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Quantifying Regulatory Barriers to Services Trade

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ABSTRACT

This study analyses how domestic regulation affects trade in services through commercial presence and to what extent regulation, level and heterogeneity, has an impact on the choice of mode of servicing a foreign market for total services, financial services, transport, communication, computer, and other business services. Regulatory heterogeneity is found to have a relatively large impact on trade through commercial presence. If all countries in the sample harmonized or recognized each other's regulation, total services trade through commercial presence could increase by between 13 and 30% depending on the country. The study also assesses what determines services suppliers' choice of mode. Modes of supply are found to be complementary to various degrees. Commercial presence is more dominant the more similar a country pair is as far as regulation and business environment are concerned and countries sharing a common language are more likely to trade through commercial presence. For some sectors it is found that the disadvantage of remoteness is amplified by strict regulation. In most services sectors trade liberalisation generates meaningful market access only if commercial presence is allowed. Furthermore, absence of explicit barriers to trade and investment is not necessarily sufficient to attract foreign investors.

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***Keywords*:** *Trade in services, regulatory reform, regulatory harmonization, modes of supply*

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EXECUTIVE SUMMARY

This study analyses how domestic regulation affects trade in services through commercial presence and to what extent domestic regulation has an impact on the choice of mode of servicing a foreign market. The most common way of establishing a commercial presence is through foreign direct investment. The ideal data to be analysed would be sales of foreign affiliates in the host country. In the absence of such data (except for a handful of countries) a recently developed database on bilateral stocks of foreign direct investment by sector is utilised. This is in our view a better proxy for sales than FDI flows, since flows are highly volatile and it is typically found in the literature that sales are proportional to the capital stock (i.e. a reasonably stable capital output ratio). The study relates information on bilateral FDI stocks by sector to overall product market regulation indices from the OECD PMR survey, the OECD FDI restrictiveness indices, indicators of business environment captured by the World Bank's Doing Business indicators, and indices for bank regulation produced by the World Bank.

Regulation is needed in order to ensure that markets function properly and that social objectives are met, giving raise to some unavoidable compliance costs. What is avoidable, however, is to unnecessarily duplicate such compliance costs in new markets. Therefore, differences in regulation are likely to be as important for trade values and choice of mode as is the level of regulation. Differences in regulation may be a legitimate result of differences in political systems or governmental objectives. The purpose of this study is not to analyse the circumstances under which such differences are warranted, but rather to examine the costs which result from such differences. An important contribution of the paper is the development of regulatory heterogeneity indicators based on the World Bank's Cost of Doing Business indicators and indicators of banking regulations.

Comparing sales of foreign affiliates to cross-border trade in services in the handful of countries that publish such data makes it is clear that the relative importance of commercial presence has increased over time. It also appears that foreign direct investment is mainly of the horizontal type, duplicating the activities of the source country in the host countries. This may be somewhat surprising since the last couple of decades have seen considerable trade liberalisation at least at a regional level. Horizontal investments are typically motivated by cross-border trade costs savings and one would expect that their relative importance would decline to the advantage of cross-border trade following trade liberalisation.

The paper argues that growing relative importance of commercial presence can be reconciled with lower trade barriers if the motivation for establishing a commercial presence is of a strategic nature rather than merely economising on trade costs. First, mergers and acquisitions (M&A) are by far the most important way of establishing a commercial presence. Second, it is *relative* trade and entry costs that matter for the choice of mode, and entry barriers may well have been reduced more following regulatory reform than cross-border trade costs. Furthermore, regional integration has expanded the market to which a foreign investor has access, reducing the average cost of entering a foreign market.

Regulatory heterogeneity is found to have a relatively large impact on trade through commercial presence. If all countries in the sample (25 OECD countries) harmonized or recognized each other's regulation to the extent that the heterogeneity index took its lowest bilateral value for all country pairs, total services trade through commercial presence could increase by between 13 and 30% depending on the country. Likewise, if the business environment became more similar among the countries in the sample (26 OECD and non-OECD countries), total services trade through commercial presence could increase by between 2 and 60%, with the largest gains in India, Korea, Poland and China.

In addition to total services, the study examines financial services, transport, communication, computer, and other business services. Sector-specific product market indicators are used when available (financial services, transport and communication). For financial services the general regulatory environment appears to have a stronger impact on trade through commercial presence than has sector-specific regulation, although bank supervision is found to be important for establishing a commercial presence. Strict regulation in communication services has a strong and negative impact on both outward and inward foreign direct investment, and strongest for outward investment.

Turning to the question whether modes of supply are substitutes, complements or independent, the paper finds that the evidence points in the direction of their being complements or independent. In most cases, there is some evidence that restrictions on FDI have a negative impact on cross-border trade, while restrictions on trade across borders as measured by the World Bank Cost of Doing Business indicator have a negative impact on FDI. Further, there is weak evidence that FDI stimulates trade (but little evidence of the opposite). Transport is the only sector where there is some evidence that trade and FDI may be substitutes as trade is found to increase with restrictions on FDI. For financial services our regression results suggest that modes of supply are independent and FDI appears to take place independently of trade and to some extent vice versa. This is important background information for trade negotiations since it implies that restricting one mode of supply is likely to have a negative impact on the other modes as well. By the same token, liberalising e.g. cross border trade does not improve market access much unless commercial presence is liberalised as well. It also means that a services trade restrictiveness index would be more meaningful if it covered all modes for each sector.

Finally the study assesses what determines services suppliers' choice of mode. Since modes are found to be complementary to various degrees the question is not so much which mode to choose, but which one is relatively more important. In general it is found that commercial presence is more dominant the more similar a country pair is as far as regulation and business environment are concerned and countries sharing a common language are more likely to trade through commercial presence. For some sectors it is found that commercial presence falls off more sharply with distance the more restrictive is regulation. The disadvantage of remoteness is in other words amplified by strict regulation.

The policy implications of these findings are first that commercial presence appears to be increasingly the preferred mode of supply in most services sectors even when cross-border trade is progressively more feasible due to improvements in communication technology. Therefore, in most services sectors trade liberalisation generates meaningful market access only if commercial presence is allowed. Second, commercial presence is more sensitive to regulatory heterogeneity than is cross-border trade because the cost of complying with regulation may be higher and the return to investment more uncertain. Therefore, absence of explicit barriers to trade and investment is not necessarily sufficient to attract foreign investors. Put differently, strict domestic regulations that differ from those of major potential trading partners can sometimes by themselves protect local incumbents from foreign market entry.

1. Introduction

1. In the past services were seen as non-tradable, and restricting cross-border trade in services largely a non-issue, except in a few sectors such as transport and finance. However, the rapidly rising share of trade to GDP, and the ease with which information and ideas flow across borders involve internationalisation of services as well. One driving force has been multinational firms in manufacturing and extractive industries that require suppliers to provide services to the entire international operations network. Other driving forces have been market opportunities in foreign countries following technology improvements and a general shift in demand from goods to services, including more services-intensive ways of organizing production and trade. International production networks, more complex regulation, private standards related both to products and production processes come to mind.

2. Growing internationalisation has revealed services trade barriers which have become subject to negotiations with the view to reducing them both at multilateral and regional levels. Some services trade barriers are explicit, such as restrictions on foreign ownership, scope of business of foreign services providers or corporate form. However, OECD members have relatively low explicit services trade barriers and remaining barriers mainly stem from different approaches to regulation. Concerns about international investment and foreign takeovers appear, however, to be on the rise and several OECD countries have tightened regulation and administrative practices for national security reasons and other essential national interests. The services sectors in which strategic and security considerations have arisen in relation to foreign investment are transport, media and finance (OECD, 2007a). As will be discussed in this study, complying with regulation can inflict considerable costs on a company. Regulation is of course necessary in complex economies and some compliance costs are unavoidable, but complying with multiple regulatory regimes implies additional costs on foreign services providers, some of which could be avoided with smarter and better coordinated regulation.

3. The questions addressed in this study are the following: What is the impact of regulatory differences on services trade through commercial presence? How do such differences affect the choice of mode of supply? The study also provides some simulations of how regulatory reform such as harmonisation or mutual recognition of standards could affect trade. The study builds on and extends a previous paper [TD/TC/WP(2006)20/FINAL] on services trade and domestic regulation which analysed how behind-the-border regulation affects international trade in services as defined in the balance of payments statistics, extending it in four ways:

1. It utilizes a recently compiled database on bilateral foreign direct investment in services and analyses the impact of regulation on trade through commercial presence[1];

2. It analyses the impact of regulation on the choice of mode of servicing a foreign market;

3. It includes transport and communication in addition to business services and financial services that were also included in the previous study;

4. It considers a broader range of indicators on market access, national treatment, behind the border regulation and business environment.

4. Understanding how modes of supply are related is important when conducting impact analysis of regulation on international trade. If for instance commercial presence or cross-border movement of natural persons is essential for supplying a foreign market, having free cross-border trade only may not amount to much in terms of market access on the ground. By the same token cross-border trade restrictions would not

[1] See Lanz and Miroudot (2008) for a description of the database.

add much if other modes are restricted too. Conversely, if trade can be easily shifted from commercial presence to cross-border trade, for instance via the internet, then restricting commercial presence only will have a small impact. Examples of sectors that fit this description are some audiovisual services and gambling.

5. The rest of the study is organised as follows: Section two sets the scene by reviewing existing literature and describing recent developments in trade by mode. Section three provides a non-technical introduction to the methodology used and reports the results of the empirical work. Policy implications are discussed in Section four.

2. Relations to previous research

6. This section reviews literature in two related fields of research: first, what determines the choice of mode between cross-border trade and commercial presence, the two most important modes of supply as defined in the GATS, and second what determines foreign direct investment in services. The focus will be on the role of regulation, first as a determinant of where to invest and second whether to service a foreign market through cross-border trade or commercial presence. There are very few, if any, empirical studies that analyse the impact of regulation on choice of mode of supply, so this paper will draw on insights from recent theory developments applied to the characteristics of the services sectors of interest. In addition the discussion is illustrated with data from the United States, which is one of the few countries that provides comprehensive information on the activities of multinational services companies and compares such data to cross border unaffiliated trade. Finally important insights have emerged from a small but growing body of recent research using firm-level data.

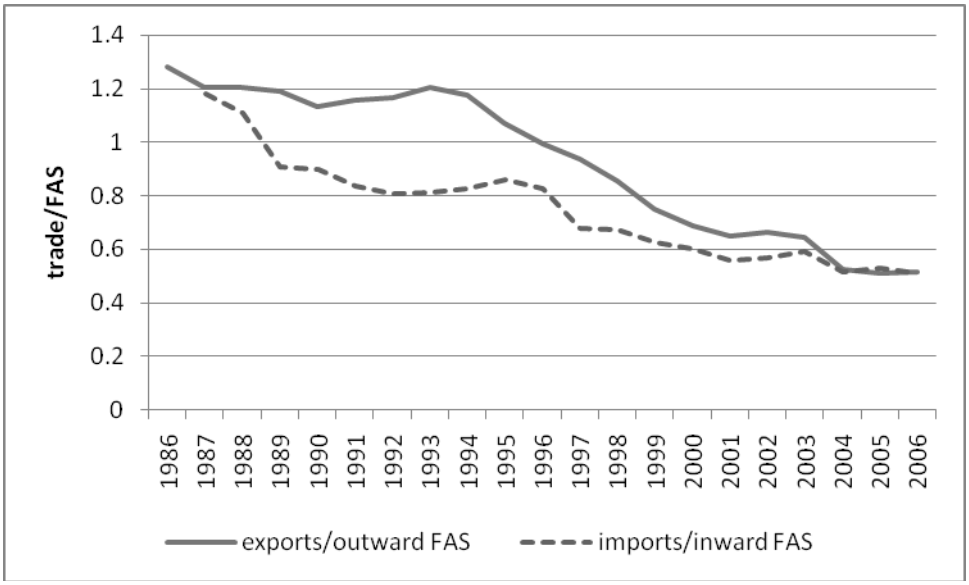
7. Services are typically heterogeneous and leave room for a broad variety of services providers - large and small, cost-effective and less so and specialised niche providers alongside high-volume low margin providers. The coexistence of a vast variety of services within a sector suggests that services may be poor substitutes for each other. If so, there will be some positive demand for local services even in the event of the entry of more efficient multinational services providers. Thus, with heterogeneous services, local firms are more likely to survive trade liberalisation even if they do not match foreign competitors' prices and cost effectiveness (Melitz and Ottaviano, 2008).

8. Heterogeneous products that are traded on the basis of a legal contract between sellers and buyers are found to be sensitive to differences in legal systems (Turrini and Ypersele, 2006). Indeed, it is argued that the border effect found in most studies on determinants of international trade occurs precisely because a national boundary draws the frontier between two legal systems. Since services are even more dependent on contractual relationships between sellers and buyers than are differentiated goods, it is likely that differences in legal frameworks and regulation in general are important determinants of bilateral trade and investment flows in services.

Trade versus investment – entry barriers versus trade costs

9. An illustration of the relative importance of trade versus FDI is provided in Figure 1 which depicts the ratio of cross-border exports to outward foreign affiliate sales (FAS) and cross-border imports to inward FAS respectively in the US during the two decades between 1986 and 2006. Clearly, the relative importance of foreign affiliate sales has increased sharply since 1994 for outward FAS and during the entire period (with a brief reversal in 1994-96) for inward FAS. Cross-border exports of services were almost 30% larger than outward FAS in 1986, while exports were only half of outward FAS in 2006.

Figure 1. Developments in cross-border trade versus foreign affiliate sales, total services, USA



Source: BEA

10. In order to understand what drives the decision whether to engage in cross-border trade or establish a commercial presence, one needs to assess what are the relative costs and benefits in each case. In the case of horizontal investments, the decision to invest is based on a trade-off between economies of scale obtained by concentrating production in one location on the one hand, and avoiding cross-border trade costs by locating production in the market where the final service is sold on the other hand. A first approach to analysing the trade versus investment nexus is thus to compare trade barriers and entry barriers.[2] Entry barriers are a source of scale economies in their own right and are therefore more likely to deter investors the smaller the market.

11. Entry barriers consist of direct investment costs and the cost of complying with regulation. The latter contains costs such as registration fees and other fees and charges payable to the host government authorities. Such charges can be trivial in OECD countries, often in the range of a few hundred dollars.[3] Indirect compliance cost with regulation, in contrast, can be substantial and foreign investors often incur considerable legal expenses in order to familiarise themselves with regulation and adjust their business practices accordingly.[4] The Canadian government, for instance, undertakes a regulation compliance cost survey every three years. The latest available is from 2005 and finds that the average compliance cost per employee was 305 Canadian dollars. The average was found to decline with the number of employees, which indicates that compliance costs are a heavier burden on small and medium sized enterprises than on large companies. However, about 40% of the compliance costs were related to paying taxes (Statistics Canada, 2006).

2 See Markusen (2002) Chapter 5 for seminal work taking this approach.

3 The PMR survey provides information on how much it costs an entrepreneur to complete all the mandatory processes in the pre-registration and registration phase when establishing a company.

4 Major consulting firms such as KPMG and Price Waterhouse Coopers produce annual compliance cost surveys for a number of countries. These include taxes, auditing and other costs that are outside the scope of this study, but it is apparent that in most OECD countries compliance cost with government regulation is considerable.

12. Entry barriers have been considerably lowered in OECD countries in the major services sectors during the past 20 years. Between 1987 and 2003 entry barriers as measured by the OECD product market regulation indicators for major non-manufacturing sectors declined from 5.0 to 1.6 on average.[5] These entry barriers do not distinguish between discriminatory and non-discriminatory regulation, but since there are few explicit restrictions on foreign investors, one can assume that lower non-discriminatory entry barriers translate into lower entry barriers for foreign investors as well, although screening procedures have tightened in some countries in recent years according to the latest OECD International Investment Perspectives report. The World Bank's Doing Business indicators provide information on the cost of business start-up procedures during the period 2003-2007 and as shown in Table 1, these have come down substantially during this short period of time.

Table 1. Cost of business start-up procedures % of GNI per capita

	2003	2007
High income: OECD	9	6
Middle income	67	43
Low income	220	143

Source: World Bank

13. The fact that the costs as share of gross national income per capita declines with rising GNI per capita reflects not only that restrictions and red-tape are generally more onerous in developing countries, but also that these are largely fixed costs that vary less across countries than does income per capita. It can also be inferred from the figures that with high entry barriers relative to local income levels, the markets are likely to be less competitive in developing than developed countries.

