No 2007 – 08
May

The Effect of Domestic Regulation on Services Trade Revisited

Cyrille Schwellnus

The Effect of Domestic Regulation on Services Trade Revisited

Cyrille Schwellnus

No 2007 – 08
May

The Effect of Domestic Regulation on Services Trade Revisited

Cyrille Schwellnus

No 2007-08
May

Contents

THE EFFECT OF DOMESTIC REGULATION ON SERVICES TRADE REVISITED

NON TECHNICAL SUMMARY

Services trade liberalisation is on the top of the agenda of trade negotiators both at the multilateral and at the bilateral level. At the multilateral level services trade liberalisation is negotiated in the framework of the General Agreement on Trade in Services (GATS) and most bilateral trade agreements now include a section on services. In contrast to negotiations over goods trade liberalisation for which negotiators are informed by reliable data and a well established body of research, services trade data and studies on services trade liberalisation based on them have only recently become available. Given the intangible nature of services that precludes the imposition of tariffs, policy induced barriers to services trade take the form of specific domestic regulations. A common approach to studying services trade liberalisation consists thus in the analysis of correlations between services trade and domestic regulation indicators. This approach has to deal with four main difficulties. (i) Services trade data are of low quality as compared to data on trade in physical goods, (ii) precise quantitative measures of domestic regulations impeding services trade are not readily available, (iii) domestic regulations may be influenced by services trade and may therefore not be considered as exogenous variables, and (iv) cross country studies are likely to yield spurious results if it is not appropriately controlled for unoberserved country heterogeneity.

The contribution of this paper is to reexamine the effect of domestic regulation on services trade using previously unexploited data that allow to address these four issues more carefully than previous studies. (i) Using the Eurostat International Trade in Services dataset it is focused on a services trade aggregate that measures as precisely as possible cross border trade in services and it is checked whether the obtained results are robust to different methods of handling inconsistencies. (ii) The aggregate product market regulation indicator developed by the Organisation for Economic Cooperation and Development (OECD) covers a large number of domestic regulations that constitute barriers to services trade and can (iii) be considered to be endogenous to services trade only to a limited extent. (iv) The recent release of a second year of the OECD regulation indicator in conjunction with the time coverage of the Eurostat International Trade in Services dataset allows the use of panel estimation techniques that partly control for unobserved country heterogeneity.

The descriptive statistics presented in this paper show a negative correlation between services trade and domestic regulation. However, the presented bivariate correlations between services trade levels (growth rates) and domestic regulation levels (growth rates) do neither appear to be statistically nor economically overwhelming. In the light of this descriptive evidence the large elasticities of services trade with respect to domestic regulation, between -1.2 and -2.3 for the exporting country depending on the specification, obtained from regressing bilateral services trade flows on a set of explanatory variables in the cross section are puzzling: Taken at face value, they would imply that a 10% decrease in the OECD PMR indicator would yield an increase in services trade of between 12% and 23%.

It is argued that the elasticities obtained from estimating this 'naive' gravity equation are likely to be biased because unobserved country characteristics are likely to be correlated with

the observed explanatory variables. The puzzle is solved by using the panel structure of the data and controlling for unobserved country heterogeneity by country fixed effects. The thus obtained elasticities reduce the estimated elasticities from the ‘naive’ gravity equation by a factor of 1.5 to 2 and are less robust to different methods of handling data inconsistencies. The most robust specification imposes the assumption that the elasticity of services trade increases with the level of domestic regulation. According to this specification, the effects of future domestic deregulation on services trade can be expected to be smaller than over the sample period 1998-2003 since in all OECD countries the level of domestic regulation is lower in 2003 than in 1998.

ABSTRACT

This paper uses the previously unexploited Eurostat ITS dataset and the latest release of the OECD Product Market Regulation indicators to reevaluate the effect of domestic regulation on cross border services trade. The empirical analysis is guided by recent theoretical advances in the theoretical derivation of the gravity equation which allows to avoid common sources of bias in previous studies. Once these common sources of bias are eliminated, the support for the claim that the domestic level of regulation reduces services trade is weakened.

JEL Classification: F13, F15, L80
Keywords: International Trade, Services, Gravity Model, Regulation

UNE RÉÉVALUATION DE L'EFFET DES RÉGLEMENTATIONS SUR LES ÉCHANGES DE SERVICES

RÉSUMÉ

La libéralisation des échanges de services est l'une des priorités des négociateurs commerciaux au niveau multilatéral comme bilatéral. La libéralisation multilatérale est négociée dans le cadre de l'accord général sur des échanges des services (GATS) ; quant aux accords commerciaux bilatéraux, la plupart incluent maintenant une section dédiée aux services. Mais alors que les négociations concernant la libéralisation des échanges de biens peuvent s'appuyer sur des données fiables et sur un corpus de recherche bien établi, les données sur les échanges de services et les études basées sur ces statistiques ne sont disponibles que depuis peu de temps et restent plus fragiles.

Etant donné la nature intangible des services, qui exclut l'imposition de droits de douane, les barrières aux échanges de services prennent la forme de réglementations domestiques spécifiques. L'approche habituelle des effets de la libéralisation consiste alors à analyser les corrélations existant entre les échanges de services et des indicateurs de réglementations nationales. Cependant, cette approche fait face à quatre difficultés principales : (i) les données sur les échanges de services sont de mauvaise qualité, (ii) des mesures quantitatives précises des réglementations nationales limitant les échanges de services ne sont pas aisément disponibles, (iii) ces réglementations peuvent être influencées par les échanges de services eux-mêmes et ne peuvent donc pas être considérées comme des variables exogènes, et (iv) les comparaisons entre pays sont susceptibles d'amener à des conclusions erronées si n'est pas pris en compte l'ensemble des sources d'hétérogénéité entre pays.

