

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. Our theoretical model demonstrates that policy heterogeneity between countries has a negative impact on bilateral service trade. We quantify bilateral policy variety through a new indicator that is applied 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 to the level of bilateral service trade. The results are applied to simulate the possible impacts of recent EU proposals for the services market. We find that making more use of mutual recognition could increase bilateral trade in commercial services among EU countries by 30% to 60%.

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

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

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1 Introduction

The paper offers a new analytic perspective on non-tariff barriers in international services trade. We show the importance of heterogeneity in form and content of national product-market regulations. The analytic framework is applied empirically to the countries of the European Union.

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.

The structure of the paper is the following. 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. We argue that the differences in product-market regulation between the service-importing and the service-exporting country may be very important. Section 3 presents a new index for measuring the relevant bilateral policy heterogeneity. The index is quantified in Section 5. The role of regulatory heterogeneity is analysed in the context of a monopolistic-competition model for international services markets (Section 4). This model forms a theoretical underpinning for the empirical analysis. Section 6 tests the heterogeneity impact on bilateral trade in a gravity analysis of bilateral services trade among EU countries. Both the level and the heterogeneity in regulation turn out to play a

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).

significant and negative role. This finding appears robust after several tests. Section 7 brings together the most important conclusions. It also 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

The variety in non-tariff barriers (NTBs) for international trade in services 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, such as the bilateral agreements for air transportation services. Some countries do not allow foreign providers to operate in particular services industries. A variation on this restrictiveness theme is formed by discriminatory access to distribution networks like railways, cable networks, telephone system, and electricity distribution.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 be fully compatible with WTO principles of non-discrimination, but nonetheless hamper trade. The negative trade effect 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 in the export market come on top of regulatory qualifications that are already complied with in the home market and in other countries where the service firm operates. Duplication of regulations could create a negative trade effect ('border effect').

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

Measurement of NTB-related trade costs

Various 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 thought to be discriminatory for foreign firms. Hoekman (1995) did a first comprehensive attempt in this line of research. Brown and Stern (2001) show in their survey that the resulting frequency indices cannot be interpreted as tariff equivalents.

Price-based measures calculate the price or cost effect of the non-tariff barrier by comparing domestic and world prices. Tariff equivalent of the NTB can then be calculated straightforwardly. This has been done for banking and maritime services (cf. Findlay and Warren, 2000).

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. 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. 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

Sunk market-entry costs

The estimated tariff equivalents derived from price measures and quantity restrictions often implicitly assume that the NTBs affect variable trade costs. This makes sense for merchandise (goods) trade. There 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 form a sub-set of all relevant NTBs. 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. Because of the country-specific character of such requirements, service exporters in fact incur sunk market-entry costs. The foreign service provider has to fulfil these requirements before entering the market, but the

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 percents to ten percents of the import value, in some cases even up to hundred percent such as in some transport services (e.g. Hoekman 1995; Findlay and Warren, 2000).

⁵ Even though these costs perhaps are not linear in the volume of trade, they certainly are no fixed costs. It is very likely that NTBs per unit of trade volume are lower for high volumes of trade.

effort and costs to fulfil them are often not related to the trade volume. For clarification we mention a few examples of regulations that affect the exporter's fixed costs:

- Firm start-up licenses and associated authorisation requirements
- Requirements that service-providing personnel must have locally recognised professional qualifications (even if it necessitates re-qualification)
- Obligatory membership of local professional association
- Juridical requirements (owners or managers of service-providing firm must have local residence or nationality, firms must have a specific legal form)
- Requirement that service providers have nationally recognised liability insurance or professional indemnity insurance
- Fully subjecting all imported service activities to regular administrative and tax procedures
- Fully subjecting temporary service personnel from the origin country to rules of the social security system of the destination country
- Limitations on inter-professional co-operation, or on the variety of services provided by one firm (even if this would require unbundling of foreign service providers)
- Impediments on the use of inputs, suppliers and personnel from the service firm's origin country (may require a search for new local suppliers)

Recent literature has modelled the export decisions of manufacturing firms as an investment decision under sunk costs.⁶ Firms do not only face per-unit costs like for transport, but also fixed costs that do not vary with the export volume. Melitz (2003) stipulates the costs for finding and informing foreign buyers, for establishing distribution channels, and for adapting products to local standards. 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 to that market in the previous period. 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

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).