14. Turning to cross-border trade costs, they are determined by the cost of communications, restrictions on cross-border transactions and restrictions on business travel.[6] For services that can be transmitted electronically, the transmission costs, as reflected in the cost of telecommunication services have come down significantly over the past 20 years (OECD, 2007b). Furthermore, the marginal cost has declined more than total costs as telecommunications companies are changing their pricing strategies towards higher fixed charges and lower prices on usage.

15. Kneller and Pisu (2007) use UK survey data on the percentage of firms that mention particular items as barriers to exporting. Table 2 reproduces their results with respect to the percentage of firms considering a certain issue as a barrier to export.

5 The index comprises transport (except maritime transport), telecommunications, postal services, electricity and gas and ranks between 0 and 6 with 6 being the most restrictive.

6 According to the EBOPS, trade in services is defined as transactions between a citizen and a non-citizen, and thus includes the services provided by business travelers, unless the services are embodied in sales of foreign affiliates.

Table 2. Barriers to exporting as perceived by British firms, 2005

Type of barrier	Specification	Percentage of firms identifying this as export barrier
Commercial	Obtaining basic information about an export market	29.8
	Identifying who to make contact with in first instance	53.7
	Establishing an initial dialogue with prospective business partners	42.8
	The marketing costs associated with doing business in export market	51.3
	Logistical and transport problems	35.0
	Exchange rates and foreign currency	41.7
Cultural	Language barriers	36.5
	Cultural differences other than language	32.4
	Home-oriented bias or preferences of foreign customers	45.2
	Building relationships with key influencers or decision-makers	43.5
Regulatory	Dealing with legal, financial and tax regulations and standards in export market	42.2

Source: survey data collected by OMB Research between May and July 2005 as part of a project funded by UK Trade and Investment (UKTI) titled 'Relative Economic Benefits of Exports and FDI'; reported in Kneller and Pisu (2007b). Barrier grouping has been adapted.

16. While some of these costs clearly apply to establishing a commercial presence as well, others do not, or to a lesser extent. Exchange rate volatility probably matters less, and the home bias is probably less of a problem after having established a commercial presence, and could tilt the trade versus investment decision towards investment. Financial market conditions and political risk also carry substantial weight in the trade versus investment decision. Such costs and uncertainties can be mitigated by well-designed and competently implemented regulation and macroeconomic management, in which case regulation would enhance trade and investment, probably to the relative advantage of investment.

17. Changes in bilateral trade and investment costs do not only affect the countries directly involved. Regional free trade agreements tend to increase intra-regional trade often at the expense of extra-regional trade. For investment, in contrast, regional trade agreements have sometimes been found to attract investors from third countries who service the entire region from one of the member countries, while reducing intra-regional FDI. Often third country investors choose to locate in a smaller member country of a regional free trade area. For instance Blomström and Kokko (1997) found this to be the case for the US Canada free trade agreement, NAFTA and Mercosur, while Baltagi *et al*. (2008) found this effect of EU enlargement to Central and Eastern Europe.

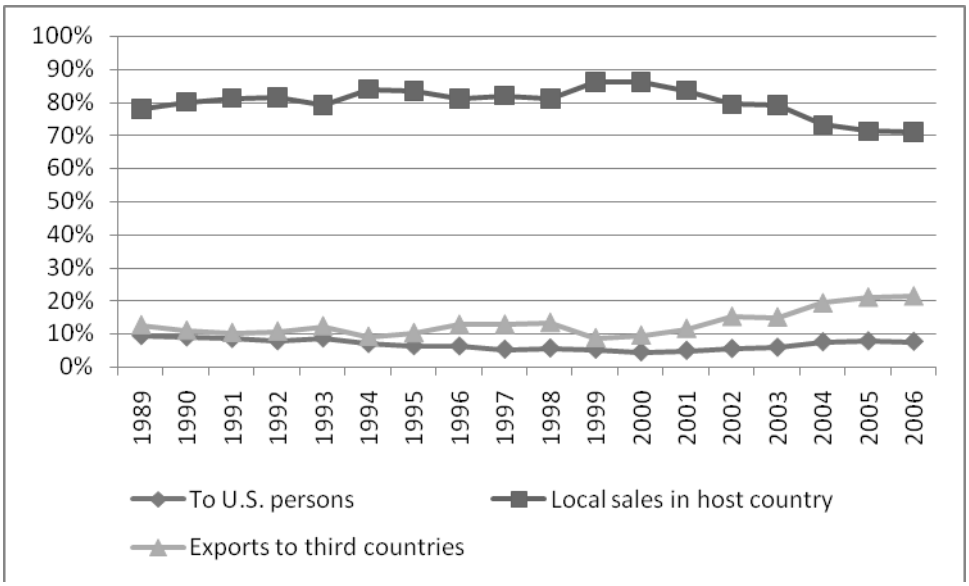
18. The empirical analysis in Section three studies the relation between regulatory entry barriers and commercial presence in services. As was argued in Kox and Nordås (2007), it may not be regulation levels per see that deter foreign services suppliers, but rather the difference in regulation with the home country. If a firm has incurred the cost of complying with regulation in its home country, additional compliance costs when establishing a business in a foreign country would be small if standards and qualifications were recognized in the host country. The empirical analysis thus focuses on regulatory *heterogeneity* between home country and potential host countries as a determinant of the trade versus investment decision.

Investments: Vertical or horizontal; and what is the importance of strategic motives?

19. When analysing the determinants of foreign direct investment in services, it is often useful to start with the motivation for making the investment. The motivation can be to service customers in the

foreign market, access cheap labour, technology or other resources in the host country; or to support production or trade in other sectors, for instance manufacturing.[7] When the motivation for establishing a commercial presence is to service consumers or corporate customers in the host country, the investment is considered horizontal. When a foreign investor locates some tasks abroad in order to benefit from access to resources of which the host country is relatively abundant, the investment is considered either vertical or export platform. Examples of export platform investments are for instance if a US investor establishes an affiliate in Ireland in order to service its customers in the entire EU market from there. Another example is if e.g. IBM establishes an affiliate for software development in India, which feeds into IBM's operations in third countries.[8] Figure 2 depicts developments in affiliate sales in the host country; to third countries; and back to the US respectively for US multinational firms in the services sector.

Figure 2. The distribution of US outward affiliate sales, total services, 1989-2006



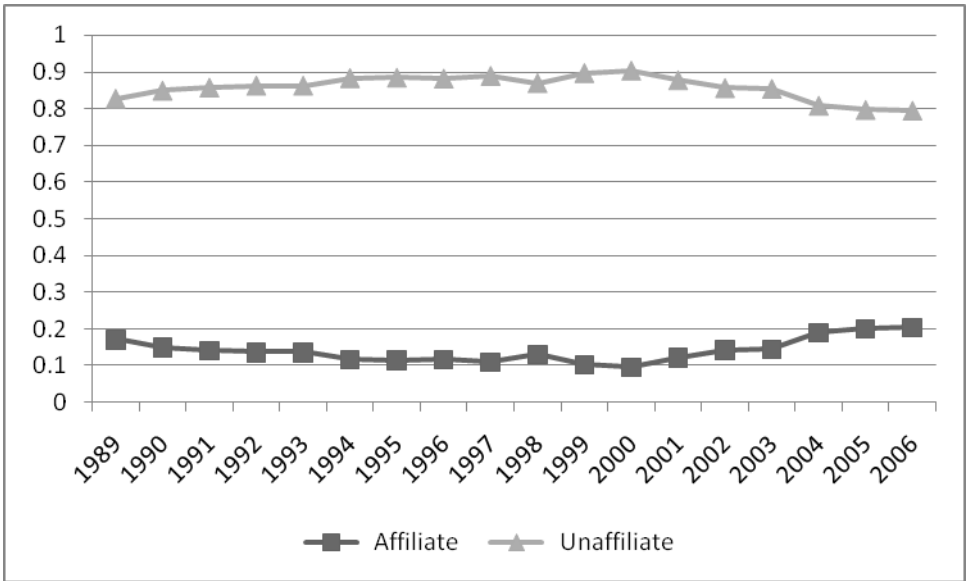
Source: BEA

20. The by far largest share is sales in the host country, accounting for about 80% of the total for most of the period depicted, but declining to 70% between 2000 and 2006. Since the year 2000 sales to third countries have become more important, but remain relatively small. Intra-firm trade is an indicator of a more complex trade and FDI pattern where the multinational provides final services through commercial presence in several countries while producing intermediate services in one or more other locations. Intra-firm trade versus non-affiliate sales for US multinationals are depicted in Figure 3.

7 See TAD/TC/(2007)21 for an analysis of the relation between trade in goods and services.

8 Notice that according to the GATS, in the former case the US affiliate's sales in Ireland is considered mode 3, while its sales to the rest of EU is considered mode 1 exports from Ireland. Likewise, exports from IBM affiliates in India are considered mode 1 exports from India.

Figure 3. US outward affiliate sales to affiliate and non-affiliate buyers total services, 1989-2006



Source: BEA

21. Unaffiliated sales have dominated throughout the period, but intra-firm sales have gained in relative importance since 2000. A possible explanation for the upswing in the affiliate sales share could be captive offshoring of tasks, which has attracted a lot of attention in recent literature.[9] There is a large literature on what determines the choice of whether to engage in captive offshoring or source from independent foreign services providers. It is found that the more standardized the service, the less strategic importance it has, and the further away from the core business it is, the more likely it is to be imported from an unaffiliated firm rather than captive offshoring.[10] Conversely captive offshoring is associated with lower governance and coordination costs and there may be intellectual property involved that the firm prefers to control.

22. The last couple of decades have seen a relatively sharp decline in trade costs both due to lower tariffs for goods and lower communication costs that are particularly relevant for services. One would therefore expect that trade should increase more than FDI and that FDI growth should be mainly along the vertical dimension since horizontal FDI is a substitute while vertical FDI is complementary to trade. This appears, however, not to have been the case. Most studies find that horizontal FDI continues to dominate both trade and vertical FDI, as Figures 1 and 2 above might suggest.[11] Theory is consistent with recent developments only if i) the relative importance of vertical or export platform FDI in services is larger than aggregate data suggests; ii) entry costs have come down at least as much as cross-border trade costs; iii) investment patterns are more complex and driven by strategic considerations in addition to trade and entry costs. In the following each of these possibilities are considered.

9 See for instance Helpman and Rossi-Hansberg (2006).

10 See Helpman (2006) for a recent survey.

11 See Neary (2008) for a recent review and analysis.

Are vertical investments more important than what first catches the eye?

23. As one recent paper puts it, one has been "hunting high and low for vertical FDI" (Davies, 2008), and with some success. First, it has been found that while horizontal versus vertical FDI is a useful distinction for analytical purposes, in reality pure forms of neither are frequently found.[12] Most foreign investments, particularly within the OECD area are a complex mix of vertical and horizontal integration patterns. Second, vertical FDI is more frequently reported in studies that analyse detailed industry level or firm level data that capture both vertical and horizontal linkages between parent and affiliates. Vertical linkages are for instance found to dominate in US multinationals' relations with their affiliates in 16 European countries in 7 manufacturing industries (Badinger and Egger, 2008). To what extent this result applies to services industries is not known and research on firm level data is needed to establish more knowledge in this field.

Have entry barriers come down relative to trade costs?

24. Above it is shown that entry barriers have come down substantially, but it is difficult to tell whether they have come down more than trade costs in services during the past couple of decades. It should also be recalled that the investment restricting effect of regulatory entry barriers depends on the size of the market in question. Thus, the FDI restricting effect of entry barriers can be reduced both by lowering or removing barriers and by extending the market to which they apply. Regional trade agreements, when covering trade and investment in services, are an example of expansion of the market to which the entry barrier applies. There has been a sharp increase in the number of regional trade agreements notified to the WTO since 1994. Although far from all of these provide foreign services affiliates from third countries access to the entire free trade area, the largest ones in terms of market size, notably EU and with few exceptions NAFTA do.[13] Regional trade agreements could therefore at least partly explain fast growing horizontal FDI in a period of significant trade liberalisation.

Strategic considerations – Mergers and Acquisitions

25. Another dimension along which foreign direct investment is classified is whether the investment is through mergers and acquisitions (M&A) or green-field. The vertical versus horizontal distinction largely abstracts from this as it should not matter for the location choice when markets are competitive. However, M&A has become the dominant entry mode for foreign investors, particularly for investment flows among developed countries (Neary, 2007). The motives, the impact and the regulatory challenges may be different depending on whether FDI is through M&A or green-field.

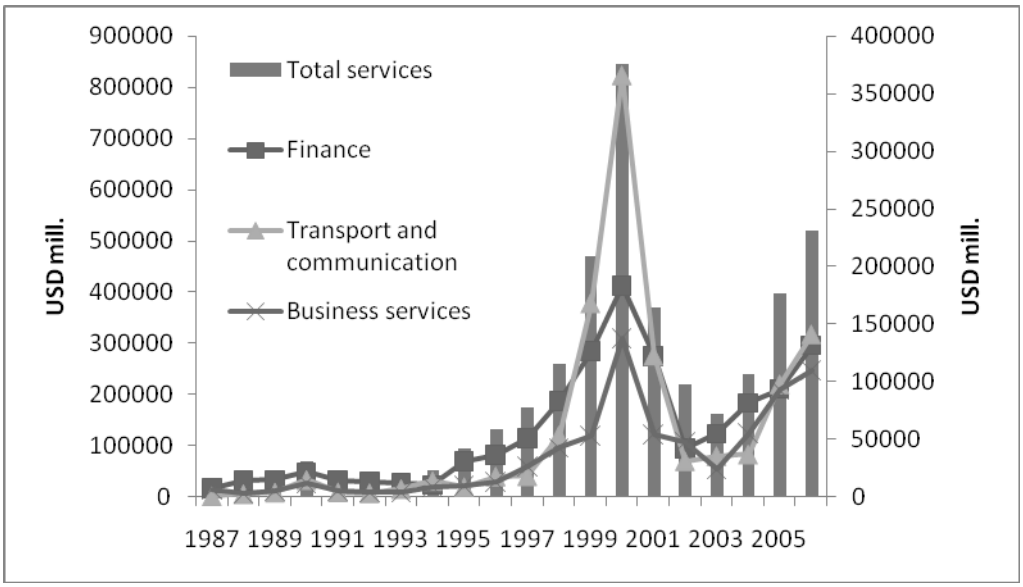
26. It has been shown in the literature that M&A come in waves and that waves of cross-border M&A typically follow trade liberalisation. A likely reason is that as trade opens up, the least productive local firms close down (Melitz, 2003) and their market share is filled by imports, while the least productive surviving firms become vulnerable to foreign take-overs. They can be attractive entry points for more productive foreign firms that can replicate their own productivity performance in acquired firms, but paying a price that reflects the profitability of the acquired firm. Furthermore, if one local firm is acquired, the next acquisition becomes more profitable because the gain from a takeover is, up to a point, larger the fewer the competitors in the market, everything else equal (Neary, 2007). This could at least partly explain the simultaneous increase in trade and a wave of M&A following trade liberalisation. Firms that

12 Markusen (2002) developed a model which he called the knowledge capital model to explain the simultaneous existence of horizontal and vertical FDI. Davis (2008) finds empirical evidence that the model fits the data well.

13 NAFTA is not included in the regression analysis reported in Section 4 and Annex 1because it is collinear with the border dummy as bilateral trade between Canada and Mexico is not available.

enter a foreign market through M&A may avoid regulatory barriers related to land use, zoning and the like, but may face competition-related regulatory measures such as a requirement to sell existing businesses, or extended screening procedures. Figure 4 shows global M&A activities for services as a whole (left-hand axis) and for selected services sectors (right-hand axis). The chart clearly indicates that M&A activities indeed come in waves; the first peaked around 1990, the second around the year 2000.

Figure 4. M&A, sales global figures 1987-2006, nominal USD mill.



Source: UNCTAD
Note: Sectoral data are depicted on the right-hand axes, total services on the left hand axis.