La contribution de cet article est de réexaminer l'effet des réglementations sur les échanges de services en utilisant des données jusque-là inexploitées qui permettent de traiter ces quatre difficultés plus soigneusement que ne l'ont fait les études existantes. (i) Partant de la base Eurostat qui concerne l'ensemble des échanges bilatéraux de services, nous ne retenons que les échanges transfrontaliers et nous traitons les incohérences présentes dans la base selon différentes méthodes (nous pourrons par la suite vérifier la robustesse de nos résultats à ces options méthodologiques). (ii) L'indicateur de réglementation développé par l'OCDE qui est utilisé dans cet article couvre un grand nombre de réglementations touchant les échanges de services. (iii) Cet indicateur peut être considéré comme raisonnablement exogène aux échanges de services. (iv) La publication récente des données relatives à cet indicateur pour une deuxième année, en combinaison avec la couverture temporelle de la base Eurostat, permet l'utilisation de techniques d'estimation en panel, qui contrôlent en partie pour l'hétérogénéité non-observée entre pays.

Nous procédons dans un premier temps à une analyse statistique des corrélations entre échanges de services et réglementation, puis nous estimons un modèle économétrique (équation de gravité). Les statistiques descriptives mettent en évidence une corrélation négative entre le niveau de réglementation et les échanges de services. Cependant, les corrélations bivariées entre le niveau (ou le taux de croissance) des échanges de services et le niveau (ou le taux de croissance) de la réglementation paraissent assez faibles au niveau

économique comme au niveau statistique. Dès lors, les élasticités élevées des échanges de services par rapport à la réglementation nationale, que nous obtenons à partir de régressions en coupe des échanges bilatéraux de services sur un ensemble de variables explicatives, paraissent surprenantes : elles impliqueraient qu'une réduction de 10% du niveau de réglementation augmenterait les échanges de services de 12% à 23%. Nous montrons alors que ces élasticités, obtenues à partir d'une équation de gravité "naïve", peuvent être biaisées du fait que les caractéristiques non-observées des pays sont susceptibles d'être corrélées avec les variables explicatives observées. Ce problème est résolu en employant la structure de panel des données et en contrôlant pour l'hétérogénéité non-observée entre pays par des effets fixes-pays. Les élasticités ainsi obtenues sont de 1,5 à 2 fois plus faibles que celles obtenues par l'estimation de l'équation de gravité "naïve" et sont moins robustes à différentes méthodes de traitement des incohérences dans les données. Il s'avère que la spécification la plus robuste impose l'hypothèse que l'élasticité des échanges de services par rapport au niveau de réglementation nationale augmente avec son niveau. D'après cette spécification la poursuite de la déréglementation après 2003 devrait avoir un impacte moins important que ce qu'il a été sur la période 1998-2003 : Tous les pays de l'OCDE ayant un niveau de réglementation plus faible en 2003 qu'en 1998.

RÉSUMÉ COURT

Ce papier utilise la base de données Eurostat sur les échanges de services et la plus récente édition des indicateurs de réglementations des marchés des produits de l'OCDE pour réexaminer l'effet de la réglementation nationale sur les échanges de services transfrontaliers. L'analyse empirique est guidée par les récentes avancées théoriques sur l'équation de gravité, ce qui permet d'éviter les sources de biais communes aux études disponibles jusqu'ici. Une fois ces sources de biais éliminées, le support empirique de l'hypothèse selon laquelle la réglementation domestique réduit les échanges de services se trouve affaibli.

Classification *JEL* : F13, F15, L80
Mots Clefs : Commerce International, Services, Modèle de Gravité, Réglementation

THE EFFECT OF DOMESTIC REGULATION ON SERVICES TRADE REVISITED [1]

Cyrille SCHWELLNUS [2]

1 Introduction

Services trade liberalisation is on the top of the agenda of trade negotiators both at the multilateral and at the bilateral level. At the multilateral level services trade liberalisation is negotiated in the framework of the General Agreement on Trade in Services (GATS) and most bilateral trade agreements now include a section on services. In contrast to negotiations over goods trade liberalisation for which negotiators are informed by reliable data and a well established body of research, services trade data and studies on services trade liberalisation based on them have only recently become available. This paper reexamines the existing empirical evidence using both previously unexploited services trade data and extending the estimation methods applied in previous contributions.

Given the intangible nature of services that precludes the imposition of tariffs, policy induced barriers to services trade take the form of specific domestic regulations. These domestic regulations can either discriminate against foreign service providers, as would be the case of a restriction on the number of foreign service providers allowed in the domestic market, or be nondiscriminatory but nonetheless act as a barrier to services trade, as would be the case of a licensing requirement that applies equally to domestic and foreign service providers. The effect of these regulations on services is either mediated through an increase in the fixed costs of exporting, as would be the case of the abovementioned licensing requirement, or an increase in the variable costs, as would be the case of a requirement to use domestically produced inputs. Only few economists would challenge the commonsense claim that the elimination of these specific domestic regulations would boost services trade. However, its empirical verification and the quantification of the effect of these domestic regulations on services trade is more intricate because of data and methodological problems.

Firstly, the services trade data used in empirical studies on services trade are of low quality as compared to data on goods trade. Even though major international institutions have made a concerted effort to issue guidelines on the collection of services trade data, concepts and definitions still differ between countries.[3]

Secondly, precise quantitative measures of domestic regulations impeding services trade are not readily available. While some progress has been made in recent years, the currently available indicators still suffer from limited country coverage, limited sectoral disaggregation

[1] I thank Agnès Bénassy, Matthieu Crozet and Thierry Mayer for helpful comments. All remaining errors are mine.

[2] CEPII, 9 rue Georges Pitard, 75015 Paris, cyrille.schwellnus@cepii.fr

[3] For the guidelines see United Nations et al. (2002).