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.

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 suggests that there is reason enough for doing this. In a survey among a large number of business-services firms in the EU (CSES 2001:190), 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.⁹ The setup-cost effects are largest for small and medium-sized enterprises (SME). According to CSES (2001): "*Evidence collected from SMEs and SME-supporting organisations suggests that many SMEs 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*". Intuition, scattered empirical evidence, and experiences from manufacturing industry thus all suggest that international regulatory differences may work out negatively on international services trade.

3 The concept of policy heterogeneity

Theory and empirics often go hand in hand. Policy heterogeneity has many dimensions, and does not easily lend itself for a quantitative analysis, let alone in an internationally comparative context. For quantifying the trade barrier stemming from bilateral policy differences, it is necessary to solve the dimension problem. A quantitative index for policy heterogeneity should, preferably, also be decomposable by policy area, so that we may evaluate for which policy types and policy domains the bilateral heterogeneity matters most. Expressed more formally, the indicator needs to have the following properties: (a) increase in the degree of regulation differences, regarding contents and implementation form; (b) aggregation possible over multiple dimensions of regulation differences; (c) yield a single numerical indicator; (d) be specific for each country pair; (e) aggregation independent of a set of subjective weights; (f) independent of judgements or a priori criteria about specific product-market policies in countries, no matter whether these criteria are subjective or based on specified objective criteria; and (g) be decomposable with respect to specified regulation areas.

⁸ Brenton and Vancauteren (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).

We derive an indicator of policy heterogeneity that satisfies these properties.¹⁰ Its basic principle is that multiple-dimension qualitative policy information is reduced to dimensionless binary information that can be aggregated and decomposed. Let there be some regulation attribute R for which it can unequivocally be assessed whether or not it applies in a country. This gives logical information: $R \in \{1,0\}$, so that regulation attribute R can also be used to compare two countries. For any two countries i and j the dissimilarity indicator h_{ij}^R has the value of 1 if both countries are dissimilar with respect to R , and 0 in the opposite case. The dissimilarity indicator h_{ij}^R is specific for each country pair. For n countries we have:

$$h_{ij}^R \in \{1,0\} \quad \text{for } \forall i, j \subset (1, \dots, n) \quad (3.1)$$

The pair-wise comparisons can be gathered in a $n \times n$ dissimilarity matrix H^R . From a perspective of informational content, not all dissimilarity indices are interesting. Trivial are the cases of self-similarity (h_{ii}^R, h_{jj}^R) and the cases of bi-directional similarity, i.e. $h_{ij}^R \equiv h_{ji}^R$. Weeding out the cases of self-similarity (matrix diagonal) and bi-directional similarity (below diagonal) we get a dissimilarity matrix with many blank elements. For a case of four countries (a, b, c, d) the dissimilarity matrix for regulation attribute R looks like:

$$H^R = \begin{bmatrix} h_{aa}^R & h_{ba}^R & h_{ca}^R & h_{da}^R \\ h_{ab}^R & h_{bb}^R & h_{cb}^R & h_{db}^R \\ h_{ac}^R & h_{bc}^R & h_{cc}^R & h_{dc}^R \\ h_{ad}^R & h_{bd}^R & h_{cd}^R & h_{dd}^R \end{bmatrix} = \begin{bmatrix} \cdot & h_{ba}^R & h_{ca}^R & h_{da}^R \\ \cdot & \cdot & h_{cb}^R & h_{db}^R \\ \cdot & \cdot & \cdot & h_{dc}^R \\ \cdot & \cdot & \cdot & \cdot \end{bmatrix} \quad (3.2)$$