27. Financial services can be digitised and traded across borders relatively easily in the event of open markets. Box 1 presents a case study from Germany which studies the relative importance and driving forces for trade and FDI.

Box 1. Financial services – a case study from Germany

A recent study of German banks analyses the determinants of commercial presence and trade in financial services, using firm-level data that includes all banks in Germany during the period 1997-2001. About a quarter of all banks did not engage in international trade or FDI at all. These were found to be the smallest and least productive. Cross-border services are much more widespread than FDI as German banks engaged in cross border trade with 188 countries, but invested in only 66 countries. However, 90% of FDI stocks are in OECD countries of which the US is by far the most important, and OECD accounted for 90% of cross-border trade, of which the UK is the most important trading partner. Furthermore, half of the banks that invested abroad invested in one country only, while only seven banks invested in more than ten countries. Turning to cross-border trade, 383 banks report trade with more than 10 countries.

These data strongly support recent research that has found that there are significant entry barriers to trade in services and that such barriers are larger for commercial presence than for cross-border trade and that entry costs increase with the number of countries that a firm enters. Therefore, exporting firms are typically larger and more productive than firms that service the domestic market only, and multinational firms are larger still than firms engaging in cross-border trade only. Econometric analysis of the data finds that country risk and banking supervision are the most important determinants of FDI. German banks would trade with countries with a weak regulatory system, but they would not invest there. Further, it is found that the higher a bank's FDI in a given market, the more it trades with that country, and vice versa, suggesting that trade and commercial presence are complementary. Nevertheless, since trade is more widespread than FDI, FDI is not necessary for trade to take place.

Source: Buch and Lipponer (2007)

28. To summarise this section, the literature suggests that horizontal investment is more likely the lower the entry barriers and the larger the market of the host country or the market that can be accessed from the host country in the case of regional trade agreements. In addition the relative importance of FDI is higher when trade costs are high and the investment is horizontal. It follows that during a period of trade liberalisation one would expect that the relative importance of cross-border trade would increase. Regional integration, regulatory reform and more complex patterns of investment, including strategic, pull in the opposite direction, contributing to increased relative importance of commercial presence. The net effect is an empirical question to which we now turn.

3. Empirical analysis

The data

29. The empirical analysis covers 42 importing/host countries[14] and 60 partner/source countries[15] for the period 1998-2006. This should in principle give us 2520 observations per year and 22680 observations altogether, but due to shorter time series for some of the explanatory variables on regulation and missing values, the number of observations used is substantially smaller. Table 3 presents the sectors that are included in the analysis. Trade data are given according to Extended Balance of Payment (EBOPS) categories, while FDI stocks are given according to ISIC classification.

[14] All OECD members except Iceland, Mexico and Turkey plus Bulgaria, Brazil, China, Croatia, Estonia, Hong Kong, India, Lithuania, Latvia, Romania, Russia, Singapore, Slovenia, Ukraine and South Africa. However, for the non-OECD countries data on regulation is limited to the World Bank Cost of Doing Business Indicators and banking regulation. There are several gaps in the trade and investment data for all countries included.

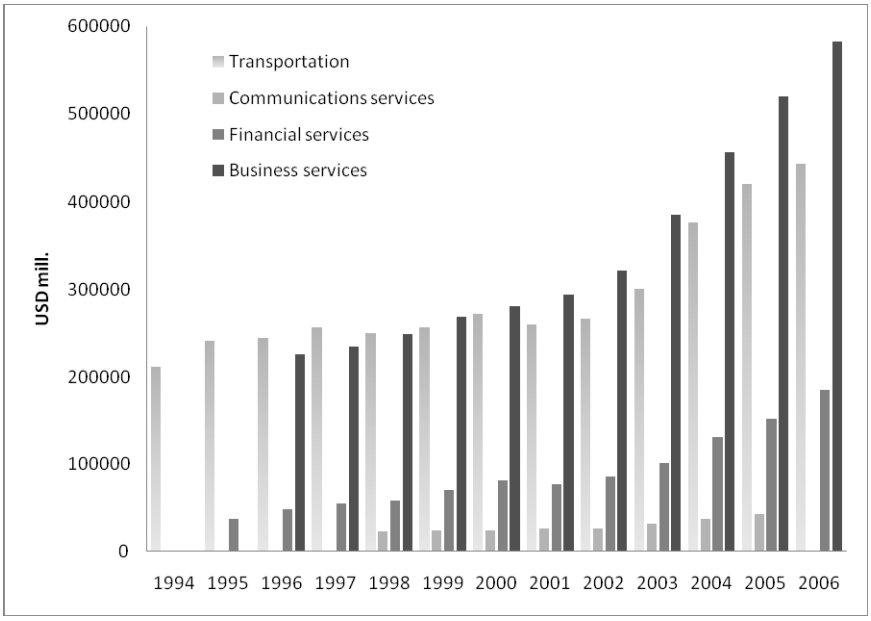
[15] The partner countries are the same as the reporting countries plus Algeria, Argentina, Chile, Egypt, Ghana, Indonesia, Iceland, Israel, Morocco, Malaysia, Mexico, Nigeria, Pakistan, the Philippines, Tunisia, Turkey, Taiwan, and Venezuela

Table 3. Sectors included, trade and FDI stocks

Sector name	EBOPS	ISIC
Transport	205	60-63
Post and telecommunications	245	64
Financial services	260	65
Computer and related services	262	72
Other business services	268	74

30. Among the services analysed in this study, business services (EBOPS 268) are the largest exporting sector, overtaking transport in the year 2000. Exports of financial services have also expanded steadily over the past decade as depicted in Figure 5. Services imports follow the same pattern, but the OECD countries combined have a positive trade balance for total services, financial services and business services, and a negative trade balance for transport and communication services.

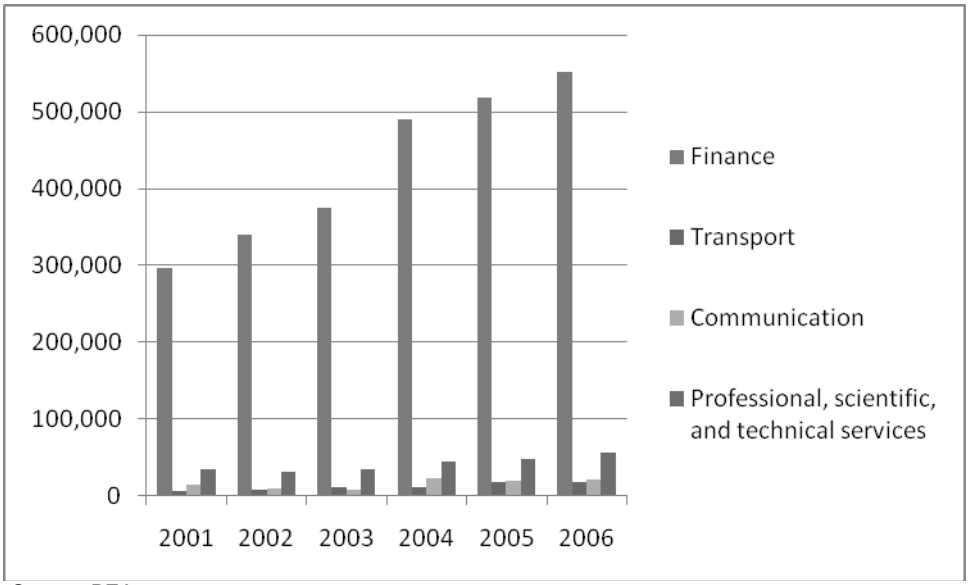
Figure 5. Total OECD services exports by sector



Source: OECD

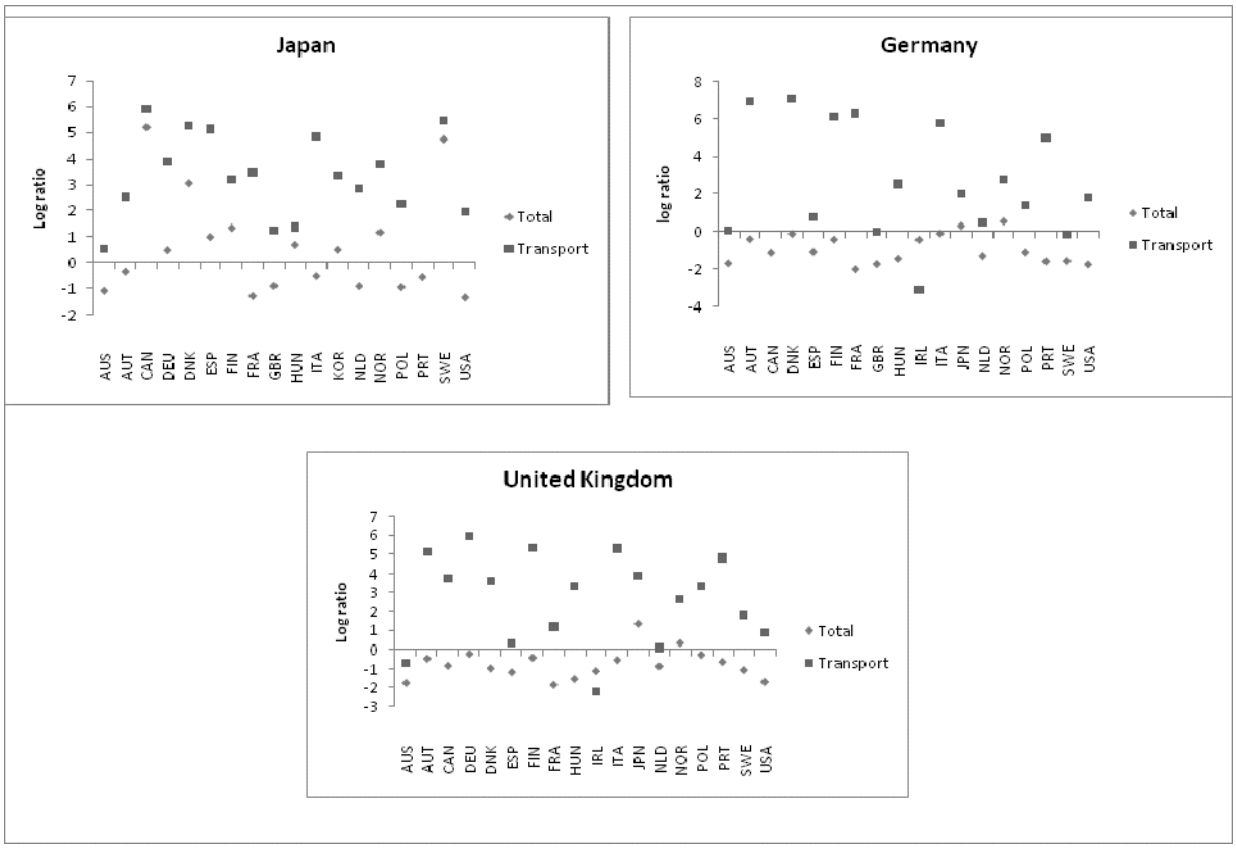
31. Turning to commercial presence, missing data from a number of countries prevents us from showing developments in total OECD inward and outward FDI or FATS. Therefore, to give an impression of the relative importance of sectors, Figure 6 depicts developments in US direct investment position abroad on a historical cost basis. Clearly, financial services are by far the largest sector, dwarfing the others. Furthermore, the growth rate has also been among the highest in this sector, but comes second to transport, which has grown fast from a low base.

Figure 6. Outward foreign direct investment position by sector, USA, historical cost base, USD mill.



Source: BEA

Figure 7. Ratio exports to outward FDI, total services and transport, 2005



Source: OECD

32. The relative importance of commercial presence and trade is illustrated by Figure 7. It depicts the log of the ratio of exports over outward FDI stocks, both measured in millions USD, by partner country for total services and transport in 2005 for Japan, Germany and the United Kingdom.

33. It is first noted that trade is relatively more important for transport than for services on average for all three source countries and with most trading partners with the notable exception of Ireland. Second, it is notable that trade is relatively more important for Japan than the other two countries. Moreover, Japan also features more prominently as an importer of services rather than a host for foreign investments, again in relative terms. In the following the determinants of these patterns are explored using the gravity model. Annex 2 provides some summary statistics for the regulatory variables. The focus of the analysis will be on regulatory heterogeneity and the methodology for constructing the heterogeneity indicators are also explained in Annex 2.

34. Information on regulation is from the following sources: the OECD Product Market Regulation (PMR) survey provides information on regulation for all OECD countries for 1998 and 2003. Sector-specific indices of regulation on the network industries (telecommunication and transport) are available for all years during the period 1998-2003. The heterogeneity indices are bilateral indices developed on the basis of the results of the PMR questionnaire as explained in Annex 2 and [TD/TC/WP(2006)20/FINAL]. Regulatory heterogeneity indices have also been developed based on the World Bank Cost of Doing Business indicators and for the World Bank's data on banking regulation using the same methodology. The World Bank method not only measures the content of regulation itself, but also the efficiency of regulatory implementation. The former data set is available for all countries in the sample from 2003 to 2006, the latter for the years 1998 and 2003.

The methodology

35. The previous study [TD/TC/WP(2006)20/FINAL] explored the relations between cross border trade, regulatory levels and heterogeneity both at the intensive and the extensive margin. The current study complements the former study by first analysing the relations between regulation and commercial presence and second what determines the choice of mode. It applies an extended gravity model for this purpose. The methodology is justified by several studies in the past which have found that bilateral stocks and flows of FDI as well as foreign affiliate sales are well explained by the gravity equation (Barba Navetti and Venables, 2004; Bergstrand and Egger, 2007). The gravity equation relates bilateral trade to relative bilateral trade costs and market size.

36. There are several possible specifications of the gravity model. The most commonly used for trade represents market size as a country-specific variable, which means that it is typically captured by country dummies that capture all country-specific information that is relevant for trade. The most commonly used specification for FDI, however, entails two bilateral variables representing market size; the combined GDP of a country pair and the difference in country size between them. Both specifications are explored. Regulatory heterogeneity indices are in general more often statistically significant in the former specification. Therefore, for the sake of robustness, we have chosen to use the results that are robust to the second specification only as a basis for deriving policy implications.

37. The gravity model is first used to estimate the relation between regulation and commercial presence where the bilateral inward FDI stock is used as a proxy. This is motivated by the fact that FDI stocks are better covered in the data than foreign affiliate sales. Besides the capital output ratio is usually fairly stable over time since the capital stock determines production capacity, and changes in capacity utilization is not likely to be large enough to create serious problems for the results.[16] Second, in order to

[16] The correlation between inward FDI stocks and inward FAS for total services was found to be 0.77 (based on 1131 observations). For financial services the correlation was 0.80 (464 observations), but for the other

explore to what extent commercial presence and trade are independent, substitutes or complement three methodologies are applied:

- Seemingly unrelated regressions (SUR) are run for the gravity model for trade and investment, testing whether their error terms are correlated (which if they are indicates that the two equations are related);

- FDI restrictiveness is included in the trade regression and vice versa. If trade is negatively affected by FDI restrictions, the two modes are likely to be complementary. If there is a positive relationship, trade and commercial presence are likely to be substitutes;

- Simultaneous equations where FDI enters the trade equation and vice versa.

38. Finally the relation between choice of mode of supplying a foreign market and regulation is explored by regressing the ratio of trade to FDI stocks on regulatory indicators, controlling for the usual gravity variables. See the technical annex for specification of the models.

Results: The relation between regulation and investment

Total services

39. The results for the heterogeneity indices are summarised in Table 4 below, while the regression results are provided in technical annex Table A1. Bilateral FDI for total services falls off with distance while increasing in combined market size, market size similarity and other similarities captured by common language and belonging to the European Union. Regulatory heterogeneity as captured by the aggregate bilateral PMR heterogeneity indicator has a relatively large and negative impact on bilateral FDI stocks. It is also found that the disadvantage of remoteness is larger the stricter is regulation so that a country will attract less FDI in services from distant sources the stricter is its regulation. This result appears for the aggregate PMR indicator as well as the following sub-indicators: barriers to trade; explicit barriers to trade and investment; state control; public ownership; and government involvement in business operations. The only individual heterogeneity sub-indicator that is significantly related to FDI when the PMR level is controlled for is barriers to competition, a result that underscores the complementarity between trade policy in a broad sense and competition policy.[17]

40. Interestingly, the effect of being a member of the European Union disappears when regulatory heterogeneity is included in the regression, which suggests that regulatory harmonisation is one of the key factors behind the estimated positive impact of EU membership on bilateral FDI. In order to explore the possibility that EU attracts investments from non-members, a dummy which is one if the host country is an EU member and the source country is not was introduced together with the heterogeneity indices. This turned out not to produce significant results at the aggregate services level, but as we shall see below, for some services sectors it did.

