2002).

To our knowledge, no study has so far investigated the implications of fixed and sunk export costs for international trade in services, although scattered evidence suggest that there is reason enough for doing this. In a survey among a large number of business-service firms in the EU 78 per cent of the responding firms mention that setup costs of selling services in other EU states are "*significant*" or "*very significant*" trading barriers (CSES 2001:190).⁹ The setup cost effects are largest for smaller firm-size categories. The European Commission (2001) states: "*Evidence collected from SME's and SME-supporting organisations suggests that many SME's back off after initial inquiries about administrative requirements and procedures because they feel they do not have the necessary resources to deal with the current complexity*".

The evidence presented in this section suggests that regulation-related fixed costs affect export decisions of service firms. Contrary to studies that consider NTBs as quasi-tariffs (volume-

⁷ Roberts and Tybout (1997) find evidence that manufacturing firms incur sunk costs for exporting (information costs, establishing brand name, setting up distribution network), and that the sunk costs involved indeed give rise to tractable hysteresis effects in entry and exit behaviour in export markets. Once having made the investment in sunk costs, firms will postpone exiting even if market and profit developments are unfavourable.

⁸ Brenton and Vancauteran (2001) consider the presence of significant 'border effects' in sectors where technical barriers are not important, as an indication that home-market preferences play a role as well. Head and Mayer (2000) draw a similar conclusion with regard to intra-EU manufacturing trade.

⁹ Of those firms that were able to estimate the size of the setup costs, 30 per cent estimated that these are in the order of 3-6 months sales proceeds, and 43 per cent estimated that the cost are more than 6 months of sales proceeds (CSES 2001: 191).

proportional cost mark-ups), we will in this study interpret the costs of international regulatory differences as a fixed costs.

3 Modelling the trade impact of policy heterogeneity

Intuition suggests that international regulation differences work out negatively on international services trade. We show on the basis of a model characterised by monopolistic competition and fixed costs that this is indeed the case. Differentiated services products are imperfect substitutes for each other. Each services firm v produces a unique product variety, which is sold on the domestic and the foreign markets. In the model we assume that trans-border services trade is demand-driven rather than cost-driven. International policy heterogeneity is reflected in the structure of fixed setup costs for service firms. The number of varieties (firms) is determined endogenously. We investigate the impact of policy heterogeneity on the variety and size of bilateral service trade.

Consumer utility increases in the quantity and variety of services products. The preference for variety implies that they derive a higher utility from spending their income on m service varieties than from spending it on $m-1$ service varieties. It does not matter whether the varieties are produced domestically or imported; there is no home bias in preferences. The utility of the representative consumer in country j is framed as a CES-utility function à la Dixit-Stiglitz:

$$U_j = \left(\sum_{i=1}^R \sum_{v=1}^{n_{ij}} X_{vij} \frac{\sigma-1}{\sigma} \right)^{\frac{\sigma}{\sigma-1}} \quad \text{with } \sigma > 1; v \in \{1, \dots, n_{ij}\}; i, j \in \{1, \dots, R\} \quad (3.1)$$

in which X_{vij} represents the consumption in country j of the variety produced by firm v from country i . The substitution elasticity σ is constant and identical over the entire range of varieties. Each services firm produces one variety. The number of varieties and firms (n_{ij}) is endogenous. The budget constraint of the representative consumer in country j reads:

$$Y_j = \frac{1}{P_j} \sum_{i=1}^R \sum_{v=1}^{n_{ij}} P_{vij} X_{vij} \quad \forall j \quad (3.2)$$

where Y_j represents real income in country j , P_{vij} is the consumer price in country j of variety v produced in country i , and P_j is the aggregate price index of services in country j . The latter is a 'true' price index, indicating the price of one unit of the composite services bundle given that the quantities of all varieties are chosen in a utility-optimising way by the representative household:

$$P_j = \left(\sum_{i=1}^R \sum_{v=1}^{n_{ij}} P_{vij}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \quad \forall j \quad (3.3)$$

The assumptions imply a strong taste and decision symmetry for consumers across countries. Assuming utility maximisation this makes it possible to derive the implicit demand curve in country j as perceived by the individual firm v from country i :

$$X_{vij}^{dem} = \left(\frac{P_{vij}}{P_j} \right)^{-\sigma} Y_j \quad \forall v, i, j \quad (3.4)$$

Each firm uses labour as only production input. Wage rates w_i and variable labour requirements (α_i) are exogenous and identical across countries, so that country suffices are suppressed henceforth. Production is subject to economies of scale. Apart from variable labour requirements, firms incur fixed labour costs for complying with government-imposed qualification criteria. Government requirements differ by country, which implies that foreign firms in each export market face country-specific qualification costs. The country-specific fixed costs are expressed as a fraction h_{ij} ($h_{ij} > 0$) of fixed qualification costs in the firm's home country (F_i). Hence, $wh_{ij}F_i$ represents the costs of policy heterogeneity. Firms have the same cost structure:

$$C_{vij} = w(\alpha X_{vij} + h_{ij}F_i) \quad \forall v, i, j \quad \text{with } h_{ij} > 0; \quad h_{ii} = 1 \quad (3.5)$$

Profits at each market are described by:

$$\pi_{vij} = (P_{vij} - w\alpha) X_{vij}^{dem} - wh_{ij}F_i \quad \forall v, i, j \quad (3.6)$$

The imperfect substitutability of each service variety means that markets are to some extent segmented. When the number of firms is large enough, individual firms ignore the effects of their own action on the aggregate price. The profit-maximising price (denoted by an asterisk) follows from (3.4) and (3.6):

$$P_{vij}^* = \beta \alpha w \quad \forall v, i, j \quad \text{with } \beta \equiv \frac{\sigma}{\sigma-1} \quad (3.7)$$

The term β represents the gross mark-up of price over marginal cost; it is strictly positive because $\sigma > 1$. Because of the identical costs and wages, prices of all varieties are identical. Free entry of firms causes P_j to fall; profitable market supply for each firm falls. Entry continues until each firm breaks even. Equations (3.7) and (3.6) may be combined to find the unique equilibrium supply level X_{vij}^* for active firms at each export market:

$$X_{vij}^* = \frac{(\sigma-1)}{\alpha} h_{ij} F_i \quad \forall v, i, j \quad (3.8)$$

The break-even supply level in export markets increases in the degree of policy heterogeneity. This is a matter of scale economies. Qualification costs must be borne up-front by exporting firms, independent of firm size. Under conditions of policy heterogeneity, national (re)qualification costs are specific for that country market. They cannot be sold or exploited elsewhere, hence they are sunk costs. In the equilibrium only those firms enter (or remain active) whose expected sales are large enough to cover the sunk market-entry costs. This implies that $n_{ij} \leq n_i$.