The system can easily be expanded from single-attribute indicators to a system dealing with multiple regulation attributes. Suppose countries are compared over a set of R_s ($s=1,2,\dots,m$) different regulation attributes, resulting in m dissimilarity indicators for each country pair. This produces a $n^2 \times m$ dissimilarity matrix H^{Rs} . The matrix can be used to calculate average heterogeneity across any preferred subset of the R_s regulation vector, or for any sub-set of countries. Average bilateral regulation heterogeneity per country pair over the m -dimension set R_s regulation attributes is:

$$HG_{ij}^{Rs} = \frac{1}{m} \sum_r h_{ij}^{Rs} \quad \forall i, j; s = 1, \dots, m \quad (3.3)$$

The elements of the set h_{ij}^{Rs} are either zero or one, so that: $0 \leq HG_{ij}^{Rs} \leq 1$. If the indicator is close to unity both countries have very dissimilar policies. Note that two country pairs with the same HG_{ij}^{Rs} -level do not necessarily have similar policies, since the indicator just registers the existence of regulation differences, not the actual content of regulations. Many regulation differences are too complex to be described by yes-no criteria. In some cases it may be more convenient to describe them in terms of distinct implementation modes. In the case of

¹⁰ Elaborated further in Kox (2006).

categorical modes, the actual implementation of a regulation is grouped into a limited number of discrete and mutually exclusive implementation modes.¹¹

Note that the heterogeneity indicator HG_{ij}^{Rs} is based on an unweighted average over all relevant regulation attributes. Abstaining from a weighting procedure has the advantage that the composite heterogeneity indicator is not based on subjective information elements. The HG_{ij}^{Rs} indicator satisfies all the required properties and can be used in trade models to represent non-tariff barriers that caused by bilateral policy heterogeneity. Two caveats need to be made with regard to the empirical interpretation of our policy heterogeneity indicator.

The first caveat concerns the relation between regulation intensity and regulation heterogeneity. Suppose we consider two pairs of countries. In the first pair, both countries are highly regulated, while in the second pair, both countries have liberalised markets. The observed level of heterogeneity for the first pair is likely to be higher than in the second country pair for the simple reason that with more regulations in place, it is more likely that there will be many regulation differences. So, the observed level of heterogeneity may to some extent be a function of the regulation intensity in countries. This is an element that will have to be controlled for in empirical applications.

The second caveat concerns the symmetry assumption (bi-directional similarity) in the heterogeneity concept. The indicator gives no information about the nature of the heterogeneity itself, nor on the question whether a country is high/low, strict/lenient or intensive/extensive with regard to a particular regulation characteristic. Arguably, firms from a highly-regulated country that export to a liberalised country will experience less policy-heterogeneity costs than firms that operate in the reverse direction. Hence, asymmetric costs may cause due to a relation between the regulation intensity and regulation heterogeneity. So, also this reason, empirical applications of our heterogeneity indicator need to control for the level or intensity of product-market regulation.

4 Modelling the trade impact of policy heterogeneity

The model in this section investigates the impact of policy heterogeneity on the variety and size of bilateral services trade. The model provides a specification for the empirical analysis in Section 6. The model considers cross-border trade where the services product crosses the border to the export country, comparable to trade in commodities.¹² Trans-border services trade is

¹¹ Consider for example regulation attribute Rp that can be implemented in k different modes $(p_1, p_2, \dots, p_k)$, so that for any country i we may find $k+1$ different values for Rp , namely $Rpi \in \{0, p_1, p_2, \dots, p_k\}$. Note that the case of binary policy attributes is a special case, with $k=1$.

¹² Other forms of services trade such as the cross-border movement by the service consumer, the establishment of foreign affiliates, and the temporary movement of individual service providers are also relevant and in some industries even more important than cross-border services trade, but an analysis of these issues would require several papers.

assumed to be demand-driven rather than cost-driven. Services markets are characterised by monopolistic competition. Differentiated services products are imperfect substitutes for each other. International policy heterogeneity is reflected in the structure of fixed setup costs for service firms.