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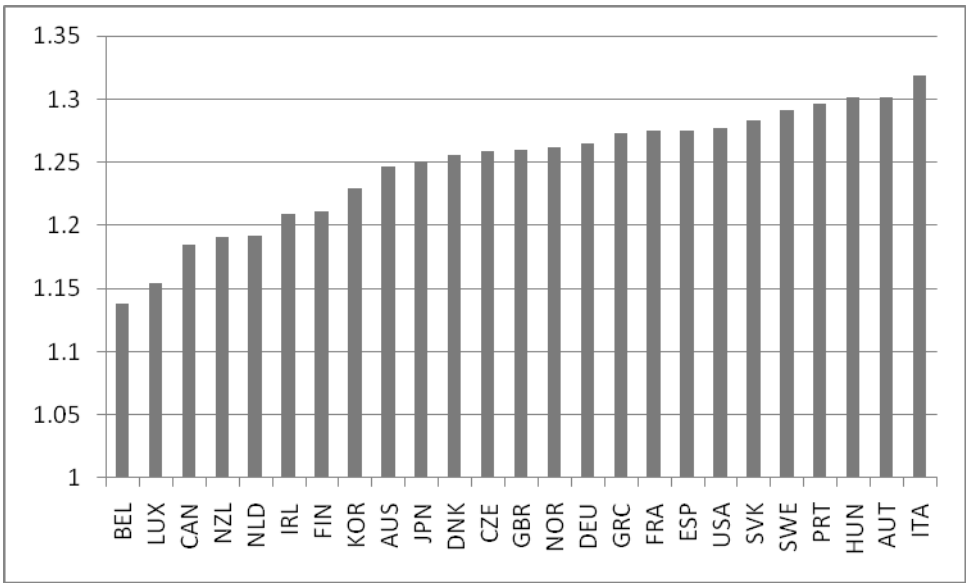
services sectors correlation was weaker (0.55 for telecoms, 0.53 for other business services, 0.32 for computer services and only 0.10 for transport). Since the correlation is very high for total services and the highly specialised financial services, a possible reason for weaker correlations in other sectors is that multinational firms are multiproduct firms that sell goods and services other than the products falling under their main activities.

17 Here it is referred to trade policy applying the GATS definition of trade in services.

41. In order to explore how harmonisation or mutual recognition would affect services trade through commercial presence in the OECD area, the impact of reducing the overall bilateral PMR heterogeneity index to the lowest bilateral level observed (around 0.2) was simulated using the regression results.[18]

Figure 8. Change from predicted levels of inward FDI if PMR was harmonized to the minimum level observed (0.2)



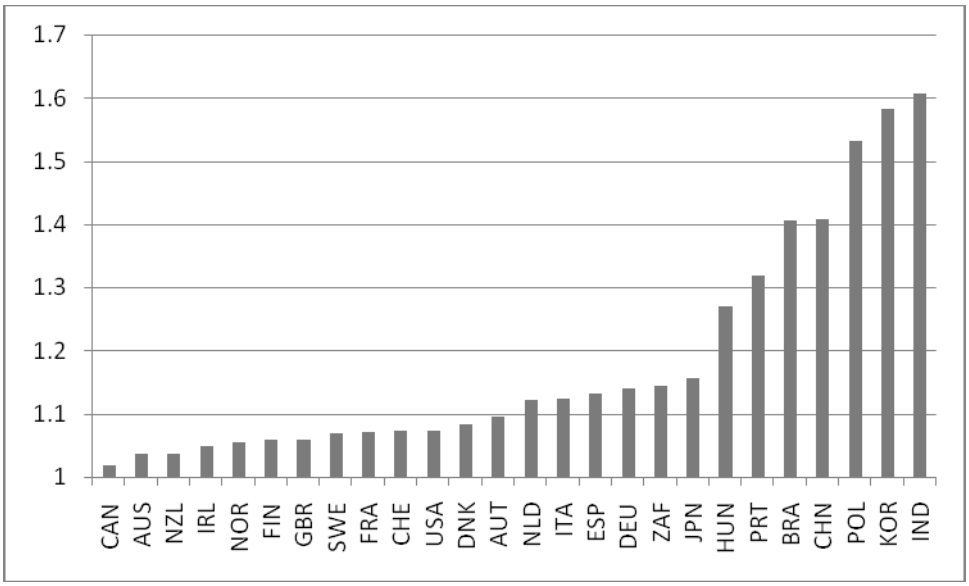
42. The countries with the largest average heterogeneity indices (Italy, Austria, Hungary and Portugal) would gain the most from harmonisation, while the most liberal countries with the lowest heterogeneity indices would gain less, but also for these countries inward investment would increase substantially following harmonisation or mutual recognition of regulation.

43. Turning to heterogeneity based on World Bank Cost of Doing Business indicators, the two indicators that capture restrictions or costs related to trade and investment directly are the one entitled "trading across borders" and "starting a business" respectively (although the former relates to administrative procedures related to trade in goods and the latter does not explicitly account for discriminatory measures).[19] The Doing Business heterogeneity indicators are available for more countries than the PMR and make analysis of a richer and more diversified sample of countries possible. The results indicate that regulatory heterogeneity is strongly and negatively associated with bilateral FDI stocks. A simulation was run exploring the effect of harmonizing the indicator of establishing a business to the lowest level observed in the data. The result for 2005 is depicted in Figure 9.

[18] The simulations use the result reported in column (2) in Annex Table A1 and reduces all bilateral heterogeneity indices to 0.2 which is close to the lowest level observed between any country pair in 2003.

[19] Heterogeneity indices for all Doing Business indicators were developed and introduced in the regressions, one by one. Only the statistically significant are reported.

Figure 9. Change from predicted levels of inward FDI if "establishing a business" was harmonized to best practice



44. The countries that would gain the most in terms of increased foreign commercial presence would be the countries with the highest entry barriers at present; India, Korea, Poland and China. At the opposite end are countries that had best practice also in the base line scenario.

Financial services

45. The determinants of bilateral foreign direct investment in financial services were explored using the general bilateral PMR heterogeneity indices, the Cost of Doing Business indicators and the bilateral Banking Regulation heterogeneity indices. The regression results are reported in Annex Table A2. The first thing to observe is that commercial presence is more sensitive to market size than the average for services sectors. EU membership appears to stimulate intra-EU investment, but EU does not seem to attract more third country investments.[20] The PMR heterogeneity indicators that are statistically significant when controlling for the (distance adjusted) level of regulation are: the overall PMR indicator; state control; and barriers to competition, while the (distance-adjusted) PMR levels in the potential host country that are significantly and negatively related to bilateral FDI are the overall index; barriers to trade and investment; public ownership; public intervention in business operations; and administrative burdens on start-ups. Stricter regulation captured by these indicators is associated with lower inward investments.

46. Heterogeneity in the policy areas covered by the starting a business, trade across borders and getting credit indicators are also negatively associated with bilateral investment, while among the banking regulation heterogeneity indicators introduced, bank supervision was the only one that had a statistically significant impact in the regressions. These results are qualitatively similar to the German study reported in Box 1, and suggest that the findings from Germany can be cautiously generalised.

[20] This result contrasts findings in the literature for total FDI as discussed above.

Telecommunications

47. Among the standard gravity variables that have the strongest statistical and economical association with bilateral FDI stocks in telecommunications are common language where countries that share a common language had almost 7-fold higher bilateral FDI stocks.[21] Having a common border, in contrast, is estimated to be negatively related to bilateral FDI, and the effect is relatively large. A possible explanation is that a neighbouring country is easier to service through cross-border trade, which is in fact what is found in the next section where the impact of regulation on choice of mode is analysed. There is finally weak support for the hypothesis that EU membership both stimulates intra-EU investments and attracts investment from third countries. None of the PMR heterogeneity indices were statistically significant in determining FDI in this sector, but the levels of regulation as captured by the overall PMR indicator, state control and administrative burden on start-ups in the host country are negatively associated with FDI inflows. Among the World Bank Cost of Doing Business indicators, heterogeneity on the sub-indicator related to the enforcement of contracts is negatively associated with bilateral FDI stocks. (see Annex Table A3 for details).

48. OECD provides sector-specific indicators of both FDI restrictiveness and product market regulation for telecommunications. These indicators do not contain sufficient details for a meaningful heterogeneity index to be developed.[22] The relationship between the level of restrictiveness and FDI was therefore the focus of analysis, and evidence is found that FDI restrictions are strongly and negatively associated with FDI. Interestingly, the impact in the source country appears to be the strongest. Thus, a one standard deviation increase in the FDI restrictiveness index for telecommunications reduces FDI outward stock by about 60% and inward stock by about 30%, everything else equal. It should be noted, however that the FDI restrictiveness index has a broad dispersion and one standard deviation is a relatively large change (the mean is 0.25 and the standard deviation 0.18).[23] The result that outward investment is more strongly related to restrictions on FDI probably indicates that highly protected local telecoms companies are less likely to venture into foreign markets than those operating in more competitive markets.

49. Also the telecommunication-specific PMR indicator is negatively correlated with both inward and outward FDI stocks in the communication sector, and the relation is of a similar magnitude for inward and outward stock. Again the estimated coefficients are relatively large as a one standard deviation increase in regulatory restrictions is associated with as much as 60% smaller FDI stocks. This should, however, not be surprising since the regulations that are included in the PMR indicator for telecommunications reflect public ownership and restrictions on the number of firms being allowed to enter the market (see Annex Table A4 for the details in the sector-specific indicators).

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21 The impact is calculated on the basis of the lowest coefficient in the regressions reported in Table A3 which is 1.888.

22 A simple measure of difference in regulation for these indicators is a dummy that is 1 if a country pair's regulatory index differs by more than one (or alternatively two) standard deviations and zero otherwise. This was tried for both communication and transport services, but the variable was dropped because of collinearity with other variables. It should be noted that the trade and FDI data lump together post and telecommunication, while data on regulation applies to telecommunication only. However, there is evidence that a quite small share of trade and investment can be attributed to postal services, at least for the period covered by these data.

23 It is noted, however, that the coefficients lose their statistical significance when country fixed effects are added. This does not necessarily mean that the results are invalid, only that they are less precisely estimated when combined with country fixed effects that are correlated with regulation.

Transport services

50. No statistically significant relation between sector specific regulation and bilateral FDI stocks were found for the transport sector. This applies both for the PMR indicator and the FDI restrictiveness index for the sector, suggesting that such regulations either are not the binding restrictions on FDI, or there is too little variation among the OECD countries for which regulatory data are available for it to have a discernible impact on FDI.

51. There are nevertheless some interesting findings. First, EU membership is negatively related to bilateral FDI in transport, although there is no evidence that EU membership attracts transport FDI from third countries. As we will see in the next section this could have to do with the impact of EU membership on choice of mode. Second, product market regulation in the potential host country of FDI discourages investment, and this is found for the overall PMR index and the sub-indicators for state control, public ownership and administrative burden on start-ups. PMR heterogeneity indices were not statistically significant except for regulatory and administrative opacity, which is positively related to inward investment, an effect which is probably due to substitution as commercial presence becomes relatively more important when country pairs differ on this indicator. This is the opposite of what is found for the other PMR sub-indicators, and needs some further future investigation (see Annex Table A5 for details on transport services).

Computer services and other business services

52. Computer services constitute a relatively small sector with a sample mean bilateral FDI stock of $52 mill., while other business services are a large category with a sample mean of $1100 mill. While computer services are lightly regulated, other business services are much more heavily regulated. For computer services we find that heterogeneity on state control and on state intervention in business operations have a statistically significant and negative relationship to bilateral FDI. In addition, the level of restrictions related to public ownership in the host country is also negatively associated with inward FDI. Thus, interestingly, for computer services it appears that government direct involvement in the economy is the most restricting factor. Possible explanations are that government is a large consumer of computer services, and may have a higher propensity to source from domestic firms, or provide computer services in-house.

53. Interestingly, heterogeneity in employment regulation (from the World Bank Cost of Doing Business survey) is negatively related to investment in computer services, an effect that is not observed for any of the other sectors. This may reflect the relatively labour/skills intensive technology used in this sector, and indicates possible complementarity between commercial presence and movement of natural persons. Differences in restrictions on starting a business are also found to be negatively related to bilateral FDI as do differences in the overall doing business indicator and getting credit (see Annex Table A6).

54. For other business services the same picture emerges. EU membership has a positive impact of FDI, EU members having about 50% higher bilateral FDI stocks than they otherwise would have. Heterogeneity in the PMR indicators did not have a statistically significant impact on bilateral FDI flows in this sector, but the level of regulation in the area of public ownership is negatively associated with inward investment, but positively associated with outward investment. The latter result is somewhat puzzling, but the likely explanation seems to be that countries with high barriers to trade and investment are less sensitive to distance for their outward investments. As for computer services, government intervention in business operations are negatively associated with inward FDI, and in this case also for outward FDI. Heterogeneity in restrictions in trade across borders as measured by the World Bank Cost of Doing

Business indicators, and the overall heterogeneity index based on this survey have a significant negative impact (see Annex Table A7).

55. The results for the relations between regulatory heterogeneity and inward FDI stocks for all sectors are summarised in Table 4.

Table 4. Summary regression results for regulatory heterogeneity and inward FDI

Sector	Statistically significant heterogeneity indicators	Impact of a one standard deviation reduction in heterogeneity
Total services	Overall indicator (PMR)	9%
	Barriers to competition (PMR)	11%
	Starting a business (WB)	15%
	Trade across borders (WB)	25%
	Overall indicator (WB)	27%
Post and telecommunications	Enforcing a contract (WB)	19%
Financial services	Overall indicator (PMR)	19%
	Barriers to competition (PMR)	19%
	State control (PMR)	11%
	Bank supervision (WB)	10%
	Starting a business (WB)	26%
	Trade across borders (WB)	19%
	Overall indicator (WB)	21%
Computer and related services	State control (PMR)	26%
	Government involvement (PMR)	13%
	Starting a business (WB)	33%
	Getting credit (WB)	19%
	Trade across borders (WB)	22%
	Overall indicator (WB)	22%
	Employment regulation (WB)	17%
Other business services	Trade across borders (WB)	19%

56. What is interesting to notice in this table is that the two sectors that are possibly the most easily traded through all modes of supply, financial services and computer and related services, are the most sensitive to differences in regulation. Whether this is because trade can shift more easily to other modes in these sectors will be further explored below, but we recall from the previous study that regulatory heterogeneity also affects cross-border trade negatively, so it is likely that heterogeneity affects both the total volume of trade through all modes and the choice of mode.

57. It is also interesting to notice that the network industries are the ones that are sensitive to differences in contract enforcement. FDI in these sectors probably involves higher fixed and to some extent sunk costs than services on average, and having investment properly protected by enforceable contracts in a similar contractual/legal framework appears to be more important in the network industries. Finally, it is also noticeable that differences in employment regulation features prominently in the computer services industry, and only this sector.

Results: The relation between regulation and choice of mode

58. Before assessing how regulation may affect the choice of mode of entering a foreign market, i.e. trade as measured in the balance of payment statistics versus commercial presence, it is useful to establish to what extent modes of supply are interrelated. In order to supply a service across borders it may be necessary to establish a commercial presence in the form of a distribution channel, customer service, a joint venture with a local firm etc. For services which can easily be transmitted electronically across borders on the other hand, trade may be either independent of commercial presence or it could be a

substitute. If onerous regulation makes it costly to establish a commercial presence, services suppliers may decide to service the market through cross-border trade. Finally, almost half of total services trade is in transport and travel. These two services sectors are likely to be strongly related to trade in goods and to investment both in goods and services.