Though we refrain from modelling which specific firms are in the sub-set n_{ij} , the size of this sub-set follows endogenously from our model.¹⁰ We start from the equilibrium of total supply and demand per country, described by $X_{vij}^{dem} = X_{vij}^*$. After substituting equations (3.4), (3.8) and (3.3) –the technicalities of which are presented in Annex 1– we derive the equilibrium number of firms from a given country k exporting to country j :

$$n_{kj}^* = \left[\frac{(\sigma-1) h_{kj} F_k}{\alpha Y_j} \right]^{\frac{1-\sigma}{\sigma}} - \sum_{i=1}^R n_{ij} \left(\frac{P_{ij}}{P_j} \right)^{1-\sigma} \quad \forall k, j \quad (3.9)$$

Note that the size of the destination country (Y) has a positive impact on the number of exporting firms. Once having derived n_{kj}^* we can determine total bilateral exports between country k and j :

$$E_{kj} \equiv \sum_{v=1}^{n_{kj}} X_{v kj}^* = n_{kj}^* X_{v kj}^* \quad \forall k, j \quad (3.10)$$

Effects of policy heterogeneity

Since each firm delivers a different service variety, the total number of service varieties in country j is reduced by policy heterogeneity. The import composition becomes less diverse. What does it imply for the level of bilateral exports? Reduction of policy heterogeneity (h_{kj}) increases the number of exporting firms to country j (equation 3.9), but it also reduces the break-even export sales per firm (equation 3.8). The question is which of both effects

¹⁰ All firms within a country are identical, but only a subset of firms enters the foreign market. We consider this as the result of random selection. Identification of the specific firms in the sub-set n_{ij} is beyond our modelling interest in this paper. However, firm-growth models by Jovanovic (1982), Evans (1987) and Baldwin (1994) offer promising elements for such modelling. Recently, Melitz (2003) has presented a model on export-market entry for firms with varying marginal and fixed costs. Due to self-selection only the most productive firms enter the foreign market while the less productive firms only serve the home market. The relative magnitude of fixed and variable costs determines the export status of firms. Bernard and Jensen (1999) offer supportive empirical evidence for this. Baldwin (2005) shows that less fixed costs of foreign entry increases exports in the Melitz model.

dominates. Substituting equations (3.8) and (3.9) and taking the derivative of exports with respect to policy heterogeneity costs yields:

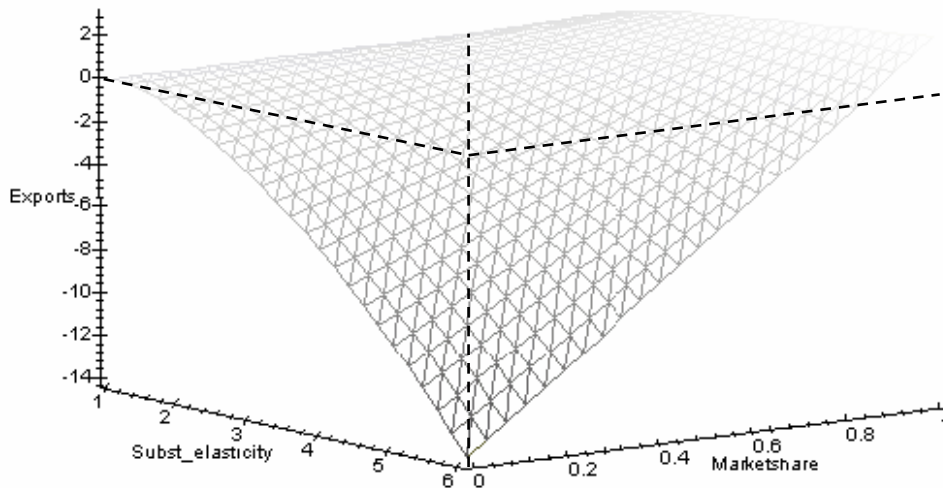
$$\frac{\partial E_{kj}}{\partial h_{kj}} = \frac{\sigma - 1}{\sigma \alpha} \left(\frac{P_j}{P_{kj}} \right)^{1-\sigma} [\sigma \omega + (1 - \sigma)] \quad \forall k, j; \text{ with } \omega \equiv \frac{n_{kj} P_{kj}^{1-\sigma}}{\sum_{i=1}^R n_{ij} P_{ji}^{1-\sigma}} \quad (3.11)$$

This equation nicely reveals the two opposite effects of policy heterogeneity. The first RHS term shows the impact of larger firm size, while the second term shows the effect of policy heterogeneity on the number of firms. Heterogeneity lowers the number of exporting firms. ω_{ij} represents the market share of all firms from country i in country j . If this market share is sufficiently small relative to the substitution elasticity, less heterogeneity in regulation leads to higher trade flows.

$$\frac{\partial E_{ij}}{\partial h_{ij}} < 0 \quad \text{if } (\sigma \omega + 1 - \sigma) < 0 \quad (3.12)$$

Figure 3.1 plots how different values of the substitution elasticity and country i 's market share affect the impact of policy heterogeneity on bilateral exports. For normal values of substitution elasticity ($\sigma > 1.1$) and for low values of ω , a reduction in regulatory heterogeneity already leads to higher bilateral exports.

Figure 3.1 Impacts of the substitution elasticity and the market share on bilateral exports



Conclusions

Using a fairly standard monopolistic-competition model we show that more policy heterogeneity works out negatively on bilateral exports. Policy heterogeneity has two effects on the level of bilateral services trade. Firstly, there will be less exporting firms. Secondly, the average size of the exporting firms becomes larger because cumulative fixed (and sunk) costs for firms increase due to the regulatory heterogeneity. The first effect dominates, so that the level of bilateral exports is negatively related to the degree of bilateral policy heterogeneity. This model prediction will be subjected to empirical testing.¹¹

Policy heterogeneity works out as a non-tariff barrier because it raises the fixed and sunk costs of market entry in export markets. Contrary to quasi-tariff NTBs, the policy-heterogeneity NTB has no impact on the export price. While the quasi-tariff NTB lowers average firm size, policy heterogeneity has the opposite effect. Policy heterogeneity thus implies less diversity of imported varieties, less consumer choice, and hence less consumer welfare. This impact on consumers effect will be strongest in small countries.