Consumer utility increases in the quantity and variety of services products. The preference for variety implies that consumers derive a higher utility from spending their income on m service varieties than from spending it on $m-1$ service varieties. We frame the utility of the representative consumer in country j as a CES-utility function à la Dixit-Stiglitz. This, together with the budget constraint allows us derive the implicit demand curve in country j as perceived by the individual firm v from country i :

$$X_{vij}^{dem} = \left(\frac{P_{vij}}{P_j} \right)^{-\sigma} Y_j \quad \forall v, i, j \quad (4.1)$$

in which X_{vij} represents the consumption in country j of the variety produced by firm v from country i . P_{vij} is the consumer price in country j of variety v produced in country i . σ is the (constant) substitution elasticity, and Y is the market size of the destination country j . P_j 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:

$$P_j = \left(\sum_{i=1}^R \sum_{v=1}^{n_{ij}} P_{vij}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \quad \forall j \quad (4.2)$$

Each services firm produces one variety, which is sold on the domestic and the foreign markets. The number of varieties and firms (n_{ij}) is endogenous.

Production is subject to economies of scale. Firms have the same cost structure. Apart from variable labour requirements, firms incur fixed labour costs for complying with government-imposed qualification criteria (labour is only production input). Government requirements differ by country, which implies that foreign firms in each export market face country-specific qualification costs. The fixed costs for an exporter from country i entering country j are expressed as H_{ij} ($H_{ij} > 0$). H_{ij} increases with the degree of heterogeneity in regulation. If H_{ij} approaches 0, the heterogeneity in regulation between country i and j becomes negligible. H_{ij} could be larger than the qualification costs at the home market i , H_{ii} . Profits for firm v in each market are then described by the sales minus costs:

$$\pi_{vij} = P_{vij} X_{vij}^{dem} - w(\alpha X_{vij}^{dem} + H_{ij}) \quad \forall v, i, j, \quad H_{ij} > 0 \quad (4.3)$$

Wage rates w , and variable labour requirements (α) are exogenous and identical across countries, so that country suffices are suppressed for these model elements.

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 (4.1) and (4.3):

$$P_{vij}^* = \beta \alpha w \quad \forall v, i, j \quad \text{with } \beta \equiv \frac{\sigma}{\sigma-1} \quad (4.4)$$

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. From equation (4.3) and (4.4) follows that the unique equilibrium supply level X_{vij}^* for active firms in each export market is:

$$X_{vij}^* = \frac{(\sigma-1)}{\alpha} H_{ij} \quad \forall v, i, j \quad (4.5)$$

The break-even supply level in each market increases in the degree of fixed qualification costs. Qualification costs must be borne up-front by firms, independent of firm size. National (re)qualification costs are specific for each country market. The acquired qualification asset cannot be sold or exploited elsewhere, hence the qualification costs are sunk costs. In the steady-state equilibrium only those firms remain active in the market whose expected sales are large enough to cover the sunk qualification costs. In this model we assume that this decision for each foreign market is made as a random draw for each firm.¹³ It implies that $n_{ij} \leq n_i$. We refrain from modelling which specific firms are in the sub-set n_{ij} , but the size of this sub-set follows endogenously from our model. We start from the equilibrium of total supply and demand per country, described by $X_{ij}^{dem} = X_{ij}^*$. After substituting equations (4.1), (4.5) and (4.2) and aggregating for all varieties –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 :

$$n_{kj}^* = \left[\frac{(\sigma-1) H_{kj}}{\alpha Y_j} \right]^{\frac{1-\sigma}{\sigma}} - \sum_{i=1}^R n_{ij} \left(\frac{P_{ij}}{P_j} \right)^{1-\sigma} \quad \forall k, j \quad (4.6)$$

¹³ 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.