59. In order to explore to what extent FDI and trade in services are complementary, substitutes or independent, several analytical approaches were taken. First, it is found that trade and investment in total services as well as individual services categories are not independent.[24] Second, it is found that restrictions on foreign direct investment in services, as measured by the OECD investment restrictions index, are negatively, but weakly, related to cross-border trade in services.[25] This indicates that cross-border trade and commercial presence are complementary. If one is restricted, the other is negatively affected too. Further evidence of dependence between modes was found when running simultaneous equations where trade and foreign direct investment were determined simultaneously. Here restrictions on cross-border trade were found to impede FDI flows, while restrictions on establishing a business were found to impede trade flows.[26] In addition, trade is positively associated with FDI stocks, but not the other way around. It is therefore concluded that cross-border trade and commercial presence are on average complementary (see Annex Tables 8 and 9 for results).

60. In the following results regarding the relations between regulatory heterogeneity and choice of mode are discussed. One caveat should be made upfront. In some cases the number of observations is small and it cannot be guaranteed that the results are representative for all OECD countries.[27] It is also noticed up front that regulatory heterogeneity appears to be more important for explaining variations in choice of mode among countries than variations in FDI stocks for most sectors (compare Table 4 above to Annex tables A10-A14).

61. For **total services** it is found that highly regulated countries tend to import relatively more and attract relatively less foreign investment. Tentatively the regression results suggest that on average the ratio of imports over inward FDI increases by 25% if the PMR heterogeneity index increases with one standard deviation. Similar results are found for the PMR heterogeneity sub-indicators for state control and government involvement in business. Thus, a country tends to attract investment from partner countries with a similar regulatory environment, and import from countries with a different regulatory environment. A similar result is found for the overall indicator from the World Bank Cost of Doing Business heterogeneity indicator. The individual sub-indicators that have a statistically significant impact on the choice of mode are access to credit and enforcement of contracts, which both favour trade. This makes intuitively sense as FDI is likely to depend more on credit and contract enforcement than does trade. It is also noticeable that these two indicators are associated with differences among countries as far as choice of mode is concerned, but does not explain variation in bilateral FDI. Among the standard gravity variables,

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[24] Seemingly unrelated regressions find that the error terms of a gravity regression for trade and for FDI are positively correlated and pass the Breusch-Pagan test at a 1% confidence level for total services and transport services 5% level for communication services, 10% for other business services. For financial services the Breusch-Pagan test gave different results depending on the specification of the equations.

[25] Before multilateral resistance is introduced in the regressions the FDI restrictiveness indicator is statistically significant. It remains negative, but loses its statistical significance when controlling for resistance.

[26] The relation is statistically significant at a 5% level when using the Poisson maximum likelihood estimator, but not significant when using OLS with fixed effects. These results, when significant, also suggest complementarity between trade in goods and services.

[27] The number of observations where there is information on trade, FDI stocks and regulation can in some cases be quite small. The regression equation is equation (4) in the technical annex (taking logs of both sides and estimated by OLS country and time dummies).

the most significantly and robustly associated with the choice of mode is common official language, which favours commercial presence over cross-border trade. Countries that share a common language on average have a 50% lower trade to FDI ratio.

62. In the **transport sector**, neighbouring countries tend to service each other's market through cross-border trade to a larger extent than countries that do not share a common border. It is recalled that there is a negative border effect in the estimates of determinants of commercial presence in the sector, so this result reinforces the conclusion that neighbouring countries tend to trade transport services while FDI is less important. Countries sharing a common language in contrast, tend to service each other's markets through commercial presence to a larger extent also in this sector. Turning to regulatory measures, more heterogeneous regulation on the overall PMR heterogeneity indicator; explicit barriers to trade and investment; state control; public ownership; and government involvement in business all tilt the trade versus investment towards trade; while regulatory and administrative opacity points in the other direction. The latter result mirrors the observation for inward FDI, which was found to be positively associated with FDI. It is also found that heterogeneity in access to credit and registration of property from the World Bank indicators tilt the trade versus investment ratio towards trade in the former and investment in the latter.

63. The border effect is similar for **communication** as it is for transport. Neighbouring countries tend to engage relatively more in cross-border trade, while countries that share a common language tend to service each other's markets relatively more through commercial presence. The only heterogeneity indicator that is significantly associated with the choice of mode in this sector is dealing with licenses from the World Bank indicators. Higher heterogeneity on this indicator tilts the choice of mode towards trade. Since licensing is very important in this sector, the result makes intuitively sense.

64. In **computer services** the heterogeneity indices that were significantly associated with the choice of mode are explicit barriers to trade and investment, which strongly tilts the balance towards trade; government involvement in business; dealing with licenses and overall heterogeneity on the World Bank Cost of Doing Business indicators. The more heterogeneous the indicators, the higher is the relative importance of trade. Heterogeneity in administrative burden on start-ups in contrast, has the opposite effect, which seems somewhat counterintuitive.

65. For **other business services** the relative importance of trade in bilateral relations is strongly and positively associated with regulatory heterogeneity. In fact, for this sector it is the only variable included in the regression that is significantly associated with a the choice of mode (together with country dummies) which suggests that countries differ a lot on what determines the choice of mode.

66. Finally, for **financial services** sharing a common language is strongly associated with commercial presence as the preferred mode of supply, while neighbouring countries tend to trade more with each other. Interestingly, heterogeneity in the tax regime tilts the trade versus investment regime towards investment.

4. Policy implications

67. This paper has explored the role of regulation and regulatory heterogeneity for trade through commercial presence and for the choice of mode for services trade. It has been found that regulatory heterogeneity is negatively associated with commercial presence and tilts the choice of mode towards trade. The empirical analysis also finds that cross-border trade and commercial presence are complementary to various degrees. That implies that services trade through cross-border supply is restricted if there are barriers to commercial presence, and vice versa. It has not been possible to estimate the impact of restrictions on movement of natural persons, but it is likely that this mode is also to a

significant extent complementary to trade and FDI. The sectors in which the evidence for a relationship between regulatory heterogeneity and trade is strongest are financial services and computer services, where a wide range of regulatory indicators have a statistically significant effect. These are also the sectors that are most easily traded through all modes of supply. Interestingly, the network industries (transport and communications) are the most affected by regulation related to licensing and enforcement of contracts; the choice of mode in the financial sector depends on regulation related to the tax regime; while computer services are affected by regulation in the labour market. From these findings we draw the following policy conclusions:

- Commercial presence appears to be increasingly the preferred mode of supply in most services sectors even when cross-border trade is more and more feasible due to improvements in communication technology.

- Absence of explicit barriers to trade and investment is not necessarily sufficient to attract foreign investors. Thus, regulatory heterogeneity is found to constitute a barrier to entry in its own right. Therefore, regulatory reform may be necessary in order to ensure market access for foreign services providers.

- Furthermore, international cooperation on regulatory reform, including continuous search for best practice and benchmarking would help reduce unintended regulatory barriers to trade and investment in services. Continuation of work with the view to binding agreements on regulatory principles in the GATS would also help reduce regulatory barriers globally.

- Modes of supply are found to be complementary, but not perfect complements. Therefore trade restrictions in services are best assessed when taking restrictions in all modes of supply into account. A full commitment in the GATS or regional trade agreements on cross-border supply may be worth little in terms of market access if there are strong restrictions on commercial presence. By the same token, a liberal foreign investment regime may result in limited investment flows if movement of natural persons are strictly regulated.

- Strict and different regulation also discourages *outward i*nvestment as local firms find it more difficult to enter foreign markets the more restricted they are at home.

- Not all services within each of the broad services categories included in this study can be traded across borders. Regulatory heterogeneity that discourages commercial presence therefore implies a narrower spectrum of traded services, both exported and imported, to the detriment of consumers and business customers of key services.

- Mergers and acquisitions are the most common way of establishing a commercial presence. Regulatory reform that lowers entry barriers may need to be complemented by a strengthening of competition policies.

- The services trade restrictiveness project (STRI), aims at quantifying barriers to trade in services through development of a regulatory profile as well as indicators that reflect the restrictiveness of regulatory barriers. For sectors where modes of supply are clearly complementary, the services trade restrictiveness index should be estimated for the sector as a whole and including restrictions on all modes.

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ANNEX 1.
TECHNICAL ANNEX

The model

The model features monopolistic competition in the market for final services where consumers maximize utility by spreading their consumption on all available varieties offered in the local market according to the relative price of each variety. They obtain utility from both the quantity of each variety consumed and from having access to a broader variety of goods and services. As is well established in the literature, consumers will allocate their expenditure on individual services categories according to their preferences. A common assumption is that they spend a constant share of their income on each product category (i.e. a nested CES function where product categories or sectors are nested according to Cobb Douglas preferences) while individual varieties within a services category are nested according to a CES function where the elasticity of substitution between individual varieties is larger than unity. Expenditure on each variety will then be determined by relative prices. Demand in country *j* for a variety produced in country *i* in sector *s* (assuming that consumers have identical and homothetic preferences) is given by:

$$x_{ij}^{s} = \sigma^{s} E_{j} \left(\frac{p_{i}^{s} t_{ij}^{s}}{P_{j}^{s}} \right)^{1-\varepsilon} \qquad (1)$$

Where E_j is total consumer expenditure in country *j*, σ_j^s is the expenditure share on sector *s*, lower case letters represent the price of the individual variety of the service in question, while upper case letters represent a price index which is a CES aggregate of the price of all available varieties within sector *s*. Bilateral trade costs are denoted t_{ij}^s and are of the iceberg type. Each firm in the sector produces one variety of the service in question. The population of firms servicing the market in country *j* consists of local firms producing and selling in country *j* (and possibly exporting), national firms in countries $i \neq j$ exporting the service across the border, and foreign affiliates of multinationals with headquarters in countries $i \neq j$.

In addition to the iceberg trade cost, exporters face a fixed trade cost denoted f_{xij}^s. Affiliates of multinational companies in contrast face a fixed cost of establishing a plant in country *j*, denoted $f_{Iij}^s > f_{xij}^s$, but saves on the iceberg trade costs. The two-country, two-factor model of multinational activities (e.g. the knowledge capital model developed by Markusen (2002)) predicts that horizontal foreign investment will totally replace trade. There are several ways of avoiding this feature that appears to be at odds with empirical evidence. One way is to introduce more countries and more factors as in Bergstrand and Egger (2007). A second possibility, not mutually exclusive is to introduce heterogeneous firms.

The empirical model estimated in this paper builds on Bergstrand and Egger's insight and combines it with the gravity model introduced by Chaney (2008), which features heterogeneous firms and fixed as well as variable trade costs. In this model bilateral exports in sector *s* are determined by the following equation:

$$X_{ij}^{s} = \sigma^{s} \frac{Y_{i} Y_{j}}{Y} \left(\frac{w_{i} t_{ij}^{s}}{P_{j}^{s}} \right)^{-\chi^{s}} \left(f_{xij}^{s} \right)^{-\left(\chi^{s}/(\varepsilon-1)-1\right)} \qquad (2)$$

Here w_i is a vector of factor prices in country *i*, χ^s represents the parameter in a Pareto distribution of firm productivity. Applying the same model to foreign affiliate sales we get:

$$FAS_{ij}^s = \sigma^s \frac{Y_i Y_j}{Y}\left(\frac{w_j}{P_j^s}\right)^{-\chi^s}\left(f_{Iij}^s\right)^{-\left(\chi^s/(\varepsilon-1)-1\right)} \qquad (3)$$

Hence the relation between trade and FDI becomes:

$$\frac{X_{ij}^s}{FAS_{ij}^s} = \left(\frac{w_i t_{ij}^s}{w_j}\right)^{-\chi^s}\frac{\left(f_{xij}^s\right)^{-\left(\chi^s/(\varepsilon-1)-1\right)}}{\left(f_{Iij}^s\right)^{-\left(\chi^s/(\varepsilon-1)-1\right)}} \qquad (4)$$

Thus, the relationship depends on relative factor prices, variable trade costs and the ratio of fixed trade and fixed FDI costs.

There are several ways of deriving a regression equation from equation (3). The standard log-linear version reads as follows:

$$\ln FAS_{ij} = \alpha_0 + \alpha_1 \ln D_{ij} + \alpha_2 hg\_reg + \lambda_i + \gamma_j + \mu_{ij} \qquad (5a)$$

The left-hand side variable is the log of inward FAS in country *i* from country *j*. D_{ij} contains the usual bilateral gravity variables (bilateral distance, dummies that capture whether or not the country pair has a common land border, shares a common official language, has a common colonial past or is members of the European Union). The third term captures regulatory heterogeneity, the variable of particular interest to this study. Finally home country and partner country dummies and an error term are included. The regression is run for total services and for the individual services sectors for which data are available.

It has been shown in the literature that the OLS estimation technique represented by equation (5a) may be biased because it excludes country pairs that do not invest in each others' markets. Besides OLS regressions tend to overestimate the impact of distance and are prone to heteroskedasticity. In order to correct for these problems, using pseudo Poisson Maximum likelihood estimators is suggested (Da Silva and Tenereyro, 2006). The estimation equation would then read:

$$FAS_{ij} = \exp(\alpha_0 + \alpha_1 \ln D_{ij} + \alpha_2 hg\_reg + \lambda_i + \gamma_j + \mu_{ij}) \qquad (5b)$$

An alternative way of expressing equation (3) when applied to FAS data is to introduce combined GDP of the country pairs and the similarity of their market sizes. With considerable investment costs, market size is crucial for the investment decision and it is useful to study the effect of market size explicitly rather than lumping it together with other country-specific variables in the country dummy. The combined markets and the difference in market size are both bilateral variables. When estimating the knowledge capital model, differences in skills between the home and the host country of the multinational are also routinely included.

$$\ln FAS_{ij} = a_0 + a_1 \ln(Y_i + Y_j) + a_2 \ln S_{ij} + \ln D_{ij} + a_3 hg\_reg + \lambda_i + \gamma_j + \mu_{ij} \quad (6a)$$

$$FAS_{ij} = \exp(a_0 + a_1 \ln(Y_i + Y_j) + a_2 \ln S_{ij} + \ln D_{ij} + a_3 hg\_reg + \lambda_i + \gamma_j + \mu_{ij}) \quad (6b)$$

where $S_{ij} = \left[1 - (Y_i/(Y_i + Y_j))^2 - (Y_j/(Y_i + Y_j))^2\right]$

Egger (2008) has shown that in models with differentiated products, exports can be expressed as the product of the number of exporting firms, the average output price of these firms and the average quantity exported by each firm. He also shows that with this specification the marginal impact of distance on trade flows is non-linear and depends on the number of products being exported and relative prices. We use this insight to include the product of the *level* of regulation in the source and host country respectively and distance. This takes into account that the impact of distance on trade and FAS flows depend on the resistance terms, and the regulatory restrictiveness level is assumed to be one determinant of the resistance term. In addition it creates a bilateral variable that incorporates the regulatory level. This is useful, since it is reasonable to control for regulatory level when analysing the impact of regulatory heterogeneity, and it is otherwise difficult to distinguish the regulatory levels from the country dummies (data on regulation is available for two years only).

Having explored various specifications or the gravity model, we prefer the following for commercial presence:

$$FDI_{ij} = \exp(a_0 + a_1 \ln(Y_i + Y_j) + a_2 \ln S_{ij} + a_3 \ln D_{ij} + a_4 reg_i * \ln D_{ij} + a_5 reg_j * \ln D_{ij} + a_6 hg\_reg + \lambda_i + \gamma_j + \mu_{ij}) \quad (7)$$

where bilateral stocks of FDI are used as a proxy for sales of foreign affiliates. We are aware that a fully specified gravity model according to Egger (2008) should include a number of additional interaction terms between income and bilateral trade costs. However, the limited number of observations in our sample creates problems of distinguishing between direct and indirect impact of bilateral trade costs, and we therefore limit the combination variable to regulatory barriers. The results are reported in the tables below where only regressions with statistically significant regulatory measures are included. In all tables ***, **, * refer to statistical significance at a 1, 5 and 10% level respectively. In all tables standard errors are reported in parenthesis. The results are robust to using the alternative specifications 5b or 6b. In fact specification (5b) produced more statistically significant results for a number of regulatory heterogeneity indices. Furthermore if the regulatory indices were logged, the results were "better" still. However, we have chosen to err on the side of cautiousness, and report only the results that are robust also in specification (7).