and a limited time dimension.[4]
Thirdly, the specific regulations impeding services trade may potentially not be exogenous. Instead of domestic regulations having a causal effect on services trade, it cannot be excluded that services trade may have a causal effect on domestic regulations. A plausible mechanism would be as follows: Technological progress as, for instance, in the form of lower costs of telecommunication leads to higher volumes of services exports. Services exporters have higher stakes in services trade liberalisation and pressure the government to eliminate specific regulations that impede services trade.
Finally, empirical studies on the effect of domestic regulations on services trade usually resort to a gravity equation approach that consists in regressing bilateral services trade flows on gross domestic products (GDPs), proxies of bilateral trade barriers and other potential determinants of bilateral services trade flows. This particular type of cross country regression suffers from omitted variable bias if unobserved country heterogeneity is correlated with some of the explanatory variables.
The contribution of this paper is to reexamine the effect of domestic regulation on services trade using previously unexploited data that allow to address the four abovementioned issues more carefully than previous studies. Firstly, the use of the Eurostat International Trade in Services (ITS) dataset that has a more comprehensive sectoral coverage than previously used datasets allows to focus on a services trade aggregate that measures as precisely as possible cross border trade in services. Transport and travel which are likely to be largely determined by trade in goods are excluded from the analysis. Potential problems of reliability of the used Eurostat ITS data are discussed and the robustness of the obtained results to different methods of handling inconsistencies is checked. Secondly, the use of an aggregate product market regulation (PMR) indicator provided by the Organisation for Economic Cooperation and Development (OECD) allows to capture regulations that are highly relevant to services trade. Thirdly, the use of an aggregate PMR indicator has the advantage that it can be considered as endogenous to services trade only to a limited extent: While it is likely to be endogenous to aggregate economic developments, the claim of endogeneity of an aggregate PMR indicator to developments in services trade appears implausible. Finally, the recent release of an aggregate PMR indicator by the OECD for one additional year in conjunction with the more comprehensive time coverage of the Eurostat ITS dataset allows the use of panel estimation techniques that partly control for unobserved country heterogeneity.
This paper confirms results of previous studies on a robust negative correlation between domestic regulation and services trade. In contrast to previous studies that do not control for unobserved country heterogeneity, it argues that the evidence for the claim that domestic regulation reduces services trade is weakened once this common source of bias is eliminated: The estimated elasticities of services trade with respect to regulation are reduced by a factor of 1.5 to 2 and are less robust to different methods of handling inconsistencies in the data if it is appropriately controlled for unobserved country heterogeneity. In line with a recent

[4] See Findlay and Warren (2000) for the efforts of the Australian Productivity Commission to provide sectorally disaggregated indicators of barriers to services trade and Conway et al. (2005) for the efforts of the Organisation for Economic Cooperation and Development (OECD) to provide aggregate and sectorally disaggegated indicators of domestic regulations for several years.

report of leading academic economists on World Bank research (Banerjee et al., 2006) that criticises ‘placing fragile selected new research results on a pedestal [...]’, this paper argues that the drawing of robust policy conclusions requires further improvements in data quality and availability and further empirical research.

Section 2 starts with a critical review of the literature on the effect of domestic regulation on services trade. Section 3 presents the data and descriptive statistics on the correlation between the OECD PMR indicator and services trade. The short discussion of recent theoretical derivations of the gravity equation in section 4 provides the economic rationale for a ‘structural’ specification of the gravity equation and illustrates the direction of the likely bias induced by estimating a ‘naive’ specification. The huge effects of domestic regulation on services trade obtained from a ‘naive’ pooled cross section specification in section 5.1 are approximately reduced by a factor of two in the ‘structural’ panel estimations in section 5.2, which confirms the theoretical expectations on the direction of the bias. The robustness of the obtained results is checked in section 5.3 and section 6 concludes.

2 A Critical Review of the Literature

The first empirical study on the effect of domestic regulation on services trade is Nicoletti et al. (2003a,b). They use the first release of the OECD Trade in Services by Partner Country (TISP) dataset that covers the years 1999-2000. Combining this with an indicator for domestic regulation that is the sum of sectoral regulation indicators in 12 disaggregated services sectors weighted by their GDP shares, they end up with approximately 500 bilateral services export observations. They find that domestic regulation has a significant and robust negative effect on services exports. One drawback of Nicoletti et al. (2003a,b) is that the analysis is conducted on total services trade including travel and transport. The second is that the indicator for domestic regulation used by Nicoletti et al. (2003a,b) does not capture regulation that is relevant to services trade very precisely. In particular, sectoral regulation indicators for the network industries and the retail sector that do essentially not trade in services are included in its calculation and weighted by their substantial GDP shares. Thirdly, they estimate the effect of their regulation indicator on services trade by resorting both to a ‘naive’ and to a sophisticated specification of the gravity equation, labelling the sophisticated one ‘transformed least squares’ (TLS). As pointed out in the introduction, the ‘naive’ specification is likely to yield biased estimates due to the omission of unobserved country specific determinants of services trade. TLS is an attempt to control for unobserved country heterogeneity when only a cross section of services trade data is available. To identify the coefficients of interest, TLS assumes that unobserved bilateral heterogeneity is uncorrelated with the observed explanatory variables. According to recent derivations of the gravity equation, this identification assumption is necessarily violated.[5] Since formal statistical tests often have low power, their non rejection of the exogeneity assumptions cannot

[5]In Anderson and van Wincoop (2003) unobserved bilateral heterogeneity is a function of observed bilateral distance so that, in theory, the identification assumption underlying TLS is necessarily violated.

be intepreted as supporting it.[6] The results reported in Nicoletti et al. (2003b) show that the OLS and TLS specifications yield almost identical coefficient estimates on their indicator of domestic regulation which casts additional doubts on the effectiveness of TLS to purge the estimates of cross country heterogeneity. Nicoletti and Mirza (2004) use a similar sample and similar estimation methods as Nicoletti et al. (2003a). Instead of the weighted mean of the regulation indicators in 12 services sectors they use the aggregate OECD PMR indicator for 1998 as a measure of domestic regulation and obtain again a robust negative and significant effect on services exports.

Kox and Lejour (2005) estimate a gravity equation augmented by the aggregate OECD PMR indicator and an indicator of regulatory heterogeneity. They find that the overall level of PMR in the exporting country and regulatory heterogeneity between the exporting and the importing country in the domains of barriers to competition and barriers to trade and investment have a significant and robust negative effect on services exports. Even though this study improves on Nicoletti and al. (2003) by excluding transport and travel from the analysis and by focusing on trade in commercial services, the approach is unconvincing on at least two grounds. Firstly, the estimation approach does not appropriately take into account the unobserved exporter and importer specific terms of recent structural derivations of the gravity equation since it applies the TLS estimation method of Nicoletti and al. (2003). This is again reflected in the fact that the coefficients from the 'naive' specification of the gravity equation and the TLS specification are almost identical. Secondly, it appears dubious that the regulatory heterogeneity indicator devised by Kox and Lejour (2005) effectively captures the extent of pairwise differences in regulation: It decreases when within a pair of countries both countries have a particular regulation in place instead of only one of the countries. This is a problematic assumption since a particular regulation, as for instance the abovementioned licensing requirement, can differ markedly within a country pair even if it is in place in both of them.