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 :

$$E_{kj} \equiv \sum_{v=1}^{n_{kj}} X_{vkj}^* = n_{kj}^* X_{vkj}^* \quad \forall k, j \quad (4.7)$$

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. What does it imply for the level of bilateral exports? Reduction of policy heterogeneity (H_{kj}) increases the number of firms exporting to country j (equation 4.6), but it also reduces the break-even export sales per firm (equation 4.5). The question is which of both effects dominates. Substituting both equations in (4.7) and taking the derivative of exports with respect to policy heterogeneity costs yields:

$$\frac{\partial E_{kj}}{\partial H_{kj}} = \frac{\sigma - 1}{\sigma \alpha} \left(\frac{P_j}{P_{kj}} \right)^{1-\sigma} [\sigma \omega_{kj} + (1 - \sigma)] \quad \forall k, j; \text{ with } \omega_{kj} \equiv \frac{n_{kj} P_{kj}^{1-\sigma}}{\sum_{i=1}^R n_{ij} P_{ij}^{1-\sigma}} \quad (4.8)$$

This equation nicely reveals the two opposite effects of policy heterogeneity. The first term within the square brackets 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. Here ω_{kj} represents the market share of all firms from country k in country j . If their joint market share is sufficiently small relative to the substitution elasticity, less heterogeneity in regulation leads to a higher bilateral trade flow:

$$\frac{\partial E_{kj}}{\partial H_{kj}} < 0 \quad \text{if } (\sigma \omega_{kj} + 1 - \sigma) < 0 \quad (4.9)$$

For normal values of substitution elasticity ($\sigma > 1.1$) and for market share less than 10%, a reduction in regulatory heterogeneity already leads to higher bilateral exports. Only in case the exporting country has a larger market share in the destination country, and the substitutability between the varieties is low, less heterogeneity in regulation could reduce bilateral exports.

We conclude that more policy heterogeneity works out negatively on bilateral exports using a standard monopolistic-competition model. The effect of less exporting firms dominates the effect of the larger size of the exporting firms on bilateral exports. We investigate this prediction empirically in Section 6.

5 Policy-heterogeneity: empirical implementation

In section 3 we developed how policy heterogeneity could be framed in single quantitative indicators. Here we give brief description of the operational use and empirical implementation of the policy-heterogeneity indicator. For quantifying bilateral policy heterogeneity we build on work by the OECD Economics Department (cf. Nicoletti *et al.* 2000). They have identified the important comparison items with respect to domestic 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 over 1100 economic policy comparison items for the benchmark year 1998. This database is taken as point of departure. After deleting policy items that were either considered too industry-specific, too general, or irrelevant for service markets 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.¹⁴ For each of the 183 items we assess bilateral policy differences for each country pair. Dissimilarity yields binary information per policy item: if two countries have a different approach we assign a value of 1, and a zero otherwise. To obtain an overall index of bilateral heterogeneity in product-market regulation we summed the dissimilarity values over all 183 items, see Section 3. The composite indicator ranges between 1 in case of complete dissimilarity and 0 in case of identical product-market regulations. Table 5.1 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.¹⁵ Table 5.2 shows the relative weights. It also indicates how we expect that heterogeneity in policy sub-domains affects bilateral trade (expected sign of coefficient). These expectations take into account that exports and foreign direct investment (setting up a local business unit) can be substitutes as a form of international service supply.

¹⁴ The data selection procedure is described in Kox, Lejour and Montizaan (2004, Annex I).

¹⁵ 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 *et al.* (2000). The classification distinguishes main policy domains and sub-domains in a 4-layered hierarchy.

Table 5.1 Heterogeneity of product market regulation among EU member states, year 1997/1998

	Den- mark	Gree- ce	Swe- den	UK	Aus- tria	Belg. – Lux.	Finland	France	Ger- many	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.

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.

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*.

Table 5.2 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	
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.

6 Empirical analysis

The impact of international regulatory heterogeneity on international service trade will be 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. 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.¹⁶ 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 4.