Table A1. The relationship between inward investment and regulation, total services

	EU	PMR	BT	SC	PO	IBO	BC	EBT	SAB	TAB
ln GDP combined	0.991	3.524*	1.674***	3.959	2.696***	4.365***	1.961	2.641	2.493	2.604***
	(0.737)	(2.070)	(0.281)	(2.566)	(0.335)	(0.656)	(2.160)	(2.099)	(3.032)	(0.33)
ln similar GDP	0.852**	2.256**	1.390***	2.467*	1.916***	2.700***	1.527	1.816*	1.622	1.675***
	(0.375)	(1.044)	(0.181)	(1.290)	(0.183)	(0.344)	(1.088)	(1.068)	(1.519)	(0.175)
ln distance	-0.369***	-0.423***	-0.487**	-0.411***	-0.0929	0.0789	-0.490***	-0.455***	-0.360***	-0.259
	(0.0373)	(0.0783)	(0.224)	(0.0910)	(0.218)	(0.296)	(0.0775)	(0.0821)	(0.079)	(0.246)
Border	0.372***	0.353***	0.392***	0.351***	0.439***	0.293**	0.403***	0.395***	0.352***	0.335**
	(0.0536)	(0.108)	(0.140)	(0.111)	(0.143)	(0.123)	(0.113)	(0.106)	(0.079)	(0.145)
Common language	0.402***	0.558***	0.672***	0.577***	0.574***	0.597***	0.682***	0.653***	0.329***	0.447***
	(0.0593)	(0.154)	(0.183)	(0.144)	(0.161)	(0.184)	(0.136)	(0.144)	(0.08)	(0.138)
Colony	0.226***	0.167	0.0901	0.158	0.137	0.298*	0.0666	0.101	0.154*	0.290*
	(0.0575)	(0.133)	(0.143)	(0.127)	(0.133)	(0.166)	(0.119)	(0.121)	(0.086)	(0.172)
Both EU	0.537***								0.608***	0.684**
	(0.164)								(0.157)	(0.294)
Only host EU	-0.0959									
	(0.166)									
Heterogeneity		-1.343**	-0.160	-0.509	0.495	-0.0800	-1.163**	-0.376	-0.673***	-0.471**
		(0.588)	(0.686)	(0.320)	(0.526)	(0.268)	(0.491)	(0.337)	(0.179)	(0.216)
Host reg x distance		-0.0877***	-0.324**	-0.0658**	-0.270***	-0.404***	0.0184	-0.0544**	0.04	-0.323
		(0.0311)	(0.143)	(0.0260)	(0.0583)	(0.109)	(0.0391)	(0.0269)	(0.122)	(0.22)
Source reg x dist		0.0406	0.311	0.0185	0.0823	-0.0188	0.0353	0.0501**	-0.152	0.089
		(0.0329)	(0.204)	(0.0241)	(0.0676)	(0.147)	(0.0333)	(0.0253)	(0.165)	(0.234)
Observations	5200	596	400	596	400	400	596	596	1950	650
Pseudo R-squared	0.921	0.937	0.943	0.937	0.947	0.945	0.936	0.936	0.919	0.917

Note: The PPML estimator is used in all regressions. Country and time dummies are applied. Column headings refer to the heterogeneity indicators, which are defined as follows: PMR=product market regulation; BT=barriers to trade and investment; SC= state control; PO=public ownership; IBO= government involvement in business; BC=barriers to competition; EBT=explicit barriers to trade and investment; SAB=regulation related to starting a business (from World Bank); TAB=regulation related to crossing a border (from World Bank). Standard errors are in parentheses.

Table A2. The relationship between inward investment and regulation, financial services

	EU	PMR	BT	SC	PO	IBO	ABS	BC	SAB	TAB	CRE	SUPERV.
ln GDP combined	2.687**	8.355**	1.270***	8.303*	2.366***	4.429***	8.995**	7.710*	3.047	2.586***	2.617	4.226
	(1.204)	(3.979)	(0.389)	(4.462)	(0.406)	(1.082)	(4.211)	(4.054)	(5.143)	(0.401)	(9.648)	(3.076)
ln similar GDP	1.551**	4.631**	1.294***	4.599**	1.814***	2.878***	4.947**	4.387**	1.752	1.505***	1.488	2.176
	(0.604)	(1.978)	(0.269)	(2.225)	(0.275)	(0.591)	(2.095)	(2.033)	(2.569)	(0.210)	(4.827)	(1.579)
ln distance	-0.464***	-0.525***	-0.511	-0.546***	0.377	-0.214	-0.599***	-0.491***	-0.513***	-0.192	-0.669***	-0.720***
	(0.0465)	(0.153)	(0.363)	(0.143)	(0.359)	(0.478)	(0.108)	(0.111)	(0.116)	(0.417)	(0.128)	(0.0919)
Border	0.241**	0.143	-0.134	0.141	0.196	-0.0259	0.157	0.250	0.096	0.038	0.07	0.212
	(0.108)	(0.218)	(0.293)	(0.220)	(0.274)	(0.285)	(0.228)	(0.225)	(0.159)	(0.269)	(0.193)	(0.223)
Common language	0.787***	1.254***	1.625***	1.335***	1.360***	1.686***	1.352***	1.386***	0.825***	0.865***	0.647***	0.455**
	(0.0866)	(0.239)	(0.336)	(0.234)	(0.320)	(0.328)	(0.251)	(0.217)	(0.126)	(0.227)	(0.62)	(0.223)
Colony	0.190*	-0.0677	-0.548*	-0.112	-0.316	-0.241	-0.170	-0.149	-0.0408	0.184	0.047	0.191
	(0.106)	(0.222)	(0.286)	(0.225)	(0.259)	(0.311)	(0.217)	(0.215)	(0.153)	(0.233)	(0.169)	(0.210)
Both EU	0.804***								0.917***	0.928***	0.967***	
	(0.208)								(0.179)	(0.304)	(0.210)	
Only host EU	-0.183											
	(0.204)											
Heterogeneity		-2.926**	1.015	-1.135*	1.400	-0.811	-0.312	-1.956**	-1.243***	-0.766***	-0.669***	-0.691**
		(1.157)	(1.145)	(0.589)	(0.853)	(0.495)	(0.468)	(0.939)	(0.260)	(0.265)	(0.199)	(0.290)
Host reg x distance		-0.117*	-0.820***	-0.0598	-0.522***	-0.330*	-0.0427**	-0.0943	0.159	-0574	0.10**	
		(0.0607)	(0.281)	(0.0401)	(0.119)	(0.173)	(0.0198)	(0.104)	(0.193)	(0.573)	(0.04)	
Source reg x distance		0.0635	0.418	0.0209	0.0163	0.0316	0.0196	0.00913	-0.133	-0.001	0.015	
		(0.0740)	(0.315)	(0.0465)	(0.0990)	(0.232)	(0.0280)	(0.0500)	(0.264)	(0.365)	(0.045)	
Observations	5200	596	400	596	400	400	596	596	1950	650	1300	1106
Pseudo R-squared	0.869	0.876	0.898	0.874	0.903	0.893	0.872	0.873	0.865	0.871	0.869	0.866

Note: The PPML estimator is used in all regressions. Country and time dummies are applied. Column headings refer to the heterogeneity indicators, which are defined as follows: PMR=product market regulation; BT=barriers to trade and investment; SC= state control; PO=public ownership; IBO= government involvement in business; ABS=administrative burden on start-ups; BC=barriers to competition; SAB=regulation related to starting a business (from World Bank); TAB=regulation related to crossing a border (from World Bank); CRE=getting credit (from World Bank); SUPERV= bank supervision (from World Bank) Standard errors are in parentheses.

Table A3. The relationship between inward investment and regulation, post and telecommunication

	EU	PMR	SC	ABS	ENC
ln GDP combined	0.316	4.462	1.091	1.633	6.666
	(1.549)	(3.087)	(3.725)	(3.768)	(6.414)
ln similar GDP	0.446	2.640*	0.956	1.250	3.645
	(0.789)	(1.555)	(1.861)	(1.917)	(3.215)
ln distance	-1.057***	0.409	0.377	-0.110	-1.207***
	(0.106)	(0.458)	(0.443)	(0.312)	(0.444)
Border	-1.621***	-1.585*	-1.577*	-1.372*	-1.708***
	(0.242)	(0.846)	(0.857)	(0.764)	(0.380)
Common language	1.944***	2.028***	2.081***	1.888***	2.045***
	(0.202)	(0.540)	(0.518)	(0.537)	(0.296)
Colony	0.131	-0.0627	-0.105	0.0248	0.294
	(0.145)	(0.405)	(0.423)	(0.382)	(0.206)
Both EU	0.584**				-0.004
	(0.240)				(0.287)
Only host EU	1.016***				
	(0.368)				
Heterogeneity		-1.817	0.129	0.0845	-0.708***
		(1.977)	(0.965)	(0.770)	(0.320)
Host reg x distance		-0.675***	-0.337***	-0.162**	0.272
		(0.229)	(0.103)	(0.0661)	(0.483)
Source reg x distance		-0.0836	-0.122	-0.199	0.095
		(0.118)	(0.0811)	(0.126)	(0.422)
Observations	5200	596	596	596	1950
Pseudo R-squared	0.867	0.905	0.903	0.901	0.895

Note: The PPML estimator is used in all regressions. Country and time dummies are applied. Column headings refer to the heterogeneity indicators, which are defined as follows: PMR=product market regulation; SC= state control; ABS=administrative burden on start-ups; BC=barriers to competition; ENC=enforcing a contract (from World Bank). Standard errors are in parentheses.

Table A4. The relationship between inward investment and levels of sector-specific regulation, communication services

	(1)	(2)
ln GDP combined	1.023***	0.925***
	(0.190)	(0.101)
ln GDP similar	0.662***	0.374***
	(0.212)	(0.111)
ln distance	-0.798***	-1.522***
	(0.180)	(0.0964)
border	-1.173**	-2.258***
	(0.478)	(0.287)
common language	1.973***	1.927***
	(0.368)	(0.232)
colony	0.644	1.312***
	(0.423)	(0.184)
host FDI restrictions	-2.301***	
	(0.772)	
source FDI restrictions	-5.721***	
	(0.909)	
ln price host	0.642	2.964***
	(1.273)	(1.050)
ln price source	-2.419***	-0.596
	(0.809)	(0.596)
host PMR telecoms		-0.956***
		(0.163)
source PMR telecoms		-0.916***
		(0.117)
Fixed effects	No	No
Observations	924	2526
Pseudo R-squared	0.628	0.709

Note: The price variable is the price level relative to the world average for communications services as reported in the UN comparison project. These are used as a proxy for the multilateral resistance term in the gravity model where country dummies could not be used since they are collinear with the regulation variables of interest.

Table A5. The relationship between inward investment and general regulation, transport services

	EU	PMR	SC	PO	ABS	RAO
ln GDP combined	0.924	6.992**	4.228	1.353***	3.923	2.227
	(1.181)	(3.196)	(3.011)	(0.488)	(3.532)	(3.501)
ln similar GDP	0.742	3.677**	2.302	0.928***	2.173	1.302
	(0.595)	(1.597)	(1.490)	(0.316)	(1.747)	(1.744)
ln distance	-1.039***	-0.321	-0.518**	0.134	-0.811***	-0.864***
	(0.0719)	(0.258)	(0.225)	(0.538)	(0.176)	(0.189)
Border	-0.669***	-1.030**	-1.044**	-1.110***	-0.995**	-0.974**
	(0.158)	(0.441)	(0.431)	(0.393)	(0.457)	(0.437)
Common language	1.048***	1.052***	1.140***	1.059**	1.089***	1.336***
	(0.121)	(0.294)	(0.282)	(0.470)	(0.300)	(0.302)
Colony	0.153	0.554*	0.498	0.351	0.534*	0.450
	(0.135)	(0.329)	(0.323)	(0.408)	(0.321)	(0.338)
Both EU	-0.927***					
	(0.340)					
Only host EU	-0.163					
	(0.368)					
Heterogeneity		-0.934	-0.427	-1.625	-0.0281	2.501**
		(1.701)	(0.755)	(1.290)	(0.575)	(1.163)
Host reg x distance		-0.455***	-0.185**	-0.596***	-0.153***	-0.0541
		(0.131)	(0.0726)	(0.190)	(0.0520)	(0.0336)
Source reg x distance		-0.0818	-0.0655	0.0215	-0.0368	-0.0309
		(0.0986)	(0.0610)	(0.148)	(0.0402)	(0.0369)
Observations	5200	596	596	400	596	596
Pseudo R-squared	0.779	0.769	0.764	0.783	0.763	0.764

Note: The PPML estimator is used in all regressions. Country and time dummies are used. Column headings refer to the heterogeneity indicators, which are defined as follows: PMR=product market regulation; SC= state control; PO=public ownership; ABS=administrative burden on start-ups. Standard errors are in parentheses.

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Table A6. The relationship between inward investment and regulation computer and related services

	SC	PO	IBO	SAB	EMP	TAB	CRE	ABA
ln GDP combined	7.616	4.296***	5.910***	5.597	3.823	3.547***	15.88**	3.689***
	(6.968)	(0.477)	(1.645)	(4.770)	(4.272)	(0.321)	(8.304)	(0.338)
ln similar GDP	4.001	2.179***	3.177***	3.068	2.166	2.113***	8.228**	2.334***
	(3.433)	(0.249)	(0.900)	(2.396)	(2.149)	(0.216)	(4.024)	(0.232)
ln distance	0.0532	1.155**	0.0636	-0.766***	-0.101	-0.590*	-1.003***	1.014
	(0.219)	(0.509)	(0.581)	(0.148)	(0.183)	(0.305)	(0.164)	(1.105)
Border	0.505*	0.894***	0.904***	0.269	0.416**	0.119	0.402*	0.100
	(0.261)	(0.226)	(0.289)	(0.187)	(0.170)	(0.265)	(0.235)	(0.230)
Common language	0.691	0.947***	1.011*	0.706***	0.379***	0.704***	0.357	0.498**
	(0.465)	(0.328)	(0.518)	(0.189)	(0.186)	(0.260)	(0.235)	(0.207)
Colony	0.422	0.276	0.216	-0.133	0.201	0.247	0.085	-0.108
	(0.472)	(0.294)	(0.490)	(0.221)	(0.193)	(0.255)	(0.246)	(0.262)
Both EU				-0.436	-0.544*	-0.473	-0.363	-0.915*
				(0.308)	(0.299)	(0.567)	(0.409)	(0.521)
Heterogeneity	-3.017***	1.161	-0.836*	-1.638***	-0.398***	-0.870**	-0.758**	-2.793***
	(0.729)	(1.156)	(0.494)	(0.337)	(0.173)	(0.374)	(0.308)	(0.887)
Host reg x distance	-0.312***	-0.846***	-0.528**	0.053	-0.780***	-0.348	0.143***	-2.664**
	(0.0710)	(0.192)	(0.263)	(0.275)	(0.157)	(0.338)	(0.05)	(1.086)
Source reg x distance	0.0626	0.131	0.125	-0.011	-0.007	-0.019	0.053	0.107
	(0.0657)	(0.144)	(0.282)	(0.265)	(0.106)	(0.267)	(0.053)	(0.940)
Observations	596	400	400	1950	1950	650	1300	650
Pseudo R-squared	0.903	0.946	0.930	0.878	0.885	0.912	0.885	0.908

Note: The PPML estimator is used in all regressions. Country and time dummies are used. Column headings refer to the heterogeneity indicators, which are defined as follows: SC= state control; PO=public ownership; IBO= government involvement in business; SAB=regulation related to starting a business (from World Bank); TAB=regulation related to crossing a border (from World Bank); EMP=employment regulation; CRE=getting credit (from World Bank); ABA=overall regulation (from World Bank). Standard errors are in parentheses.