4 Quantifying policy heterogeneity

Policy heterogeneity has many dimensions, and does not easily lend itself for a quantitative analysis, let alone in an internationally comparative context. In order to test the predictions from our theoretical framework empirically, we had to develop an index for bilateral policy heterogeneity.

We build on the path-breaking work by a team of OECD researchers (Nicoletti, Scarpetta and Boylaud (2000)). They have identified the important comparison items with respect to product-market regulation, and developed indices for international differences in regulatory intensity. Their database on international regulation differences is mainly fed by official inputs from governments of OECD member states. The OECD International Regulation database is by far the most detailed and structured dataset on national differences in product-market regulation. It gives information on 1600 economic policy comparison items for the benchmark year 1997.

We have removed all items that were too industry-specific, too general or irrelevant for service markets. In the end we preserved 183 detailed aspects of product market regulation for assessing heterogeneity in economic policies. Most of the remaining items are of a more or less general nature, or at least they can be considered as representative (*pars pro toto*) for a country's overall product market regulation approach.¹²

¹¹ Since firm-level data on international services trade are unavailable we assume that country j 's demand for imported services distinguishes product varieties by their country origin.

¹² The data selection procedure is described in Kox, Lejour and Montizaan (2004, Annex I).

Our index for bilateral regulatory heterogeneity builds upon detailed pair-wise comparisons between individual countries for specific aspects of product market regulation, both regarding the form and the contents of the regulation. For each item of the cleaned-up database we assess whether two countries are identical or not. It yields information of a binary nature: when the two countries differ in that particular regulation item we assign a value of 1 , and when there is no difference we assign the value of 0 to the regulation heterogeneity index. The results per item are aggregated for all relevant item per country pair.¹³ The value of the composite indicator ranges between 1 in case of complete dissimilarity and 0 in case of identical product-market regulations. Table 4.1 reports the average bilateral policy heterogeneity. It is lowest between Denmark and Ireland (0.26) and highest between the UK and Poland (0.70).

The impact of regulatory heterogeneity on fixed market-entry costs may differ by policy area. We have therefore decomposed the overall heterogeneity index into five specific policy areas, identified in the OECD regulation database. The five sub-domains of product-market regulation are: *barriers to competition*; *administrative barriers for start-ups*; *regulatory and administrative opacity*; *explicit barriers to trade and investment*; and *state control*.

Disaggregation allows us to test in which policy areas the international regulatory heterogeneity has its largest trade impact on services. The decomposition was done on basis of additional information from the OECD regulation database.¹⁴ Table 4.2 shows the relative weights. It also indicates how we expect that heterogeneity in policy sub-domains affect bilateral trade (expected sign of coefficient). These expectations take into account that exports and foreign direct investment (setting up a local production unit) can be substitutes as a form of international service supply.

Explicit barriers to trade and investment includes for instance quantity restrictions, measures that can be expected to have a strong and directly negative impact on bilateral trade. However, heterogeneity with regard to this sub-domain may also imply high costs for complying with regulatory requirements in investment. If investment is hampered, firms could decide to serve the foreign market through exports. Therefore, the overall effect is difficult to predict a priori.

More heterogeneity in *administrative burdens for start-ups* could stimulate trade. The reason is that administrative burdens make it more difficult for foreign service firms to set up a local subsidiary in the other country. The latter increases the relative attractiveness of exporting as a way of delivering services to these markets. Hence, a positive impact on bilateral service trade might result.

¹³ Annex 1 describes the index in more formal detail.

¹⁴ Per comparison item, the OECD has classified to which type of policy area it refers. This classification is based on the analytical approach developed in Nicoletti, Scarpetta and Boylaud (2000). The classification distinguishes main policy domains and sub-domains in a 4-layered hierarchy.

Table 4.1 Heterogeneity of product market regulation among EU member states, year 1997/1998

	Den- mark	Gree- ce	Swed- en	UK	Aus- tria	Belg. - Luxem	Finland	France	Germ- any	Ireland	Italy	Nether- lands	Portu- gal	Spain	Czech Rep.	Poland	Hungary
Denmark	0.00	0.46	0.40	0.36	0.45	0.39	0.43	0.46	0.38	0.26	0.46	0.40	0.46	0.42	0.53	0.63	0.62
Greece		0.00	0.42	0.44	0.43	0.36	0.44	0.43	0.41	0.48	0.47	0.39	0.38	0.41	0.43	0.39	0.34
Sweden			0.00	0.34	0.48	0.39	0.47	0.43	0.39	0.32	0.49	0.32	0.51	0.45	0.48	0.54	0.43
UK				0.00	0.50	0.40	0.43	0.46	0.37	0.30	0.50	0.40	0.49	0.37	0.57	0.70	0.46
Austria					0.00	0.50	0.43	0.43	0.46	0.46	0.37	0.40	0.42	0.45	0.45	0.36	0.46
Belgium-Lux						0.00	0.38	0.35	0.39	0.43	0.45	0.34	0.42	0.37	0.52	0.50	0.44
Finland							0.00	0.41	0.41	0.45	0.44	0.32	0.42	0.43	0.45	0.45	0.41
France								0.00	0.43	0.43	0.37	0.34	0.42	0.48	0.46	0.45	0.45
Germany									0.00	0.32	0.43	0.37	0.39	0.40	0.48	0.57	0.48
Ireland										0.00	0.49	0.44	0.42	0.40	0.52	0.62	0.55
Italy											0.00	0.41	0.44	0.43	0.51	0.40	0.49
Netherlands												0.00	0.35	0.41	0.38	0.46	0.35
Portugal													0.00	0.44	0.44	0.43	0.39
Spain														0.00	0.53	0.53	0.43
Czech Republic															0.00	0.36	0.46
Poland																0.00	0.38
Hungary																	0.00

Country data are corrected for non-response or missing data.

Table 4.2 Detailed indicators of regulation heterogeneity by sub-domain of product-market regulation (PMR)

Components of heterogeneity indicator and covered policy domains	Number of items in the dataset	Weight as % of total number of items for overall PMR heterogeneity indicator	Expected impact of sub-domain heterogeneity on bilateral trade
Regulatory and administrative opacity	13	7.1	negative
Explicit barriers to trade and investment	14	7.7	not clear
Other outward barriers ^{a)}	5	2.7	^{a)}
Administrative burdens on start-ups	45	24.6	positive
Barriers to competition	61	33.3	negative
State control	45	24.6	negative
Overall PMR heterogeneity indicator	183	100	negative

a) The policy heterogeneity index for this sub-domain is not used in the regressions because it is only based on five reported items.