Kox and Nordas (2007) extend the analysis of Kox and Lejour (2005) along three dimensions. Firstly, they use the World Bank Governance indicators which cover a larger set of countries than the OECD PMR indicators as a measure of domestic regulation. Secondly, they include zero trade flows in the analysis to avoid potential selection bias and they provide, thirdly, a disaggregated analysis of trade in financial services using disaggregated regulation indicators for the banking sector from Barth et. al. (2006). They find both a robust negative correlation between the level of domestic regulation and services trade and a robust negative correlation between regulatory heterogeneity and services trade. In contrast to Kox and Lejour (2005), Kox and Nordas (2007) state explicitly that their results should be interpreted in terms of correlations instead of causal effects. However, there is no explicit treatment of unobserved country heterogeneity and, as discussed in the previous paragraph, the measure of regulatory heterogeneity is problematic.

Kimura and Lee (2006) include an 'Economic Freedom of the World' (EFW) indicator published by the Canadian Fraser Institute in a 'naive' specification of the gravity equation,

[6] Even if a Hausman type test does not reject the validity of the identification assumption, this cannot be taken as supporting it: It is well known that under many circumstances Hausman type tests have low power.

where the EFW indicator can be seen as an inverse proxy for domestic regulation.[7] The estimation is performed on total services including travel and transport and the data are from the OECD TISP dataset for 1999-2000. It is found that the estimated coefficient on the EFW indicator is positive and significant at the 1% level. No effort is made to control for unobserved country heterogeneity.

Walsh (2006) uses an updated version of the OECD TISP dataset for 1999-2001 that has the advantage of including disaggregated services trade positions and an 'Index of Economic Freedom' published by the Heritage Foundation as a proxy for domestic regulations.[8] It is found that higher economic freedom has a significant and negative effect on trade in commercial services. Walsh (2006) uses the Hausman and Taylor (1981) (HT) estimator to control for unobserved country heterogeneity. The identification assumption is similar to the TLS specification: Unobserved bilateral heterogeneity is assumed to be uncorrelated with the observed bilateral explanatory variables. The criticism discussed in the context of the TLS specification therefore also applies to the HT specification. The troubling positive estimated coefficients on the distance variable for some services trade aggregates and the negative effect of higher economic freedom on services trade raise further doubts on the validity of the specification.

More generally, the identification of the effect of the country specific OECD PMR indicators on services trade in the cross section appears unconvincing. Controlling for unobserved country heterogeneity by including a full set of origin and destination country fixed effects is not possible in the cross section since the fixed effects would absorb the variables of interest. Alternatives to the TLS approach of Nicoletti et al. (2003a) as the two step procedure proposed by Cheng and Wall (2005) or the HT estimator proposed by Egger (2005) have similar drawbacks. Cheng and Wall (2005) propose to regress bilateral exports on the bidimensional variables (distance, shared language, common border) and a full set of origin and destination country fixed effects in a first step. The residuals from this regression are then regressed on the unidimensional variables (origin and destination country GDPs and PMR indicators) in a second step. Since the country specific variables included in the second step regression are likely to be correlated with unobserved country specific variables, the estimates on the unidimensional variables are still likely to suffer from omitted variable bias. Egger (2005) proposes to apply the HT estimator to the estimation of cross section gravity models arguing that it is reasonable to assume that the time invariant bidimensional explanatory variables are uncorrelated with the unobserved origin and destination country fixed effects. From the viewpoint of recent theoretical derivations of the gravity equation, this assumption is likely to be violated since it can be shown that unobserved origin and destination country fixed effects are necessarily correlated with observed bilateral distances. If theory is to be taken seriously, it appears therefore that the most appropriate method to control for unobserved country heterogeneity is to include origin and destination country fixed effects in an estimation that exploits the panel structure of the bilateral services trade data at hand.

[7] The EFW indicator can be downloaded at `http://www.freetheworld.com/download.html`.

[8] The 'Index of Economic Freedom' can be downloaded at `http://www.heritage.org/research/ features/index/`.

3 Data and Descriptive Statistics

3.1 Eurostat ITS Database

The present study is based on the Eurostat ITS database which is, in turn, based on the Balance of Payments (BoP) information provided by the member states of the European Union. The BoP records transactions between a member state's resident and non-resident entities. It therefore covers mode 1 (cross border supply), mode 2 (consumption abroad), and mode 4 (presence of natural persons) of services trade as defined in the General Agreement on Trade in Services (GATS). Services supplied by affiliates of foreign owned companies are not recorded in the BoP since they are considered as resident entities. Mode 3 (commercial presence) is therefore excluded *a priori* from the Eurostat ITS database. As pointed out in the introduction, the present study's focus is on the effect of PMR on cross border trade in services. The exclusion of mode 3 from the Eurostat ITS database is therefore not sufficient and it is decided to further exclude the two components of mode 2, travel and transport, from the sample. The Eurostat ITS database reports both trade in total services (BoP position 200) and trade in disaggregated service categories. These can be used to construct the following services trade aggregates that come very close to the definition of cross border trade in services. A 'residual services' position can be constructed by substracting transport (BoP position 205) and travel (BoP position 236) from total services (BoP position 200). Alongside 'other commercial' services this position includes both 'non-allocated services' (BoP position 982) and government services (BoP position 291). The Eurostat ITS database also reports a position 'other services' (BoP position 981) that excludes 'non-allocated services' from the 'residual services' position. After substracting 'government services' from 'other services', the position 'other commercial services' is obtained. The different services trade aggregates that can be calculated from or are directly reported in the Eurostat ITS database are displayed in figure 1.