Table A7. The relationship between inward investment and regulatory heterogeneity, other business services

	EU	BT	PO	IBO	TAB
ln GDP combined	2.125	3.434***	4.841***	5.995***	3.368***
	(1.632)	(0.540)	(0.564)	(1.228)	(0.396)
ln similar GDP	1.347	2.153***	2.823***	3.281***	1.892***
	(0.821)	(0.398)	(0.321)	(0.673)	(0.246)
ln distance	-0.511***	-2.112***	-1.026*	0.864**	-0.151
	(0.0898)	(0.537)	(0.606)	(0.422)	(0.419)
Border	-0.00504	0.224	0.208	0.169	-0.104
	(0.111)	(0.238)	(0.261)	(0.239)	(0.206)
Common language	0.493***	1.225***	0.603*	0.0651	0.852***
	(0.153)	(0.337)	(0.347)	(0.488)	(0.231)
Colony	0.341**	-0.180	0.417	1.050***	0.735**
	(0.145)	(0.338)	(0.298)	(0.320)	(0.305)
Both EU	0.538**				0.834*
	(0.257)				(0.485)
Only host EU	0.108				
	(0.278)				
Heterogeneity		1.715	-0.541	0.418	-0.874***
		(1.310)	(1.002)	(0.892)	(0.301)
Host reg x distance		0.465	-0.368***	-0.644***	-0.749*
		(0.358)	(0.122)	(0.192)	(0.398)
Source reg x distance		1.763***	0.555***	-0.415**	-0.010
		(0.472)	(0.186)	(0.198)	(0.410)
Observations	5200	400	400	400	650
Pseudo R-squared	0.911	0.935	0.942	0.931	0.945

Note: The PPML estimator is used in all regressions. Country and time dummies are used. Column headings refer to the heterogeneity indicators, which are defined as follows: BT= barriers to trade and investment; PO=public ownership; IBO= government involvement in business; TAB=regulation related to crossing a border (from World Bank); Standard errors are in parentheses.

Table A8. The relation between trade and restrictions on FDI and vice versa, total services, finance and communication services

	Total services			Finance			Communication		
	Trade		FDI	Trade		FDI	Trade		FDI
ln GDP combined	1.626***	5.256	2.597***	2.212***	15.36**	2.590***	1.782***	0.811	2.065***
	(0.068)	(3.350)	(0.331)	(0.091)	(7.161)	(0.397)	(0.125)	(5.116)	(0.249)
ln similar GDP	0.640***	2.699	1.697***	0.740***	7.651**	1.542***	0.793***	0.615	1.303***
	(0.095)	(1.673)	(0.177)	(0.109)	(3.551)	(0.214)	(0.081)	(2.552)	(0.187)
ln distance	-0.53***	-0.675***	-0.39***	-0.603***	-0.634***	-0.528***	-0.633***	-0.859***	-1.21***
	(0.057)	(0.034)	(0.105)	(0.0984)	(0.130)	(0.115)	(0.0787)	(0.0860)	(0.208)
Border	0.0419	0.256***	0.343**	-1.148***	0.339	0.0477	0.0399	0.705***	-2.072***
	(0.126)	(0.072)	(0.154)	(0.255)	(0.272)	(0.262)	(0.195)	(0.130)	(0.416)
Common language	0.648***	0.451***	0.412***	1.573***	0.598***	0.830***	1.150***	0.284*	2.319***
	(0.129)	(0.089)	(0.130)	(0.218)	(0.191)	(0.209)	(0.170)	(0.165)	(0.424)
Colony	-0.0273	0.0446	0.174	-0.414	-0.650***	0.0140	-0.317	-0.142	0.242
	(0.127)	(0.100)	(0.138)	(0.253)	(0.164)	(0.216)	(0.198)	(0.199)	(0.326)
Both EU	0.166	0.071	0.600**	0.181	-0.457	0.755***	0.518**	-0.370	-0.632
	(0.128)	(0.127)	(0.272)	(0.212)	(0.319)	(0.284)	(0.217)	(0.474)	(0.788)
Host FDI restr.	-0.373			-2.786			-0.0647		
	(0.649)			(1.701)			(0.355)		
Source FDI restr.	-0.954			-2.955***			-0.813**		
	(0.664)			(1.035)			(0.368)		
Host price index	1.369***			5.480***			-1.561***		
	(0.373)			(1.616)			(0.442)		
Source price index	0.737***			3.199***			1.128***		
	(0.218)			(0.423)			(0.214)		
Heterogeneous SAB	1.626***	0.233*	-0.761**		1.025***	-1.408***		0.511**	0.175
	(0.0681)	(0.120)	(0.376)		(0.385)	(0.426)		(0.215)	(0.670)
Heterogeneous TAB	0.640***	-0.322***	-0.482**		-0.765***	-0.871***		-0.082	-0.780*
	(0.095)	(0.093)	(0.230)		(0.218)	(0.254)		(0.182)	(0.427)
Observations	514	2477	650	619	1063	650	632	1111	650
Pseudo R-squared	0.864	0.942	0.918	0.819	0.941	0.876	0.784	0.911	0.914

Note: The PPML estimator is used in all regressions. Country and time dummies are used.

Table A9. The relation between trade and restrictions on FDI and vice versa, transport, computer and other business services

	Transport			Computer services			Other business services		
		Trade	FDI		Trade	FDI		Trade	FDI
ln GDP combined	1.736***	5.640*	1.692***	2.086***	8.668	3.390***	2.019***	4.415	3.614***
	(0.0399)	(3.187)	(0.155)	(0.216)	(7.066)	(0.391)	(0.0952)	(4.280)	(0.332)
Ln similar GDP	0.765***	2.931*	1.146***	0.563***	4.281	1.953***	0.592***	2.173	2.199***
	(0.0435)	(1.594)	(0.168)	(0.188)	(3.538)	(0.242)	(0.119)	(2.139)	(0.219)
ln distance	-0.458***	-0.503***	-1.133***	-0.602***	-0.571***	-0.538***	-0.686***	-0.588***	-0.854***
	(0.0379)	(0.0418)	(0.165)	(0.154)	(0.107)	(0.178)	(0.0692)	(0.0512)	(0.136)
Border	0.192**	0.500***	-0.715**	-0.00219	-0.574**	0.0181	0.0107	0.407***	-0.118
	(0.0875)	(0.0689)	(0.313)	(0.237)	(0.228)	(0.184)	(0.197)	(0.136)	(0.242)
Common language	0.304***	0.169**	1.029***	0.422**	0.143	0.771***	0.665***	0.337***	0.736***
	(0.0787)	(0.0770)	(0.268)	(0.185)	(0.206)	(0.234)	(0.212)	(0.128)	(0.242)
Colony	0.184**	0.135	0.0857	-0.0220	0.533**	0.231	-0.644***	-0.342***	-0.116
	(0.0910)	(0.104)	(0.309)	(0.206)	(0.214)	(0.260)	(0.173)	(0.117)	(0.283)
Both EU	0.200**	0.209*	-0.876	0.406	0.609*	0.504	-0.290**	0.109	-0.650
	(0.101)	(0.126)	(0.638)	(0.401)	(0.350)	(0.460)	(0.139)	(0.205)	(0.528)
Host FDI restrictions	0.750***			0.0256			-0.744		
	(0.261)			(1.303)			(0.835)		
Source FDI restrictions	0.901***			-0.424			-1.809***		
	(0.313)			(1.180)			(0.478)		
Host price index	0.481**			1.954***			1.237*		
	(0.201)			(0.687)			(0.684)		
Source price index	1.385***			1.829***			1.423***		
	(0.136)			(0.394)			(0.190)		
Heterogeneity SAB		0.0386	-0.490		0.597*	-1.385**		-0.236	-1.912***
		(0.165)	(0.584)		(0.340)	(0.564)		(0.165)	(0.452)
Heterogeneity TAB		-0.154	-0.720		-0.158	-0.823***		-0.215*	-0.770**
		(0.123)	(0.444)		(0.215)	(0.294)		(0.116)	(0.389)
Observations	1248	2179	650	598	1005	650	691	1217	650
Pseudo R-squared	0.825	0.902	0.808	0.690	0.925	0.946	0.832	0.952	0.910

Note: The PPML estimator is used in all regressions. Country and time dummies are used.

Table A10. Relation between regulation and choice of mode, total services

	PMR	***SC***	***IBO***	***SAB***	***CRE***	***ENC***	***ABA***
ln relative GDP per capita	-5.078*	-5.136*	1.995***	-1.328	-1.368	-1.564	-1.620
	(2.995)	(3.003)	(0.410)	(2.204)	(2.232)	(2.224)	(2.202)
ln distance	0.0227	0.0234	-0.0514	0.0961	0.0692	0.0789	0.0436
	(0.172)	(0.173)	(0.175)	(0.0856)	(0.0875)	(0.0865)	(0.0860)
Border	-0.358	-0.380	-0.413	-0.0465	-0.0517	-0.113	-0.0347
	(0.314)	(0.314)	(0.358)	(0.183)	(0.186)	(0.185)	(0.183)
Common language	-0.796**	-0.824**	-1.255***	-0.726***	-0.614***	-0.864***	-0.645***
	(0.400)	(0.400)	(0.421)	(0.186)	(0.200)	(0.188)	(0.187)
Both EU	0.598	0.562	0.618	0.169	0.158	0.163	0.124
	(0.455)	(0.455)	(0.435)	(0.186)	(0.189)	(0.188)	(0.186)
Colony	-0.213	-0.203	-0.0745	0.193	0.0886	0.0890	0.141
	(0.398)	(0.399)	(0.431)	(0.202)	(0.204)	(0.203)	(0.201)
Regulatory heterogeneity	3.210**	1.659*	1.309*	1.627***	0.558***	0.676***	2.321***
	(1.583)	(0.924)	(0.790)	(0.273)	(0.210)	(0.171)	(0.379)
Observations	424	424	287	1139	1139	1139	1139
R-squared	0.576	0.575	0.592	0.579	0.568	0.571	0.579
memo: impact of one sd change in HG	25%	19%	25%	49%	16%	22%	45%

Note: Column headings refer to the heterogeneity indicators, which are defined as follows: PMR overall product market regulation: SC= state control; IBO= government involvement in business; SAB=regulation related to starting a business (from World Bank); CRE=getting credit (from World Bank); ENC=enforcement of contracts (from World Bank); ABA=overall regulation (from World Bank). Standard errors are in parentheses.

Table A11 . Relation between regulation and choice of mode, financial and communication services

		Finance		*Communication*
	SAB	TAX	ABA	LIC
ln relative GDP per capita	4.253	0.775	3.512	0.576*
	(7.864)	(0.502)	(7.915)	(0.326)
ln distance	-0.339	-0.374	-0.434*	-0.259
	(0.216)	(0.457)	(0.222)	(0.286)
Border	2.027***	2.730***	1.976***	1.414*
	(0.525)	(1.020)	(0.529)	(0.742)
Common language	-2.935***	-3.430***	-2.766***	-0.468
	(0.472)	(0.922)	(0.487)	(0.659)
Both EU	0.634	0.628	0.578	1.692
	(0.690)	(1.590)	(0.696)	(1.214)
Colony	1.236***	0.902	1.089**	0.815
	(0.465)	(0.921)	(0.464)	(0.623)
Regulatory heterogeneity	2.239***	-2.432*	2.749**	1.516**
	(0.704)	(1.302)	(1.233)	(0.643)
Observations	393	139	393	164
R-squared	0.621	0.642	0.616	0.701
memo: impact of one sd change in HG	73%	-52%	55%	57%

Note: Column headings refer to the heterogeneity indicators, which are defined as follows: SAB=regulation related to starting a business (from World Bank); TAX=paying taxes (from World Bank); LIC=dealing with licences (from World Bank); ABA=overall regulation (from World Bank). Standard errors are in parentheses.

Table A12 Relation between regulation and choice of mode, transport services

	PMR	***EBT***	***SC***	***PO***	***IBO***	***RAO***	***SAB***	***RPR***	***CRE***	***ABA***
ln relative GDP per capita	-3.042	-3.322	-3.234	1.992**	2.325**	-3.593	-4.557	4.140	-4.638	-4.785
	(3.566)	(3.563)	(3.568)	(1.008)	(0.993)	(3.583)	(3.180)	(6.199)	(3.178)	(3.174)
ln distance	0.0452	0.0244	0.0433	-0.165	-0.133	0.0939	0.151	0.324*	0.109	0.112
	(0.210)	(0.210)	(0.210)	(0.227)	(0.226)	(0.210)	(0.124)	(0.166)	(0.125)	(0.124)
Border	0.896**	0.812**	0.883**	0.829*	0.799*	0.823**	0.696***	0.590*	0.703***	0.694***
	(0.376)	(0.375)	(0.375)	(0.455)	(0.453)	(0.375)	(0.263)	(0.333)	(0.263)	(0.263)
Common language	-0.587	-0.676	-0.637	-1.229**	-1.329**	-0.658	-0.762***	-0.767**	-0.521*	-0.649**
	(0.509)	(0.508)	(0.509)	(0.577)	(0.577)	(0.509)	(0.289)	(0.365)	(0.303)	(0.292)
Both EU	0.676	0.901	0.635	0.714	0.669	0.693	1.150***	1.451***	1.130***	1.135***
	(0.580)	(0.588)	(0.579)	(0.593)	(0.590)	(0.579)	(0.283)	(0.462)	(0.283)	(0.282)
Colony	-0.371	-0.339	-0.370	0.131	0.0422	-0.257	0.335	0.279	0.322	0.313
	(0.469)	(0.465)	(0.468)	(0.538)	(0.542)	(0.466)	(0.288)	(0.366)	(0.288)	(0.287)
Regulatory heterogeneity	3.220*	1.744**	2.103*	2.160*	1.782*	-1.642**	1.151***	-0.772*	0.964***	1.984***
	(1.894)	(0.796)	(1.103)	(1.250)	(0.915)	(0.811)	(0.396)	(0.412)	(0.305)	(0.548)
Observations	405	405	405	266	266	405	1021	693	1021	1021
R-squared	0.519	0.522	0.520	0.570	0.571	0.521	0.532	0.560	0.532	0.534
memo: impact of one sd change in HG	26%	30%	24%	29%	35%	-21%	33%	-20%	29%	37%

Note: Column headings refer to the heterogeneity indicator used, which are defined as follows: PMR= overall product market regulation EBT= explicit barriers to trade and investment; SC= state control; PO=public ownership; IBO= government involvement in business; SAB=regulation related to starting a business (from World Bank); RPR=registering property (from World Bank); CRE=getting credit (from World Bank); ABA=overall regulation (from World Bank). Standard errors are in parentheses.

Table A13. Relation between regulation and choice of mode, computer and related services

	EBT	*IBO*	*ABS*	*LIC*	*ABA*
ln relative GDP per capita	-4.760	1.729*	1.722	0.124	4.229
	(7.017)	(0.914)	(6.949)	(0.462)	(5.028)
ln distance	-0.934**	-0.802*	-1.025***	-0.347	-0.478**
	(0.382)	(0.424)	(0.379)	(0.419)	(0.196)
Border	0.222	1.322	-0.136	-0.558	0.118
	(0.694)	(0.835)	(0.686)	(1.036)	(0.496)
Common language	-0.0786	-1.215	0.0989	0.255	-0.805*
	(0.836)	(0.927)	(0.817)	(0.960)	(0.467)
Both EU	0.617	-0.322	-0.00522	1.128	0.715
	(1.302)	(1.383)	(1.272)	(1.682)	(0.630)
Colony	-0.657	0.291	-0.760	0.859	1.169***
	(0.861)	(0.958)	(0.849)	(0.903)	(0.447)
Regulatory heterogeneity	4.058***	3.052**	-4.247***	1.561*	2.276*
	(1.473)	(1.463)	(1.250)	(0.938)	(1.165)
Observations	154	92	154	144	411
R-squared	0.645	0.714	0.656	0.667	0.603
memo: impact of one sd change in HG	85%	67%	-48%	59%	44%

Note: Column headings refer to the heterogeneity indicator used, which are defined as follows: EBT= explicit barriers to trade and investment; IBO= government involvement in business; ABS=administrative burden on start-ups LIC=dealing with licences (from World Bank); ABA=overall regulation (from World Bank). Standard errors are in parentheses.