State control is most important in services that use fixed infrastructures (rail, communication, distribution of electricity, water and gas), although there is still little international trade in most of these services.

Regulatory *Barriers to competition* is an area that is close to the operational functioning of service firms, so that we expect a negative impact of heterogeneity in this sub-domain. This also applies for *Regulatory and administrative opacity*.

5 Empirical analysis

The impact of international regulatory heterogeneity on international service trade has been investigated in the context of a gravity model. Reminiscent to the gravity law in physics, the crux of the gravity trade model is that it predicts bilateral trade from the market size of the partner countries, and the distance between them, as a proxy for variable trade costs. The gravity model is a multi-purpose work horse for empirical trade theory. Helpman and Krugman (1985), and Bergstrand (1989) have shown that the model can be derived from a trade model with differentiated goods and monopolistic competition. Deardorff (1998) demonstrated that it can also be consistent with the Heckscher-Ohlin trade theory. Recently, Anderson and Van Wincoop (2004) have generalised these earlier findings. They show that the gravity model can be derived from any trade model obeying three conditions: (a) trade-separability, i.e. the allocation of production and consumption is separable from the bilateral allocation of trade across countries, imposing separable preferences and technology; (b) the aggregator of product varieties is of a CES-type and identical across countries; and (c) the ad-valorem tax equivalents of trade costs do not depend on the quantity of trade.¹⁵

¹⁵ Anderson and Van Wincoop (2004) show that under some conditions the second and third assumption can be relaxed.

The conditions of Anderson and Van Wincoop imply that the gravity equation may follow from any kind of demand equation based on an Armington demand structure, including the one we used in section 3. Numerous studies have applied the gravity model to total trade or manufacturing trade. Nicoletti *et al.* (2003) is one of the first to apply this analysis to bilateral trade in services.

In our application the basic gravity model is augmented with regulation variables. Nicoletti *et al.* (2003) also includes regulation variables.¹⁶ They find that a higher regulation level in an import country has a negative effect on that country's bilateral service trade. Their analysis only considers the intensity level –on a scale relative to other OECD countries– of a country's product-market regulation. In our opinion this approach only identifies a small part of the regulatory trade barriers. As argued before, it is the policy heterogeneity at a more disaggregate level that creates the real sunk-cost effects for service exporters. What Nicoletti *et al.* (2003) may have found is that a high *level* of product market regulation in the import country combined with (unobserved) *heterogeneity* in regulation between the partner countries causes a negative trade impact.¹⁷ This conjecture can be checked by including the *level* and the *heterogeneity* of product-market regulation as explanatory variables. We do this for the home and foreign market. This allows us to test for the hypothesis that a low level of regulation in home markets has a positive effect on the competitiveness of its service exporters in the world market (e.g. Porter 1990).

In our specification of the gravity model bilateral trade in commercial services is explained by GDP in the country of origin, GDP in the country of destination, physical distance, language distance, and policy variables. The gravity equation that we test reads:

$$\ln(TRD_{ij}) = \beta_0 + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(DIS_{ij}) + \beta_4 LAN_{ij} + \beta_5 PMR_i + \beta_6 BEN_j + \sum_k \beta_{7k} HET_{ijk} + \beta_8 D_{00} + \beta_9 D_{01} + \varepsilon_{ij} \quad (5.1)$$

TRD represents the bilateral exports between region *i* and *j*. The basic explanatory variables are: GDP in the exporting region *i*, GDP in the importing region *j*, and geographical distance (*DIS*) and language distance (*LAN*) between those regions. The level variables are all expressed in logarithms. The added policy variables are: *PMR* represents the level of product-market regulation in the country of origin *i*, and *BEN* the barriers to entrepreneurship in the country of destination *j*, while *HET* represents regulation-heterogeneity indicators for each pair of countries. The suffix *k* represents the five sub-domains in regulation heterogeneity (cf. section 4). Year dummies for the year 2000 (*D₀₀*) and 2001 (*D₀₁*) are added to control for possible time effects. In some of the regressions we also controlled for country-specific fixed effects.

¹⁶ Other studies are: Grünfeld and Moxnes (2003), Kimura and Lee (2004), and Lejour and de Paiva Verheijden (2004).

¹⁷ Other differences between our paper and Nicoletti *et al.* (2003) are in the country coverage (EU versus OECD), period of analysis, and the type of bilateral service trade (other commercial services versus total services).

Data

We focus on bilateral trade in commercial services, hence disregarding government services. Moreover, we exclude *transport* and *tourism* because both services trade categories are quite special.¹⁸ *Transport* because it is strongly related to the total volume of goods trade, and is subject to particular regulatory regimes quite different from overall product-market regulation (e.g. because of environmental externalities). *Tourism* trade is excluded because in most of this trade consumers rather than producers move to the foreign country, and because it to a large extent is determined by non-policy factors like climate, weather conditions and cultural heritage. Tourism is also subject to relatively few product-market regulations.

The bilateral services trade data on 'Other Commercial Services' and 'Total Services' are from the OECD trade statistics (OECD 2003) for the period 1999-2001. We have focussed on the countries that were EU members in that period. Only 9 of these EU countries report bilateral trade data.¹⁹ The original data were not made consistent by the OECD. It means that there are possibly two reporting sources: the country of origin and the country of destination. Their reporting can deviate significantly. For getting a consistent set of bilateral trade data we applied the same method as Lejour and de Paiva Verheijden (2004) for selecting the reporting countries that across all trading partners have the least bias for over- or underreporting in comparison to all trade partners. In case of multiple reporting we choose the data of the most reliable reporting countries for our dataset. For the EU countries with missing data we took the data as reported by their bilateral partners. In this way, we only miss bilateral trade data between the countries Denmark, Greece, Ireland, Spain and Sweden. Data for 2000 and 2001 are corrected for nominal differences caused by US dollar inflation.

GDP data are from the World Bank Development Indicators dataset, and distance data from CEPII (Gaulier *et al.* 2003). The language data are based on linguistic differences between languages, derived from the place of the language on the language classification tree (Belot and Ederveen 2005).