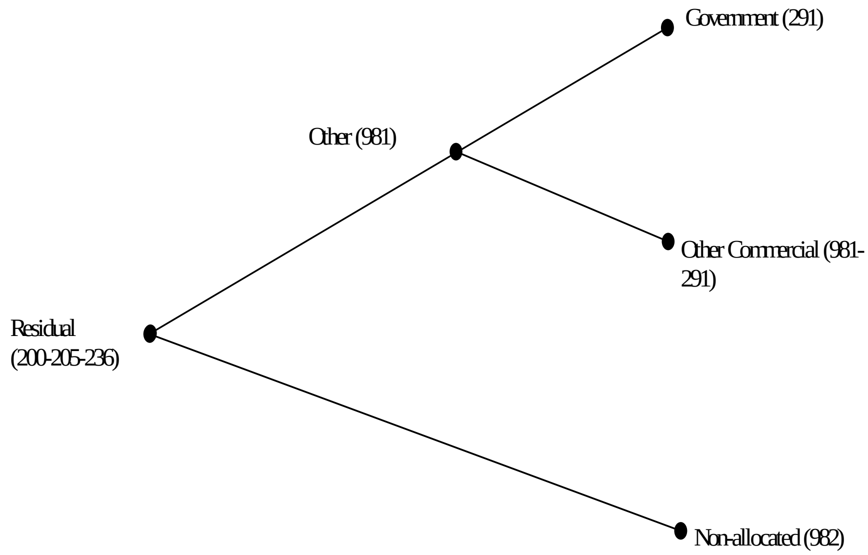
The aggregate that comes closest to the definition of cross border trade in services is 'other commercial' services. Unfortunately, the number of nonmissing observations for this aggregate is low.[9] It is therefore decided to focus on the aggregate 'other services' on which more complete information is available and to report results on 'residual services' and 'other commercial services' in the robustness checks. Government services represent only a small fraction of 'other services' and do therefore arguably not have a major effect on the estimation results.[10] The sectoral disaggregation that allows to focus on cross border trade in services and the extensive time coverage (1985-2004) that allows the use of panel estimators make the Eurostat ITS database appropriate for the current purpose. Nonetheless, it is not free of limitations as shall be illustrated in the following.

Firstly, the Eurostat ITS database contains both missing reports, 0 reports and negative reports. Clearly, missing reports do not contain any economic information and are therefore dropped from the sample. In contrast, 0 reports may contain useful economic information and

[9] Since the Eurostat ITS dataset contains mostly missing values for government services, substracting it from the residual of BoP position 981 results in a large loss of observations.

[10] In the estimation sample, 'government services' represent 7.2% of 'other services'.

Figure 1: Services trade aggregates in Eurostat ITS dataset



are used in several specifications. Negative reports are specific to trade in services data and related to the internal pricing of multinationals and differences between claims and premia in the insurance sector. Since it is difficult to attach an economic interpretation to a negative export or import, it is decided to drop these observations from the sample.

Secondly, the accuracy of the information contained in the Eurostat ITS database appears to suffer from different BoP definitions and recording systems across the reporting countries. This is reflected in the fact that, in general, the report of the exporting country on a given trade flow differs from the report of the importing country. While differences between exporter and importer reports are also present in data on trade in physical goods, it appears that the problem is quantitatively more relevant for trade in services.[11] This does not impair the usefulness of the Eurostat ITS dataset for econometric analyses: Measurement error in the dependent variable does not lead to biased estimates so long as it is not systematically correlated with the explanatory variables. However, it is important to verify that the results do not depend on whether the importer report or the exporter report is chosen by default. For the results reported in the main text the importer reporter is chosen by default but the robustness of the results to choosing the exporter report is checked in section 5.3.

Thirdly, for the purposes of the present study it is necessary to dispose both of data on bilateral services trade and of data on PMR. The aggregate OECD PMR indicators are available for the years 1998 and 2003. In principle, the information on services trade flows in the Eurostat

[11] A quantitative assessment of reporting inconsistencies using 'adjusted means' is available from the author upon request.

ITS database for the time period 1998-2004 could therefore be used. For the following two reasons, it is decided to further restrict the sample to the time period 1999-2004. Firstly, the reliability of bilateral services trade data is generally considered to increase over time: Most central banks and international organisations do not publish bilateral services trade data before 1999. [12] Secondly, the number of nonmissing observations in 1998 is low so that there is effectively not a large loss of information if it is excluded from the sample.[13]

3.2 OECD PMR Database

As mentioned in the introduction, various quantitative measures of domestic regulations have recently become available but these measures still suffer from limited country coverage, limited sectoral disaggregation and limited time coverage. Findlay and Warren (2000) summarise the effort of the Australian Productivity Commisssion to provide detailed indicators of regulatory barriers to services trade. Unfortunately, these indicators are only available for a limited number of services sectors and only for one year.[14] The Doing Business indicators published by the World Bank are of limited usefulness for the present purpose since they capture mainly regulations in the manufacturing sector while its Governance indicators build on a 'subjective' methodology: Instead of summarising objective regulatory measures as the Australian Productivity Commission and the Doing Business indicators, it assembles individual perceptions on the regulatory environment into an indicator.[15] If it is decided to use an 'objective' measure on the grounds that subjective measures may be contaminated by the respondents' ideology and current business cycle conditions, the analyst is left with the indicator of product market regulation published by the OECD. This indicator covers domestic regulations both in the manufacturing and in the services sector in 1998 and 2003. While the OECD PMR indicator has the drawback of not dealing exclusively with domestic regulations in the services sector, it covers a wide array of service sector specific regulations and can therefore be considered as highly positively correlated with domestic regulations in the services sector.[16]

The present study uses the aggregate OECD PMR indicator as a measure of domestic regulation. According to Conway et al. (2005) it covers regulations that have the potential to reduce competition in areas where technology and market conditions make competition viable. The indicator is normalised over a scale of 0 to 6, higher values indicating higher restrictiveness of domestic regulation. As discussed in the introduction, a drawback of this measure is that it encompasses both PMR in the manufacturing sector and PMR in the

[12] The OECD, for instance, publishes its TISP dataset for the time period 1999-2003.

[13] See Appendix A.1 for the number of nonmissing observations by year.

[14] The indicators can be downloaded at `http://www.pc.gov.au/research/rm/services restriction/index.html`.

[15] The Doing Business indicators can be downloaded at `http://www.doingbusiness.org/` and the Governance indicators at `www.worldbank.org/wbi/governance/data`.