Numerous studies have applied the gravity model to total trade or manufacturing trade, but applications to services are scarce. Kimura and Lee (2006) use the model to assess differences between total bilateral services trade and bilateral goods trade with respect to several explanatory variables (ten OECD countries, period 1999-2000). Lejour and de Paiva Verheijden (2007) apply the gravity equation to establish differences in the relevance of the home market effect, market size and distance for bilateral services trade versus bilateral goods trade (14 EU countries). Grünfeld and Moxnes (2003) estimate the gravity model to assess the impact of trade barriers (derived from Findlay and Warren, 2000) on bilateral OECD trade in services. They conclude that removing the barriers could increase bilateral services trade by 50 per cent.

Nicoletti *et al.* (2003) pioneered one of the first studies to explain bilateral trade in services by a gravity model augmented with regulation variables. 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 their policy variables only identify a small part of the regulatory trade barriers, since 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 We check this conjecture by including both the *level* and the *heterogeneity* of product-market regulation as explanatory variables. We do this for the home and foreign market. This also 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).

¹⁶ Anderson and Van Wincoop (2004) show that under some conditions the second and third assumption can be relaxed.

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).

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:

$$\ln(TRD_{ij}) = \beta_0 + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(DIS_{ij}) + \beta_4 LAN_{ij} + \beta_5 PMR_i + \beta_6 BEN_j + \sum_k \beta_{7k} HET_{ijk} + \beta_8 D_{00} + \beta_9 D_{01} + \varepsilon_{ij} \quad (6.1)$$

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.

Data

We focus on bilateral trade in commercial services, hence disregarding government services. *Transport* and *tourism* are also excluded, 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 in ‘Other Commercial Services’ and ‘Total Services’ are from the OECD trade statistics, and cover the period 1999-2001 (OECD 2003). The focus is on the EU member countries in that period. Only 9 of these EU countries report bilateral service 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. A consistent matrix of bilateral trade data is achieved by applying the same method as Lejour and de Paiva Verheijden (2007) for selecting the reporting countries that across all trading partners have the least bias for over- or underreporting in comparison to their all trade partners. In case of multiple reporting we choose the data of the

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.

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.²⁰ Data for 2000 and 2001 are corrected for nominal differences caused by US dollar inflation.

Table 6.1 gives an idea of the order of magnitude of intra-EU exports and imports of services for the old EU member countries. Intra-EU trade in *Other commercial services* in 2001 accounted for 41 per cent (146 billion US\$) of total services trade (350 billion US\$). The remainder is travel and transport services. The descriptive data show that the size of countries

Table 6.1 Intra EU trade in other commercial services and total services, 2001 (in million US\$)				
Country	Other commercial services		Total services	
	Export	Import	Export	Import
Austria	5 586	4 795	21 854	20 964
Belgium-Luxembourg	19 510	15 041	32 532	27 778
Denmark	..	..	14 777	12 635
Finland	1 363	1 917	3 230	4 386
France	12 795	14 895	37 200	31 588
Germany	24 412	33 239	46 511	77 635
Greece	1 162	1 323	7 340	4 607
Ireland	11 573	13 329	14 690	17 284
Italy	14 681	19 288	33 850	31 495
Netherlands	16 799	17 209	32 594	33 817
Portugal	1 067	1 278	6 244	4 344
Spain	..	..	42 878	21 018
Sweden	7 042	6 288	11 918	12 802
United Kingdom	30 703	13 928	45 333	48 782
Total Intra-EU a)	146 693	142 530	350 952	349 135

Note: a) Last row is aggregate of the 14 countries. Source: OECD (2003)

is important for the size of their services export. Some countries like Austria and the United Kingdom are net exporters, while other countries like France and Germany are net importers. 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).

²⁰ The bilateral trade flows between these countries are not zero; from more detailed data we know that the trade aggregates for *other commercial services* are not reported because some of the constituting sub-sector trade flows for these aggregates are not reported. Our regression results thus are not biased because of not accounting for zero trade flows.

Results

We test the augmented gravity model first by OLS regression and afterwards by other estimation methods for refinement and for robustness checks. The regression results are summarised in Table 6.2, and will be discussed subsequently, starting with the OLS results in the first data column.