Table A14. Relation between regulation and choice of mode, other business services

	BT	*EBT*	*IBO*	*RAO*	*SAB*	*ENC*
ln relative GDP per capita	-0.294	-6.325	0.0328	-0.396	-1.603	-1.535
	(0.852)	(6.897)	(0.830)	(7.044)	(3.836)	(3.838)
ln distance	-0.327	-0.509	-0.330	-0.513	-0.286	-0.315*
	(0.346)	(0.355)	(0.346)	(0.364)	(0.177)	(0.178)
Border	0.578	-0.218	0.803	-0.317	0.993**	0.973**
	(0.734)	(0.691)	(0.739)	(0.705)	(0.451)	(0.452)
Common language	-1.175	-0.613	-1.388*	-0.264	-0.423	-0.479
	(0.814)	(0.836)	(0.819)	(0.847)	(0.400)	(0.401)
Both EU	-0.0491	-0.538	-0.922	-1.475	-0.874	-0.852
	(1.302)	(1.327)	(1.247)	(1.348)	(0.563)	(0.563)
Colony	0.687	0.298	0.683	0.362	0.00139	-0.130
	(0.773)	(0.810)	(0.772)	(0.829)	(0.405)	(0.400)
Regulatory heterogeneity	5.578**	4.198***	2.829**	2.437*	1.135**	0.679*
	(2.472)	(1.311)	(1.223)	(1.306)	(0.577)	(0.379)
Observations	114	186	114	186	469	469
R-squared	0.834	0.727	0.835	0.714	0.713	0.713
memo: impact of one sd change in HG	78%	89%	61%	41%	32%	22%

Note: Column headings refer to the heterogeneity indicator used, which are defined as follows: BT= barriers to trade and investment; EBT= explicit barriers to trade and investment; IBO= government involvement in business; RAO=regulatory and administrative opacity; SAB=regulation related to starting a business (from World Bank); RPR=registering property (from World Bank); ENC=enforcing contracts (from World Bank).

Table A15. Summary statistics on banking regulation heterogeneity

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Entry into banking	2213	0.66	0.22	0	1
Ownership restrictions	2213	0.44	0.38	0	1
Capital requirements	2213	0.30	0.22	0	1
Activity restrictions	2213	0.64	0.26	0	1
Liquidity & Diversification Requirements	2213	0.30	0.27	0	1
Discipline/ Problem Institutions/Exit	2213	0.63	0.25	0	1
Supervision	2213	0.47	0.16	0	1
All business areas	2213	0.52	0.10	0	0.77

Table A16. Summary statistics on Doing Business heterogeneity

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Starting a business	6535	0.34	0.25	0	1
Dealing with licenses	3128	0.52	0.30	0	1
Employing workers	6535	0.43	0.42	0	1
Registering property	4946	0.38	0.28	0	1
Getting credit	6535	0.52	0.27	0	1
Paying taxes	3128	0.45	0.30	0	1
Trading across borders	3128	0.62	0.28	0	1
Enforcing contracts	6535	0.54	0.29	0	1
Closing a business	6535	0.48	0.31	0	1
All business areas	6535	0.47	0.15	0	0.92
All business areas (indicator over those policy areas for which a complete time series is available)	6535	0.46	0.16	0	0.92

ANNEX 2.
DOCUMENTATION OF THE APPLIED POLICY INDICATORS

This annex describes the methodology for the policy indicators used in the present paper. Emphasis is on the documentation of the non-OECD indicators.

To investigate econometrically how and how much the regulatory environment affects the decisions by individual firms we need quantitative indicators. The indicators must cover multiple dimensions of regulatory differences between countries, such as the area of regulation, the types of regulatory instruments, the responsible agencies, the legal status, the sector coverage, exemptions, transparency, and treatment of foreign companies. All dimensions of the regulatory climate may affect the relative costs and attractiveness of direct investment between two countries. A combination of different regulatory indicators may be required to cover all relevant policy differences. For ranking countries in terms of the strictness of their product-market regulation we may need a different indicator than when we want to grasp the overall cost impact of a country's regulatory system on the costs of individual firms. Both indicator approaches are useful, but for different purposes. More detailed indicators are required when we want to pinpoint what types of regulation are most decisive for bilateral trade and FDI. This annex briefly documents the regulation indicators we used in the present study.

Two ways of quantifying differences in economic policies and business environment

The OECD system of indicators for product-market regulation (PMR) forms a seminal contribution to a comprehensive measurement of many aspects of product market regulation across countries (Nicoletti, Boylaud and Scarpetta 2002). The emphasis in the OECD system of PMR indicators is on providing a consistent set of indicators that measures the *relative strictness of product market regulation in a country compared to that in other OECD countries*. It also provides summary indicators for sub-areas of product market regulation: barriers to competition; administrative barriers for start-ups; regulatory and administrative opacity; explicit barriers to trade and investment; and state control (Conway *et al.* 2005). The information is based on a large number of different data points, and the information is mainly provided by OECD member governments. Limitations of these indicators are that they do not cover non-OECD countries, and that -at the moment of writing- they were only available for 1998 and 2003.

A different measurement approach is adopted by the Cost of Doing Business project of the World Bank, following prior work by a group of Harvard economists (Djankov *et al.* 2002; 2008). They apply a new way for measuring national differences in business climate and institutions. The approach uses fictive but well-defined business cases (e.g. a very specific trading transaction, a firm's request for a specific expansion of a storehouse, or setting up a new firm). The Doing Business team (with local assistance) subsequently quantifies how such standardized business plans are typically handled by a country's regulatory and judicial system and government apparatus (World Bank, 2008). The same business case is applied in all countries. For each country (in 2008: 181), they use different and not always revealed private

and governmental information sources.[28] They provide an 'Ease of Doing Business' country ranking, for every business area. A ranking list is for our purposes a somewhat inferior way of measuring the relative performance of countries. For this reason we have constructed our own regulation-level indicators on the basis of the World Bank Cost of Doing Business database. This procedure is documented below. The Cost of Doing Business indices are updated each year and they are available for a very large set of countries. The number of measuring points per country is less than for the OECD PMR (sub-)indicators.

A third approach to measuring differences in policy and business environment is developed by CPB Netherlands Bureau for Economic Policy Analysis. Its emphasis is not on the ranking of countries, but on assessing to what extent specific policies differ between any pair of countries. The background idea is that for the individual company that considers export or FDI, it is important to know *to what degree policies in the target country are dissimilar to policies in the firm's home country*.[29] For the firm this may even be more important than the question of relative country rankings, since adaptation to and compliance with different policies goes along with changes in working practices and sunk costs. Such adaptation and compliance costs are in fact a latent variable that we cannot observe directly. But we may proxy the importance of such costs by the degree of regulatory heterogeneity (dissimilarity) between country pairs. The basic measurement approach is virtually free of subjective judgements. The method digitalizes policy differences for each pair of countries, thus allowing to aggregate policy items across different dimensions. The reliability of the approach increases with the number of data points used in the measurement. The heterogeneity indices have been calculated on the basis of the full databases that are beneath the OECD's PMR indicators and the World Bank's Cost of Doing Business indicators

Table A2.1 Regulatory indicators used for quantitative analysis in this paper

		Topic of comparison	
		Product-market regulation of countries	Regulatory impact on Cost of Doing Business
Regulatory aspect	Relative ranking of policy strictness in countries	1. OECD PMR ranking (sub-) indicators	2a. Level indicators WB Cost of Doing Business 2b. FDI Restrictiveness Index OECD
	Bilateral heterogeneity (dissimilarity) between country pairs	3. CPB bilateral heterogeneity indices based on OECD International Regulation database	4. CPB bilateral heterogeneity indices based on WB Cost of Doing Business database

Table A2.1 summarises the main differences and correspondences between these policy indicators. For an analytical description of the third set of indicators in Table A2.1 we refer to a former OECD

[28] A recent independent evaluation of the World Bank Cost of Doing Business indicator system (IEG 2008) concluded that "overall the indicators objectively and reliably measure what they set out to measure" and that the indicators indeed depicted regulatory aspects that matter for individual firms. However the evaluators stressed that this is not yet a welfare analysis that also weighs the potential benefits of regulation (e.g. regarding policy areas like 'employing workers' and 'paying taxes'). The evaluation has led to a few changes (World Bank 2008).

[29] See for a more comprehensive description of the bilateral policy heterogeneity indicator, its analytical underpinning and its empirical derivation, Kox and Nordås (2007) and Kox (2009). The full dataset will become available soon at www.cpb.nl early in 2009.

document (Kox and Nordås 2007, Annex 3). Here we describe the method for deriving the regulation indicators 2a and 4 that have been developed for this publication.

Regulation level indicators based on World Bank Cost of Doing Business database

Since the World Bank only produces country rankings on the basis of the Doing Business (DB) database we have decided to produce our own indicators of regulation-caused costs of doing business per country. The Doing Business (DB) database was started in 2003 and in recent years includes 97 data points per year per county on the basis of which the costs of doing business for that country are determined. A large part of the data is collected by measuring the way in which a country handles business plans in specified areas. The following business areas are covered: *Starting a Business, Dealing with Licenses, Employing workers, Registering Property, Getting Credit, Protecting investors, Paying Taxes, Trading Across Borders, Enforcing Contracts, and Closing a Business*. With the exemption of *Trading Across Borders*, all regulation areas cover behind-the-border types of regulation. For each of these areas a number of sub-indicators are available. We have used a selection of 28 sub-indicators.[30] For two business areas (Getting Credit, Protecting Investors) the selection criteria meant that no variables were left. This leaves us with eight DB regulation areas and 28 subsumed variables that can be used to make comparisons across countries and comparisons over time. All subsumed variables are defined such that an increase of the indicator can be expected to increase the costs of business transactions, and hence also the costs of international trade or FDI transactions with firms in the country. These variables are used to derive regulation level indicators for specified business areas.

We have applied the following aggregation procedure.

1. Divide sub-indicator *j* score of country *i* by country-sample average for sub-indicator *j*, yielding index numbers Q_{ji} (time suffix suppressed);

2. Divide item Q_{jit} score of country *i* in year *t* by the corresponding country-sample average in base year *0*, yielding normalised indicator $R_{ijt}=Q_{jit}/Q_{j0}$;

3. Correct annual country score R_{ijt} for annual percentage of change in sample average, multiplying by $[\,1 - [(Q_{jt} - Q_{jt-1})/ Q_{jt-1}\,]\,]$ which yields corrected country scores RC_{ijt}. We have applied simple averages, thus avoiding that subjective elements are added as weights.

4. Aggregate all RC_{ijt} for regulation area *A* to arrive at transformed and normalised country score RC_{iAt} for regulation area A. It describes the relative costs of doing business in country *i* that is associated with regulation in business area *A*. Scoring high on this index can be expected to represent relatively high regulatory costs at firm level. Since the indicator is also normalised with respect to a common base year, RC_{iAt} can also be applied to represent the impacts of deregulation over time. This aspect is useful in the time panel dimension of analysis.

5. Except for these area-specific RC_{iAt} indicators, we have also aggregated the eight business areas by simple averaging to get an indicator for overall regulation-caused cost of doing business in a country. This indicator is called ABA_{it} (All Business Areas).

[30] The selection criteria are: (a) only continuous numerical sub-indicators; (b) only sub-indicators that are directly affected by national regulatory policies; (c) no sub-indicators that rather than describing a country's regulatory characteristics describe strictly political preferences of the country like tax levels or the use of minimum wages (we left out the latter indicators).

The acronyms per business areas are: ENC - Enforcing contracts; EMP - Employing Workers; TAB - Trading across Borders; SAB - Starting a Business; CLO - Closing a Business; LIC - Dealing with Licenses; RPR - Registering Property; TAX - Paying Taxes; ABA - All Business Areas.

Bilateral heterogeneity indices based on World Bank Cost of Doing Business database

This set of indicators of bilateral policy heterogeneity is derived from the 2008 version of the World Bank's Doing Business (DB) database.[31] The dataset has backward extended to include data from 2003 onwards. The DB database in 2008 included 10 policy areas as indicated in Table A2.2.

The basic principle of the DB heterogeneity indicator is that multiple-dimension and partly qualitative information on the business environment is reduced to dimensionless binary information. The numbers of dimensions in which overall bilateral differences are measured ranges between 13 and 86. The information from this large number of dimensions is subsequently digitalised and compressed to arrive at dimensionless heterogeneity indicators, specific for each pair of countries. The bilateral heterogeneity indicator is based on a simple average over all policy items for each of the ten areas of the business environment depicted in Table A2.2.

Table A2.2 Bilateral heterogeneity indicators derived from World Bank DB database

Business environment area	Bilateral heterogeneity variables	
	Name	Number of separate data point used for calculating bilateral indices
1. Starting a business	HG_SAB	4
2. Dealing with licenses	HG_LIC	4
3. Employing workers	HG_EMP	5
4. Registering property	HG_RPR	3
5. Getting credit	HG_CRE	10
6. Protecting investors	HG_PIN	2
7. Paying taxes	HG_TAX	6
8. Trading across borders	HG_TAB	6
9. Enforcing contracts	HG_ENC	3
10. Closing a business	HG_CLO	3
All business environment areas	HG_ABA	46

The aggregation procedures do not apply any weights, so that the composite heterogeneity indicator per area is not based on subjective information elements. We briefly summarise how the aggregation procedure works, starting with the simplest case:

A. Suppose for instance that business environment area "Registering Property" is measured through three data points P,Q and R for each of which it can unequivocally be assessed whether or not these

[31] For the general methodology of the World Bank Cost of Doing Business indicators we refer to www.doingbusiness.org where the Doing Business methodology is described and from which the full database can be downloaded.

regulation attributes apply in a country. This gives logical information of a binary nature: we can assess unambiguously whether or not this regulation attribute applies or not. Take item *R* that we compare for two countries *i* and *j*. The dissimilarity indicator h_{ij}^{R} has the value of 1 when both countries are *dis*similar with respect to *R*, and 0 in the opposite case. The same can be done for the other regulation attributes *P* and *Q* and the corresponding dissimilarity indicators h_{ij}^{P} , h_{ij}^{Q} . The combined bilateral heterogeneity indicator for "Registering Property" then becomes: $\mathrm{HG\_RPR} = \frac{1}{3}\left(h_{ij}^{P} + h_{ij}^{Q} + h_{ij}^{R}\right)$. It always has a value between 0 and 1. If HG_RPR=1 it means that the two countries differ in all policy attributes that together measure the area "Registering Property".

B. This was the simplest case where the basic country information has a binary nature. It becomes a bit more complex when for instance policy item *G* can have 4 different, discrete values, like 'non-existent', 'low', 'average' and 'high'. Here we can nonetheless still unequivocally assess whether countries are different or not. But because the number of possible values for *G* is higher, the likelihood that two countries are different increases. To prevent that the heterogeneity score becomes a function of the number of discrete values that *G* can have, the number of possible values for a comparison item is compressed, so that it never can have more than six different values. Note that all countries are compared with regard to the same item *G*, so that the heterogeneity pattern *between* countries is never disturbed by the fact that some comparison items may take more than two discrete values.

C. Some of the basic variables in the DB database have a continuous numerical value, e.g. the number of days it takes for a firm to get a start-up license. Since continuous variables by their nature can have lots of different values a variety-reducing method has been applied by assigning a limited range of different intervals for a specific continuous variable. Per variable we first determine the maximum range that contains all numerical values in the sample. The range is divided by the standard deviation, yielding a value K. The next step takes care of the higher moments of the distribution by a correction factor E that corrects for the relation between the mean and the standard deviation.[32] Now it is possible to determine the potential number of different value intervals for that numerical variable, using a lower threshold of three categories and a ceiling of maximum six categories:

$$Z = \left|\mathrm{int}(K.E)\right| \quad \text{with } 3 \le Z \le 6$$

This procedure is applied individually for each continuous variable. Subsequently, for all countries the continuous variable is re-coded according to the number of intervals Z. The bilateral heterogeneity indicator per item can now be derived as in steps A and B.

D. The overall bilateral heterogeneity indicator for a specific regulation area X is derived by summing all item-wise heterogeneity indicators for area X and dividing by the number of non-empty data points for that area.

The heterogeneity indicators thus obtained are dimensionless numbers based on digitalising the bilateral differences in economic policy and regulation items. For comparisons over time, it is important that the number and nature of comparison items are constant over time. Otherwise the heterogeneity indicator should be treated as an annual cross section rather than as a time series. We have calculated

[32] The correction factor is calculated as: $E = 1 - \frac{M - \sigma}{(\sigma - M)^2}$ in which M is the mean value and σ is the standard deviation. The denominator is squared so that it is always positive.

bilateral heterogeneity indicator HG_ABA2 which is based on those data cells for which information is available over the entire period (covering policy areas HG_SAB, HG_CRE, HG_ENC and HG_CLO).

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