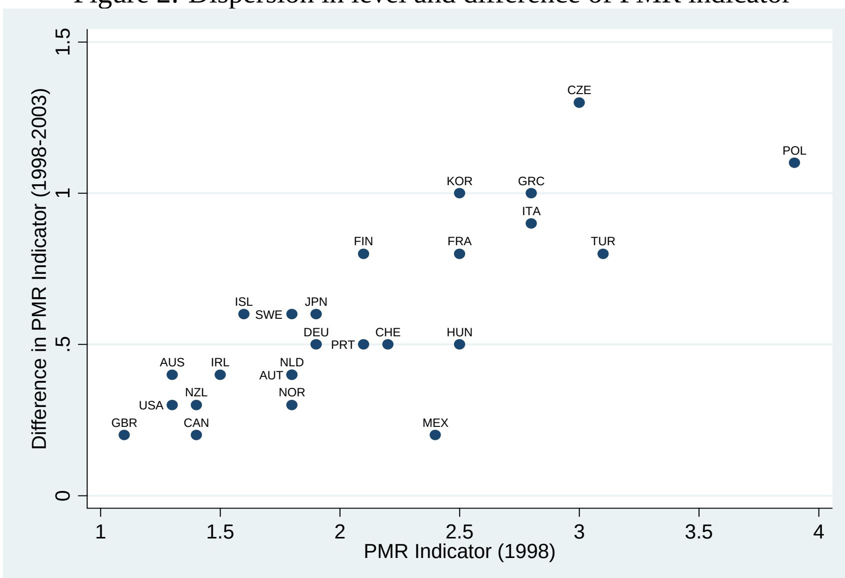
[16] The database is described in Conway et al. (2005). Nicoletti and Pryor (2006) show that the OECD PMR indicator is highly positively correlated with the World Bank *Governance* subindicator for the overall level of regulation.

services sector. Nevertheless, the regulatory subdomains it covers can all reasonably be assumed to have an effect on the services sector and services trade: All the disaggregated indicators for specific subdomains of regulation except 'tariff trade barriers' cover the services sector and some of them cover only the services sector.[17] Most of the disaggregated indicators that are then aggregated into the overall OECD PMR indicator can be expected to be of particular relevance to services trade, as for instance the indicator for price controls, sector specific administrative burdens, licenses and permits, legal barriers to entry or discriminatory procedures. The overall level of PMR as measured by the OECD PMR indicators is therefore likely to be highly correlated with domestic regulation specific to the services sector. Moreover, the aggregate OECD PMR indicator can be considered as less endogenous to developments in services trade than more disaggregated measures of barriers to services trade. As pointed out in the introduction, it may be that higher volumes of services trade are causing product market deregulation instead of product market deregulation having a positive causal effect on services trade volumes. If this argument is valid, then the negative effect of PMR on services trade would be overestimated. However, the use of the aggregate OECD PMR indicator limits the practical relevance of this argument: While a detailed and disaggregate measure of barriers to services trade can be considered as endogenous to services trade, the aggregate OECD PMR indicator is endogenous to aggregate economic developments but only to a limited extent to developments in services trade.

The first part of the empirical analysis in section 5.1 of the present study uses the cross section variation in the PMR indicators to identify the effect of PMR on services trade while the panel data analysis in section 5.2 exploits the time variation. It is important to verify that there is variation of the OECD PMR indicator not only in the cross section but also over time. From figure 2, it can be seen that the OECD PMR indicators converged between 1998 and 2003: The countries with the highest indicators in 1998 reduced their level of domestic regulation by more than the countries with the lowest indicators. Even though the dispersion of the OECD PMR indicator in the 1998 cross section appears to be larger than the dispersion of the difference between 1998 and 2003, figure 2 shows that there is considerable dispersion in the difference. This is confirmed by the calculation of the coefficients of variation of the level and the difference of the OECD PMR indicators: Since the coefficient of variation of a variable normalises by the mean of the variable and the mean of the difference is lower than the mean of the level, the coefficient of variation of the difference (0.5) is actually higher than the coefficient of variation of the 1998 level (0.31). *A priori* the identification of the effect of PMR on services trade therefore appears to be possible both using the cross section variation of the OECD PMR indicator and their variation in the time series.

[17]Overall, there are 16 disaggregated indicator of which 'use of command and control regulation', 'price controls' and 'sector specific administrative burdens' cover only the services sector.

Figure 2: Dispersion in level and difference of PMR indicator



3.3 Other Explanatory Variables

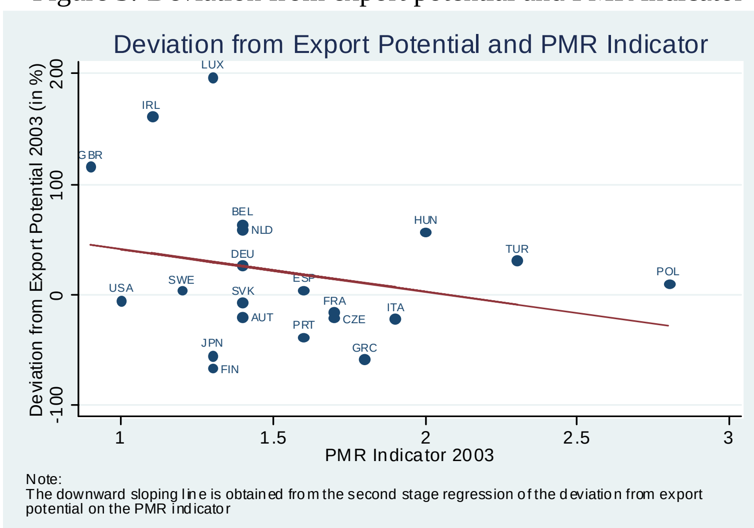
Besides the Eurostat ITS and the OECD PMR datasets, the gravity analysis in section 5 draws on the following data sources. Trade cost proxies (distance, common border, common language) are from CEPII's bilateral database. Distance is measured as the population weighted average of the great circle distances between the 20 largest cities in the origin and destination countries. Common language is based on the ethnologues' definition and equals one if a language is spoken by at least 9% of the population in both countries. The population and GDP data are provided by the World Development Indicators Online Database. In case the information is missing in the World Development Indicators Database, it is complemented by the International Monetary Fund World Economic Outlook database. More details on data sources and construction can be found in appendix A.1.