The OLS results in Table 6.2 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. The regulation level in the destination country (*Barriers to entrepreneurship*) has no significant effect.²¹ 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*) appears 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.²²

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 6.2 represent the regression results with fixed effects.²³ The parameter estimates of the significant heterogeneity variables become a bit smaller, but the pattern of results is otherwise unchanged.

²¹ This does not change if we take an indicator of overall product market regulation for the destination country.

²² Results are available upon request. Moreover, we have also estimated a panel regression. These effects are similar to the ones presented in Table 6.2.

²³ 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.

Table 6.2 **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)	– 0.71*** (0.22)	– 0.71*** (0.22)
Regulation level					
Product market regulation	– 0.33*** (0.07)		– 0.37*** (0.07)	– 0.34*** (0.09)	
Origin					
Barriers for entrepreneurship	0.08 (0.05)	– 0.08 (0.05)			– 0.03 (0.07)
Destination					
Regulation heterogeneity					
Heterogeneity, administrative	0.07 (0.26)	0.27 (0.25)	0.30 (0.25)	0.35 (0.36)	0.35 (0.36)
barriers for start ups					
Heterogeneity, barriers to	– 3.67*** (0.37)	– 2.64*** (0.39)	– 3.21*** (0.40)	– 3.10*** (0.55)	– 3.10*** (0.55)
competition					
Heterogeneity, regulatory and	– 0.50*** (0.23)	– 0.78*** (0.24)	– 0.40* (0.24)	– 0.23 (0.33)	– 0.23 (0.33)
administrative opacity					
Heterogeneity, state control	– 0.14 (0.40)	– 0.00 (0.40)	– 0.31 (0.40)	0.74 (0.58)	0.74 (0.58)
Heterogeneity, barriers to	– 1.31*** (0.23)	– 0.97*** (0.25)	– 0.80*** (0.25)	– 0.86*** (0.30)	– 0.86*** (0.30)
trade and investment					
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 bilateral variables are transformed as deviations from their individual country-wise mean (DM). Cf. main text.

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 mean (hence: DM.).²⁴ 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” 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 (6.1) the variables of the 'origin' equation read as:

$$\Delta_k Z_{kj} = Z_{kj} - \frac{1}{I} \sum_{i=1}^I Z_{ij} \quad (6.2)$$

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:

$$\Delta_m Z_{im} = Z_{im} - \frac{1}{J} \sum_{j=1}^J Z_{ij} \quad (6.3)$$

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 the destination-specific unobserved effects are accounted for by the transformation, and the origin-specific unobserved effects are evaluated 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.²⁵ 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.

²⁴ It is a “within” fixed-effect estimator (cf. Verbeek 2004). While the “within” estimator mostly gives identical results as for estimating the non-transformed equation with dummies, here the situation is different due to the bilateral variables. Erkel-Rousse and Mirza (2002) introduced the method for bilateral trade.

²⁵ Thus assuming that the deviations of bilateral fixed effects from their means are i.i.d. random terms.

The two last columns of Table 6.2 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 *Regulatory and administrative opacity* 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 *Explicit barriers to trade and investment* remain invariably negative and significant. The year dummy for 2001 is no longer significant in the FIML estimates.

Summing up, the regression results for bilateral trade in 'other commercial services' are fairly stable over various specifications and estimation procedures.²⁶ A robust result is that inter-country differences with regard to product-market regulation in the areas of *Barriers to competition* and *Explicit barriers to trade and investment* 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 tested regression equation 6.1 for bilateral trade in *total* services. The results for 'total services' and 'other commercial services' can never be fully comparable.²⁷ However, repeating our analysis for total services makes it possible to compare the results with other papers that have applied the gravity model to total international services trade. The full regression results for total services trade are presented in Annex 2. Here we summarise the differences with the results in Table 6.2. 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.²⁸ 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 6.2, but their value is about halved. Much of this effects seem 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

²⁶ Doing the same regressions with the seemingly unrelated regression (SUR) method did not change the results.

²⁷ 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.

²⁸ This is in line with Lejour and de Paiva Verheijden (2007) who concluded that language differences are not significant for trade in transport services. 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.