Data on the relative intensity of product-market regulation are drawn from the OECD summary indicators for the relative strictness intensity of each country's product market regulation (cf. Nicoletti *et al.* 2000). We constructed the data on bilateral regulatory heterogeneity indicators based upon OECD International Regulation Database for 1997/1998.

Results

We test the augmented gravity model by OLS regression, and afterwards apply other estimation methods for refinement and for robustness checks. The regression results are summarised in Table 5.1, and will be discussed subsequently, starting with the OLS results in the first data column.

¹⁸ As a control for the robustness of our findings we also have run a regression for total service trade. These findings are reported briefly after presenting our main results.

¹⁹ The data for Belgium and Luxembourg are combined.

Table 5.1 Regression results: explaining bilateral trade in other commercial services, EU-14 countries, 1999-2001

	Estimation method				
	OLS ^{a)}	OLS fixed effects origin	OLS fixed effects destination	FIML ^{b)} DM origin + fixed effects	FIML ^{b)} DM destination + fixed effects
Gravity variables					
Ln GDP Origin	0.83*** (0.03)		0.83*** (0.03)	0.83*** (0.04)	
Ln GDP Destination	0.67*** (0.03)	0.70*** (0.03)			0.88*** (0.04)
Ln Distance	- 0.76*** (0.07)	- 0.71*** (0.07)	- 0.82*** (0.07)	- 0.85*** (0.09)	- 0.85*** (0.09)
Language distance	- 0.69*** (0.15)	- 0.68*** (0.15)	- 0.64*** (0.15)	- 0.70*** (0.22)	- 0.70*** (0.22)
Regulation level					
Product market regulation	-0.33*** (0.07)		- 0.37*** (0.07)	- 0.34*** (0.09)	
Barriers for entrepreneurship	0.08 (0.05)	- 0.08 (0.05)			- 0.03 (0.07)
Regulation heterogeneity					
Heterogeneity, administrative barriers for start ups	0.07 (0.26)	0.27 (0.25)	0.30 (0.25)	0.35 (0.36)	0.35 (0.36)
Heterogeneity, barriers to competition	-3.67*** (0.37)	- 2.64*** (0.39)	- 3.21*** (0.40)	- 3.10*** (0.55)	- 3.10*** (0.55)
Heterogeneity, regulatory and administrative opacity	- 0.50*** (0.23)	- 0.78*** (0.24)	- 0.40* (0.24)	- 0.86*** (0.30)	- 0.86*** (0.30)
Heterogeneity, state control	- 0.14 (0.40)	- 0.00 (0.40)	- 0.31 (0.40)	- 0.23 (0.33)	- 0.23 (0.33)
Heterogeneity, barriers to trade and investment	- 1.31*** (0.23)	- 0.97*** (0.25)	- 0.80*** (0.25)	- 0.74 (0.58)	- 0.74 (0.58)
Year dummy 2000	0.11 (0.08)	0.04 (0.07)	0.05 (0.07)	0.01 (0.10)	0.01 (0.10)
Year dummy 2001	0.22*** (0.08)	0.13** (0.07)	0.15*** (0.07)	- 0.01 (0.10)	- 0.01 (0.10)
Constant	- 5.81*** (0.90)				
Country dummies		origin, significant	destination, significant	destination, significant	origin, significant
Number of observations:	481	481	481	481	481
Adjusted R-squared	0.85	0.87	0.87	0.70	0.61

^{a)} Absolute value of standard error in brackets. Code: *** = coefficient significant at 1% confidence level; ** = coefficient significant at 5% confidence level; * = coefficient significant at 10% confidence level.

^{b)} Full Information Maximum Likelihood (FIML), applying simultaneous estimation of equations for origin and destination countries. All variables are transformed as deviations from the mean (DM), bilateral variables separately from the mean over the origin (exporting) countries, and from the mean over the destination (host) countries (see main text).

The OLS results in table 5.1 show that the estimated coefficients of the basic gravity model are significant, have plausible magnitudes and the expected signs. The market size (GDP) coefficient for the origin country is higher than the one for the destination country. The estimated parameters for physical distance and language distance have about the same size, which may be specific for services, because face-to-face communication tends to be more important than for trade in goods. The language variable may also pick up non-regulation trade barriers such as cultural differences. How do the policy variables affect bilateral services trade? The level of product market regulation in the origin country (PMR) has a significant negative impact on bilateral trade. This is in line with the Porter hypothesis: regulation shields off the home market, and hampers the international competitiveness of domestic service providers, thus reducing their export possibilities. Interestingly, we found that the regulation level in the destination country (*Barriers to entrepreneurship*) has no significant effect.²⁰ Three of the indicators for bilateral regulatory heterogeneity are statistically significant and have a substantial negative impact on bilateral services trade. The areas for which this holds are, in order of importance: *Barriers to competition*, *Explicit barriers to trade and investment*, and *Regulatory and administrative opacity*. Bilateral policy heterogeneity in two other regulation areas (*State control* and *Administrative barriers for start-up firms*) appear to have no significant impact. The dummy for the year 2001 is statistically significant, while the one for the year 2000 is not. Separate regressions for the individual years do not show many significant differences in the values of the estimated parameters.²¹

We check for the possibility that the coefficients of the explanatory variables pick up the effects of unobserved country variables by introducing fixed effects (country dummies) in the OLS regressions. The second and third data columns of Table 5.1 represent the regression results with fixed effects.²² The parameter estimates of the significant heterogeneity variables become a bit smaller, but the pattern of results is otherwise unchanged.

After correcting for period effects (time dummies) and country effects (dummies for origin and destination country), there is still the possibility that unobserved country-pair effects affect the results. An excessive loss of degrees of freedom prevents us from including dummies for all country-partner pairs. We solve this by transforming variables as deviations from their individual mean (hence: DM).²³ For each destination country it focuses on the differences between origin countries, and for each origin country it assesses the differences between destination countries. In this way two equations for bilateral exports are obtained: an “origin”

²⁰ This does not change if we take an indicator of overall product market regulation for the destination country.

²¹ Results are available upon request. Moreover, we have also estimated a panel regression. These effects are similar to the ones presented in table 5.1.

²² Fixed effects or in this case country dummies represent all country-specific heterogeneity that is not captured by the other country-specific variables (like GDP and PMR) in the first specification (OLS without fixed effects). The disadvantage is that we can not ascribe this heterogeneity to specific economic variables. For analytical reasons it is therefore not attractive to combine country dummies for the origin and destination countries in one specification.