3.4 Descriptive Statistics

The following descriptive statistics do not exploit the bilateral dimension of the Eurostat ITS database but use the information on countries' aggregate services exports. The graphs below display simple bivariate correlations between the level and the growth rates of services exports and the level and growth rates of the OECD PMR indicators. In unreported results it has been verified that the graphs reported below are qualitatively unchanged if instead of services exports services imports are used as the dependent variable. Since it is not controlled for other determinants of services trade, the results should be interpreted with caution.
In Figure 3 the deviation from export potential in the year 2004 is plotted against the aggregate OECD PMR indicator for the year 2003, where the deviation from export potential

is calculated as the residual from a regression of services exports on GDP and per capita GDP.[18] GDP is intended to capture the size of the economy and per capita GDP its level of economic development. It is apparent from figure 3 that economies with a low PMR indicator tend to have higher services exports than predicted by their size and by their level of economic development. It should be noted, however, that the PMR indicator does not contribute much to the explanation of deviations from export potentials: Some lightly regulated economies as the United States, Finland or Japan display negative deviations from their export potentials while some more heavily regulated economies as Hungary and Turkey display positive deviations from their export potentials. This is also reflected in the insignificant coefficient on the PMR index and the low value of the R^2 of the second stage regression.[19] Unreported results indicate that the correlation between deviations from export potentials and the aggregate OECD PMR indicators becomes slightly more negative if the outliers Ireland and Luxembourg are dropped from the sample.

Figure 3: Deviation from export potential and PMR indicator



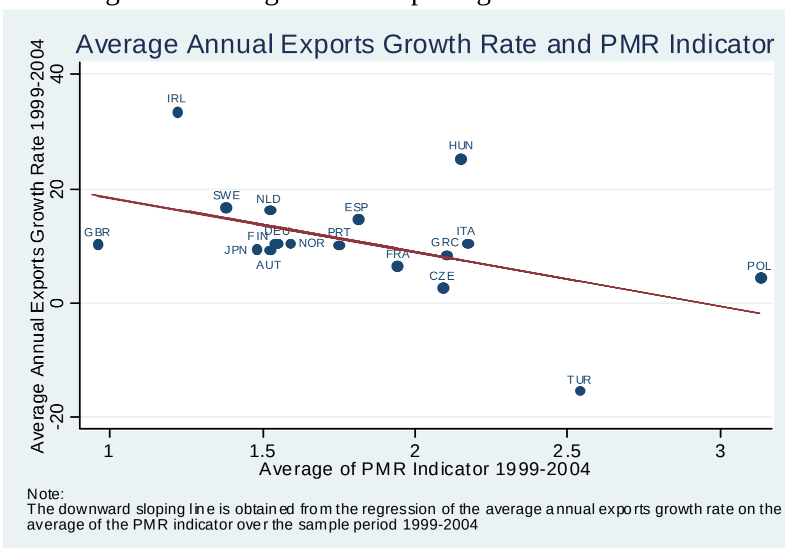
A similar picture emerges if the average annual growth rates of services exports between 1999 and 2004 are plotted against the level of the PMR index in the year 1998. More lightly regulated economies appear to have grown at a faster pace than more heavily regulated economies. In contrast to the descriptive statistic computed in the previous paragraph, the level of the PMR indicator contributes significantly to the explanation of the average

[18]This first stage regression yields the following coefficients (standard errors in parentheses): $\ln(exp_i) = \underset{(1.3)}{-7.9} + \underset{(0.07)}{0.64} \cdot \ln(gdp_i) + \underset{(0.16)}{0.92} \cdot \ln(gdp/pop)_i$ with $R^2 = 0.9$.

[19]$\widehat{exp_i} - exp_i = \underset{(56.3)}{79.9} - \underset{(35)}{38.7} \cdot PMR_i$, where $R^2 = 0.06$ and $(exp_i - \widehat{exp_i})$ denotes the difference between observed and predicted exports from the first stage regression.

annual exports growth rate: The coefficient on the PMR indicator in the regression of the average annual growth rate on the PMR indicator is significant at the 5 percent level and explains approximately 25% of the variance in average annual growth rates.[20] Unreported results indicate that the slope of the regression line becomes less negative if the outliers Ireland, Hungary and Turkey are dropped from the sample. However, the reported results are qualitatively not affected in the sense that the slope of the regression line remains negative and significant at the 5 percent level.

Figure 4: Average annual exports growth rate and PMR



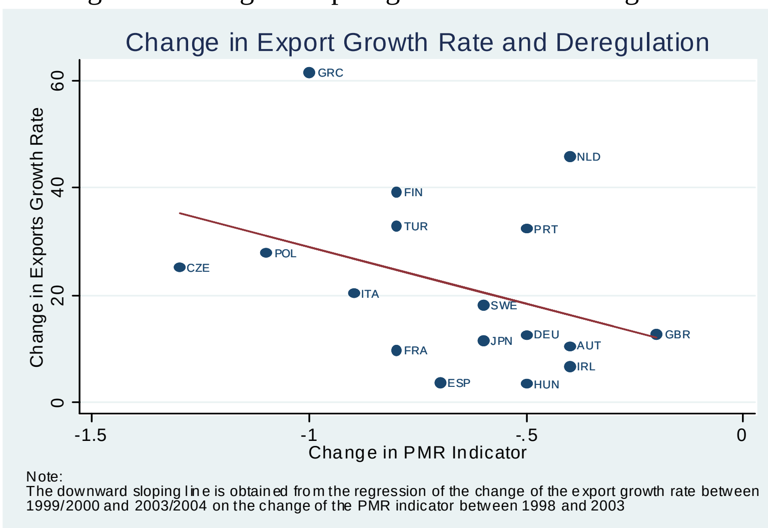
A final piece of descriptive evidence on the correlation between the overall quality of regulation as measured by the aggregate OECD PMR indicator on services trade is obtained by plotting the changes in growth rates of services exports against the changes in the PMR indicators. More precisely, for every country in the sample the difference between the growth rate in services exports in 1999-2000 and 2003-2004 and the difference between the PMR index in 2003 and 1998 is computed. This piece of descriptive evidence indicates whether differences in the intensity of deregulation between 1998 and 2003 contribute to explain changes in growth rates between 1999-2000 and 2003-2004. Again, this piece of descriptive evidence appears to support the view that economic regulation as measured by the aggregate OECD PMR indicators is negatively correlated with services exports. More specifically, the regression of the change in growth rates of services exports on the change in PMR indicators yields a negative and significant coefficient on the change in PMR indicators.[21] Unreported results indicate that the slope of the regression line becomes slightly less negative if the

[20] $\frac{\Delta exp_i}{exp_i} = \underset{(7.8)}{28} - \underset{(4.2)}{9.5} \cdot PMR_i$, where$R^2 = 0.25$ and $\frac{\Delta exp_i}{exp_i}$ denotes the growth rate of exports.