Barriers to competition is specific for ‘other commercial services’, i.e. for business services, financial services, and distribution services.

7 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, 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 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 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.²⁹

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

²⁹ There are some intermediary solutions as well. A ‘harmonisation light’ method would be to apply a common architecture in regulation, allowing quantitative (gradual) rather than systemic 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. Firms from tough countries may even appear to be ‘over-qualified’ for the more lenient countries.

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 et al. 2004).

We use the regression results of Table 6.2 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 5). 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 7.1 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 7.1 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 7.1 with the regression results for the FIML estimators with fixed effects for the country of origin (last column in Table 6.2) as our starting point. For every bilateral relation we calculate how the services trade might be 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.³⁰ 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 7.1. This results in an increase of intra-EU trade in commercial services (OCS, excluding transport and tourism) between 30 and about 60 per cent. This represents 11 to 24 per cent of intra-EU services trade, or 2 to 5 per cent of the total intra-EU trade.³¹

The effects are even bigger if the heterogeneity in regulation would be completely eliminated. Then commercial services trade could increase by 177% using the estimates for the coefficients of heterogeneity indices in the FIML regression (last data column on Table 6.2). An identical system of product market regulation – although that may neither be realistic nor desirable³² – could thus almost triple the intra-European trade in commercial services. However, this shows the numbers at stake in a trade-off on the issue of maintaining versus reducing national differences in product-market regulation.

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

³⁰ 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.

³¹ We disregard possible effects that might occur in the non-service part of bilateral trade.

³² 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 4 for the number of exporting firms and the impact of less policy heterogeneity on bilateral exports. From equality between demand (4.1) and supply (4.5) we derive the number of exporting firms from a given country k :

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

We have also substituted the price index, equation (4.2) in (4.5). After some rewriting we get

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

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 (4.6).

The effect of less regulatory heterogeneity costs on bilateral exports follows from substituting equation (4.5) in the equation for exports, (4.7), and taking the derivative using the chain rule.

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

If we substitute the derivative of the number of firms (equation (4.7)) with respect to heterogeneity costs in (A1.3) we get

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

The term between brackets consists of a negative and positive term. The equation can be rewritten by substituting the rearranged equation (4.7) 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 (4.8).

Annex 2 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*** (0.03)	0.73*** (0.04)	
Ln GDP Destination	0.76*** (0.03)	0.72*** (0.03)			0.91*** (0.03)
Ln Distance	-0.83*** (0.06)	-0.97*** (0.06)	-0.78*** (0.06)	-0.81*** (0.08)	-0.81*** (0.08)
Language distance	-0.30*** (0.13)	-0.07 (0.12)	-0.44*** (0.12)	-0.44*** (0.19)	-0.44*** (0.19)
Regulation level					
Product market regulation Origin	-0.05 (0.06)		-0.10* (0.06)	-0.06 (0.08)	
Barriers for entrepreneurship Destination	-0.04 (0.05)	-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*** (0.32)	-1.41*** (0.32)	-0.75*** (0.33)	-0.73 (0.46)	-0.73 (0.46)
Heterogeneity, regulatory and administrative opacity	-0.78*** (0.20)	-0.32* (0.20)	-1.26*** (0.20)	-1.08*** (0.28)	-1.08*** (0.28)
Heterogeneity, state control	-0.14 (0.34)	-0.03 (0.32)	0.22 (0.33)	0.67 (0.51)	0.67 (0.51)
Heterogeneity, barriers to trade and investment	-0.61*** (0.20)	-0.81*** (0.20)	0.05 (0.21)	0.03 (0.26)	0.03 (0.26)
Year dummy 2000	0.10 (0.07)	0.03 (0.06)	0.03 (0.06)	0.00 (0.08)	0.00 (0.08)
Year dummy 2001	0.15*** (0.06)	0.07 (0.06)	0.07 (0.06)	0.02 (0.09)	0.02 (0.09)
Constant	-5.21*** (0.78)				
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	0.70

^{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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