²³ It is a “within” fixed-effect estimator (cf. Verbeek 2004). In many cases the within estimator gives identical results as for estimating the non-transformed equation with dummies. In this case not, because of the bilateral variables. The method is introduced for bilateral trade by Erkel-Rousse and Mirza (2002). They call the method transformed least squares.

equation; and a “destination” equation. The “origin” equation expresses all variables as deviations from their values for the average origin (=export) country. If variable Z_{kj} is a bilateral variable of equation (5.1) the variables of the 'origin' equation read as:

$$\Delta_k Z_{kj} = Z_{kj} - \frac{1}{I} \sum_{i=1}^I Z_{ij} \quad (5.2)$$

in which I and J represent the number of countries for origin and destination. If Z represents exports from country k to j the transformed variable $\Delta_k Z_{kj}$ indicates the exports of country k to country j in deviation of the average exports to country j . Similarly, the “destination” equation expresses bilateral imports and all explanatory variables as deviations from their values for the average destination (=import) country:

$$\Delta_m Z_{im} = Z_{im} - \frac{1}{J} \sum_{j=1}^J Z_{ij} \quad (5.3)$$

After transforming all bilateral variables in this way, we estimate the two equations simultaneously by the full-information maximum likelihood (FIML) procedure. The advantage of the transformed variables is that the origin-specific unobserved effects are accounted for in the origin equation. At the same time we can add explicit country-dummies to take account of the unobserved effects for the destination countries. Similarly, in the destination equations it is the destination-specific unobserved effects that are accounted for by the transformation, and the origin-specific unobserved effects by adding explicit country-dummies. Additional degrees of freedom are gained by assuming that in each of the two equations the incremental information provided by the unobserved country-pair effect over the “pure” origin (or destination) effect is random, and can be included in the error term.²⁴ In the origin and destination equation we impose identical coefficients for the year dummies, and for those variables that express bilateral differences: physical distance, language distance, and regulatory heterogeneity.

The two last columns of Table 5.1 show the FIML regression results with the transformed (DM) variables. The coefficients of most variables are comparable to the ones found for OLS with fixed effects. The coefficient for physical distance is higher now. The coefficient for regulatory heterogeneity in *Explicit barriers to trade and investment* is no longer significant; apparently it picked up specific country-pair effects in the OLS regressions. The estimated parameters for regulation heterogeneity with respect to the areas *Barriers to competition* and *Regulatory and administrative opacity* remain invariably significant. The coefficient for the latter area is even considerably higher than in the OLS regressions. The year dummy for 2001 is no longer significant in the FIML estimates.

²⁴ Thus assuming that the deviations of bilateral fixed effects from their means are i.i.d. random terms.

Summing up, the regression results for bilateral trade in 'other commercial services' are fairly stable over various specifications and estimation procedures.²⁵ A robust result is that inter-country differences with regard to product-market regulation in the areas of *Barriers to competition* and *Regulatory and administrative opacity* have a significant negative impact on bilateral service trade. Finally, another firm result is that we consistently find empirical support for the Porter hypothesis that a high level of home-market regulation negatively affects the international competitiveness of exporters from that country.

As a final robustness check we also test regression equation 5.1 for bilateral trade in *total* services. While the results for 'total services' and 'other commercial services' can never be fully comparable, re-doing applying our analysis to total services makes it possible to compare our results with other papers that have applied the gravity model to total international services trade.²⁶ The full regression results for total services trade are presented in Annex 3. Here we summarise the differences with the results in table 5.1. The parameter for GDP in the origin country is lower, possibly because for countries 'exporting' tourism, the size of their economy is less important than their climate and culture. On average differences in language seem to be less important. This is in line with Lejour and de Paiva Verheijden (2004) who concluded that language differences are not significant for trade in transport services.²⁷ Like the result in Nicoletti *et al.* (3003) and Kimura and Lee (2004), we find that the estimated coefficient for the level of product-market regulation in the destination country (represented by *Barriers for entrepreneurship*) is now statistically significant and has a negative sign. In the OLS regressions the same heterogeneity variables are significant as in Table 5.1, but their value is about halved. Much of these effect seems to be caused by specific country-pair effects, however, since only the heterogeneity with respect to *Regulatory and administrative opacity* remains significant in the FIML regressions. From this remarkable difference we may infer that the robust negative trade effect of international policy heterogeneity with regard to *Barriers to competition* is specific for 'other commercial services', i.e. for business services, financial services, and distribution services.

6 Conclusions and policy implications

International differences in product-market regulation affect fixed rather than variable export costs. They cause a duplication of fixed qualification and policy-compliance costs for service firms that operate across borders. Qualification costs must be borne up-front by exporting firms,

²⁵ Doing the same regressions with the seemingly unrelated regression (SUR) method did not change the results.

²⁶ The reason is that total services trade include transport services and tourism services, each accounting for about 25% of total services trade. These two elements of services trade are different from other commercial services. This is partly because trade in these services is driven by other explanatory variables that are not included in our gravity equation.

²⁷ The reason could be that transport services are more standardised than transactions in most other commercial services, so that communication is less hampered by language differences.

independent of firm size. Small firms thus are in a relatively disadvantaged position. Under conditions of international policy heterogeneity, national (re-)qualification costs are specific for each country market. It requires firms to invest in country-specific 'qualification assets' that cannot be sold or exploited elsewhere, i.e. they form sunk costs. In the equilibrium only those service firms whose expected sales are large enough to cover the sunk market-entry costs will operate in export markets.

In the empirical part of our paper we have empirically tested our approach for the bilateral service trade among EU member states. We indeed find strong evidence that international differences in product-market regulation indeed constitute a robust non-tariff barrier to international trade in services, and in particular for 'other commercial services' (business services, financial services, distribution services).

Policy implications

Our results are important from a policy perspective. Governments have two basic mechanisms for reducing the costs of regulation heterogeneity for internationally operating firms, namely by regulation harmonisation, or by allowing foreign firms to operate under regulatory standards of their home country (mutual recognition). Harmonisation of regulation is a very long process, and it may not be efficient because countries may have different market preconditions or different regulatory preferences. This means that a wider application of the mutual-recognition principle may be the most auspicious track.²⁸

Reducing regulation heterogeneity could be done by applying more mutual recognition with regard to qualification standards for service providers. This indeed is the approach that has been chosen by the European Commission in its proposed and much-debated Services Directive. The Commission in 2004 launched new policy proposals for the intra-EU service market (EC 2004). A major element in the proposed measures is the 'country of origin' principle that allows for more mutual recognition of regulatory regimes in the European service markets. A service provider that meets the regulatory standards in the member state of origin should no longer be confronted by other or additional regulatory requirements in the EU country where the service is delivered. Another element in the proposals is that all EU member states are required to set up a single point of contact where foreign service firms can fulfil all administrative obligations. Finally, the EU proposals aim to eliminate unnecessary and discriminatory regulation such as nationality and residence restrictions. The proposals are applicable to a large part of the EU services sector, ranging from retail distribution to marketing research, from administration firms to certified accountants, from construction to engineering consultants (cf. Kox, Lejour and Montizaan 2004).

²⁸ There may be some intermediary solutions as well. A 'harmonisation light' approach could be to apply a common architecture in regulation, allowing quantitative (gradual) rather than qualitative regulation differences. Under 'harmonisation light' fixed qualification costs which a firm incurs in a more lenient country are no longer forfeit when entering an export country with a more tough regulation. The only thing happening is that some additional compliance costs come on top of it.

We use the regression results of Table 5.1 to calculate the potential effects of the proposed EU measures. We first assess how the EU proposals would affect the bilateral regulation heterogeneity in the relevant areas of product-market regulation. This is done by close reading of the proposals and all 183 policy items that underlie our heterogeneity indices (cf. section 3). We quantify for each of the five heterogeneity sub-indicators what impact the proposed measures may have on bilateral regulatory heterogeneity, assuming they are integrally adopted and implemented.

Table 6.1 gives the expected change in the indicators for sub-domains of product-market regulation. The heterogeneity components *Regulatory and administrative opacity* and *Explicit barriers to trade and investment* are heavily affected by the EU directive. The heterogeneity components *Administrative burdens for start-ups* and *Barriers to competition* are moderately affected, while the component *State control* is hardly affected. In the latter case, this is mainly due to the fact that network sectors are not included in the EU proposals.

Table 6.1 Expected impacts of proposed EU measures on intra-EU policy heterogeneity, by sub-domain

Components of heterogeneity indicator and covered policy domains	Reduction of the components of indicator due to implementation EU directive ^{a)}
Regulatory and administrative opacity	66 – 77 %
Explicit barriers to trade and investment	73 – 78 %
Administrative burdens for start-ups	34 – 46 %
Barriers to competition	29 – 37 %
State control	3 – 6 %
Overall PMR heterogeneity indicator	31 – 38 %

^{a)} Based on detailed item-wise consideration of the match between the proposed EU directive and the 187 specific regulation items selected from the OECD database as basis for calculating the heterogeneity indicators. If all items for a sub-domain would be fully affected by the EU directive, the expected impact would 100%. If no items are affected, the expected impact is 0%. Because of the uncertain impact of the EU directive on some regulatory comparison items - in particular for those items that are partially affected - we use a bandwidth indicating a minimum and maximum effect. Source: Kox, Lejour and Montizaan (2004).

We combine the reduction effects described in Table 6.1 with the regression results for the FIML estimators with fixed effects for the country of origin (last column in Table 5.1) as our starting point. For every bilateral relation we calculate how the services trade might changed due to the EU proposals. The effect differs for each country pair, because the initial heterogeneity in regulation and the change induced by the EU directive varies for each country pair.²⁹ We account for uncertainties by combining the uncertainty effects of the parameter estimates –using a spread between plus and minus one standard deviation around the estimated coefficients– with the bandwidth of the heterogeneity effects in Table 6.1. This results in an

²⁹ Note that exports are estimated in logs. So the new export level equals the old export level (2001) times the exponent of the product of the change in heterogeneity and the estimated coefficient. We have calculated this for each country-pair and averaged these results to derive the total EU-effect, using the size of bilateral services trade as weight.

increase of intra-EU trade in commercial services (excluding transport and tourism) between 42 and 96 per cent. Commercial services form about 10% of total intra-EU trade. Hence, total intra-EU trade could increase by 4% to 10%.

The effects are even bigger if the heterogeneity in regulation would be completely eliminated. Then commercial services trade could increase by 209% using the estimates for the coefficients of heterogeneity indices in the FIML regression with dummies for the origin countries. An identical system of product market regulation – although that may neither be realistic nor desirable³⁰ – could thus have a tripling effect on European trade in commercial services. This number shows the trade effects that are at stake in a trade-off on national differences in product-market regulation.

We may also look beyond the intra-EU services market. The results are also potentially important for the GATS/WTO negotiations on the liberalisation of international service trade. Using a wider scope for mutual recognition, WTO members should perhaps put more emphasis on mutual recognition as an important principle in international service trade.

³⁰ The principle of mutual recognition has its limits. Particularly when there are large inter-country differences in institutional development and incomes, open international trade in labour-intensive services market may have too much shock effects in some segments of the labour markets in developed countries.

Annex 1 Derivation number of exporting firms

This annex derives the equations in Section 3 for the number of exporting firms and the impact of less policy heterogeneity on bilateral exports. From equality between demand (3.4) and supply (3.8) we derive the number of exporting firms from a given country k :

$$\left[\frac{F_k h_{kj} (\sigma - 1)}{\alpha} \right] = p_{kj}^{-\sigma} \left[\sum_{i=1}^R n_{ij} p_{ij}^{1-\sigma} \right]^{\frac{\sigma}{1-\sigma}} Y_j \quad \forall k, j \quad (\text{A1.1})$$

We have also substituted the price index, equation (3.3) in (3.8). After some rewriting we get

$$\left[\frac{F_k h_{kj} (\sigma - 1) p_{kj}^{\sigma}}{\alpha Y_j} \right]^{\frac{1-\sigma}{\sigma}} = \sum_{i=1}^R n_{ij} p_{ij}^{1-\sigma} \quad \forall k, j \quad (\text{A1.2})$$

In equation (A1.2) we isolate n_{kj} from the other elements on the RHS by subtracting $n_{kj} p_{kj}^{1-\sigma}$ for the other exporting countries and dividing by $p_{kj}^{1-\sigma}$. As a result we get equation (3.9).

The effect of less regulatory heterogeneity costs on bilateral exports follows from substituting equation (3.8) in the equation for exports, (3.10), and taking the derivative using the chain rule.

$$\frac{\partial E_{kj}}{\partial h_{kj}} = \frac{\partial n_{kj}}{\partial h_{kj}} \frac{F_k h_{kj} (\sigma - 1)}{\alpha} + \frac{n_{kj} F_k (\sigma - 1)}{\alpha} \quad \forall k, j \quad (\text{A1.3})$$

If we substitute the derivative of the number of firms (equation (3.10)) with respect to heterogeneity costs in (A1.3) we get

$$\frac{\partial E_{kj}}{\partial h_{kj}} = \frac{\sigma - 1}{\sigma \alpha} \left\{ \left[\frac{F_k h_{kj} (\sigma - 1)}{\alpha Y_j} \right]^{\frac{1-\sigma}{\sigma}} (1 - \sigma) + \sigma n_{kj} \right\} \quad \forall k, j \quad (\text{A1.4})$$

The term between brackets consists of a negative and positive term. The equation can be rewritten by substituting the rearranged equation (3.10) to eliminate fixed costs and income.

$$\frac{\partial E_{kj}}{\partial h_{kj}} = \frac{\sigma - 1}{\sigma \alpha p_{kj}^{1-\sigma}} \left\{ n_{kj} p_{kj}^{1-\sigma} + (1 - \sigma) \sum_{i=1}^R n_{ij} p_{ij}^{1-\sigma} \right\} \quad \forall k, j \quad (\text{A1.5})$$

Note that the term between the accolades almost corresponds to the price index to the power $1 - \sigma$. Rewriting this term and dividing equation (A1.5) by $P_j^{1-\sigma}$ we get equation (3.11).

Annex 2 Policy heterogeneity index

Let there be n independent countries that may observably differ with regard to attribute R . The simple bilateral heterogeneity indicator h_{ij}^R has the value of zero in case of country similarity, and the value of 1 in case of country dissimilarity:

$$h_{ij}^R \in \{1,0\} \quad \text{for } \forall i, j \subset (1, \dots, n) \quad (\text{A2.1})$$

The pair-wise comparisons can be gathered in an item dissimilarity matrix, called H^R . The total degree of international dissimilarity for regulation item R can be aggregated in a single numerical indicator HG^R :

$$HG^R = \sum_i \sum_j h_{ij}^R \quad (\text{A2.2})$$

This indicator increases in the international degree of regulation dissimilarity. We can also calculate the country deviancy indicator for country i :³¹

$$DV_i^R = \frac{1}{n} \sum_j h_{ij}^R \quad (\text{A2.3})$$

Country deviancy indicators are dimensionless numbers; they give no information about the nature of the heterogeneity itself, nor on the question whether a player is high/low, strict/lenient or intensive/extensive with regard to a particular regulation characteristic. A heterogeneity or deviancy indicator therefore will always have to be used in combination with a dimensioned level indicator.

So far we considered regulation dissimilarity for a single regulation item. The approach can be extended to much more complex and detailed regulation heterogeneity problems, e.g. by distinguishing $m \subset \{R_1, R_2, R_3, \dots, RM\}$ functions in product market regulation that may each be dealt with in $s \subset \{S_1, S_2, S_3, \dots, S\}$ different modes.³² This magnifies the comparison base to a matrix of dimensions $n^2 m s$. After adapting for the added comparison dimensions the country deviancy indicator becomes:

$$DV_i^{ms} = \frac{1}{s m n} \sum_s \sum_m \sum_j h_{ij}^{ms} \quad (\text{A2.4})$$

³¹ It can also be expressed in relative terms, normalising the indicator for player i with the performance of the median player, found after ranking the deviancy indicators for all the n players.

³² Some of these s modes may be non-existent for particular regulation functions, e.g. because they are of a binary nature (yes-no). In the dissimilarity matrix these modes yield zeros.

Annex 3 Regression results for Total Services trade

Dependent variable: Total Services trade, EU-14 countries, 1999-2001	OLS ^{a)}	OLS fixed effects origin	OLS fixed effects destination	FIML ^{b)} DM origin fixed effects	FIML ^{b)} DM destination fixed effects
Gravity variables					
Ln GDP Origin	0.72*** (0.03)		0.76*** (0.02)	0.73*** (0.04)	
Ln GDP Destination	0.75*** (0.03)	0.72*** (0.03)			0.91*** (0.03)
Ln Distance	-0.83*** (0.06)	-0.96*** (0.07)	-0.78*** (0.06)	-0.81*** (0.08)	-0.81*** (0.08)
Language distance	-0.30*** (0.12)	-0.07 (0.12)	-0.44*** (0.11)	-0.44*** (0.18)	-0.44*** (0.18)
Regulation level					
Product market regulation Origin	-0.05 (0.06)		-0.10** (0.05)	-0.06 (0.08)	
Barriers for entrepreneurship Destination	-0.04 (0.04)	-0.09*** (0.04)			-0.12*** (0.06)
Regulation heterogeneity					
Heterogeneity, administrative barriers for start ups	-0.21 (0.21)	0.14 (0.18)	0.07 (0.20)	-0.03 (0.31)	-0.03 (0.31)
Heterogeneity, barriers to competition	-1.42*** (0.29)	-1.41*** (0.29)	-0.75*** (0.30)	-0.72 (0.46)	-0.72 (0.46)
Heterogeneity, regulatory and administrative opacity	-0.78*** (0.18)	-0.32* (0.19)	-1.26*** (0.19)	-1.08*** (0.28)	-1.08*** (0.28)
Heterogeneity, state control	-0.14 (0.29)	-0.03 (0.30)	0.22 (0.30)	0.67 (0.51)	0.67 (0.51)
Heterogeneity, barriers to trade and investment	-0.61*** (0.21)	-0.81*** (0.27)	0.05 (0.25)	0.03 (0.25)	0.03 (0.25)
Year dummy 2000	0.10 (0.07)	0.03 (0.06)	0.03 (0.06)	0.00 (0.09)	0.00 (0.09)
Year dummy 2001	0.15*** (0.06)	0.07 (0.06)	0.07 (0.06)	0.01 (0.09)	0.01 (0.09)
Constant	-5.21*** (0.80)				
Country dummies		origin, significant	destination, significant	destination, significant	origin, significant
Number of observations	485	485	485	485	485
Adjusted R-squared	0.86	0.89	0.89	0.69	0.71

^{a)} Absolute value of standard error in brackets. Code: *** = coefficient significant at 1% confidence level; ** = coefficient significant at 5% confidence level; * = coefficient significant at 10% confidence level.

^{b)} Full Information Maximum Likelihood (FIML), simultaneous estimation of equations for origin and destination countries.

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