[21] $\frac{\Delta exp_{i2003}}{exp_{i2003}} - \frac{\Delta exp_{i1999}}{exp_{i1999}} = \underset{(6.8)}{7.9} - \underset{(9.2)}{21} \cdot (PMR_{i2003} - PMR_{i1998})$ with $R^2 = 0.14$.

outliers Netherlands and Greece are dropped from the sample. Nonetheless, the reported results remain qualitatively unaffected since the slope of the regression line remains negative at the 1% level.

Figure 5: Change in export growth rate and deregulation



Overall, the descriptive evidence on the correlation between regulation and services trade does not appear to be entirely conclusive. In the cross section, the negative correlation between the PMR indicators and deviations from export potentials appears to be weak: The PMR indicators do not contribute significantly to the explanation of deviations from export potentials. If it is looked at time series instead of cross section relationships, the contribution of the PMR indicators to the explanation of variation in services trade appears to be more significant: A lower PMR index is associated with higher average annual services export growth rates during the observation period and a larger decrease in the PMR indicator with larger increases in services export growth rates. Note, however, that these are simple bivariate relationships in which it is not controlled for other determinants of services trade and that only a small part of the time series variation appears to be explainded by the PMR indicators.

4 Econometric Model

The gravity equation is the workhorse model of empirical trade economists. While a first generation of studies estimated a 'naive' version of the gravity equation formulated in analogy with the gravity equation in physics, there have recently been various attempts to derive structural gravity equations from standard economic theory. It can be distinguished between three broad types of approaches. Firstly, models with product differentiation by country of origin (Anderson and van Wincoop, 2003), secondly models with product differentiation and monopolistic competition (Krugman (1980)), and thirdly models with homogeneous products and heterogeneity in productivity (Eaton and Kortum, 2002).

As explained in section 3.1, this study focuses on cross border trade in services. In contrast to the other modes of services provision, cross border trade in services comes very close to the notion of traditional trade in goods: Firms can be thought of as producing services in their origin country and sending them accross the border to the destination country. In the abovementioned first approach to the derivation of the gravity equation *à la* Anderson and van Wincoop (2003), countries can be thought of as producing a differentiated bundle of services that enters the utility of the destination country's representative consumer with constant elasticity of substitution σ. The only difference between this transaction and traditional trade in goods is the mode of 'shipment' and the associated transaction costs incurred. As mentioned in the introduction, services are intangible and are therefore not physically shipped. Instead, they are transmitted electronically or by the temporary movement of the service provider. Physical trade barriers, such as freight costs, or policy induced barriers, such as tariff costs, that are relevant for traditional trade in goods can therefore be expected to be of minor relevance for trade in services. Instead, cultural, legal or regulatory barriers to the electronic or personal provision of the service can be expected to have a relevant impact on cross border services trade volumes. This points to the importance of including transaction costs that are specific to cross border trade in services in the estimated gravity equation but does not require the separate theoretical derivation of a gravity equation for services and for goods. The structural gravity equation derived in a model *à la* Anderson and van Wincoop (2003) appears to be directly applicable to trade in services. A similar argument applies to the gravity equations derived from models with product differentiation and monopolistic competition. Head, Mayer and Ries (2006) further show that a gravity equation for services trade can be derived from a model with homogeneous products and heterogeneity in productivity *à la* Eaton and Kortum (2002).

While the structural gravity equations derived from the abovementioned models rely on different assumptions and therefore have different structural interpretations of the parameters, the common lesson to be drawn from these studies is the following. The determinants of bilateral trade flows can be separated into origin specific, destination specific and bilateral specific components where part of either of these components may be unobserved by the analyst. It can be shown that theoretically the unobserved origin and destination specific components are systematically correlated with the observed bilateral specific components.[22] Standard economic theory thus indicates that the estimation of a 'naive' gravity equation results in biased estimates. To make this point as clearly as possible, consider the following generic form of a structural gravity equation augmented by the OECD PMR indicators.[23]

[22] See Baldwin and Taglioni (2006) for a succinct discussion.

[23] This equation corresponds most closely to the one derived by by Anderson and van Wincoop (2003). A similar equation arises from models with monopolistic competion. In models with homogeneous goods and heterogeneity in productivity, the interpretation of Ω_o and Ω_d changes but the generic form of the derived gravity equation is the same.

$$X_{od} = f_o(\Omega_o) \cdot f_d(\Omega_d) \cdot \frac{Y_o Y_d}{g\left(PMR_o, PMR_d, \tau_{od}\right)}, \tag{1}$$

where X_{od} denotes exports from country o to country d, Y_o and Y_d GDPs, PMR_o and PMR_d the observed origin and destination specific OECD PMR indicators, τ_{od} bilateral trade costs, and f_o, f_d, g denote functions of the variables in brackets. Ω_o and Ω_d are the origin and destination specific determinants of bilateral trade flows that are unobserved by the analyst. Hence, even if the functional form of f_o and f_d were known, the exporter and importer specific terms would remain unobserved. The exclusion of the unobserved $f_o(\Omega_o) \cdot f_d(\Omega_d)$ term from the estimating equation is likely to lead to biased estimates if it is correlated with included observed explanatory variables. A simple thought experiment illustrates the likely direction of the bias on the variables of interest in the present context, the OECD PMR indicators. For the purpose of this thought experiment, it can be assumed without loss of generality that PMR_o, PMR_d and τ_{od} enter $g(\cdot)$ linearly. Equation (1) can then be rewritten as

$$X_{od} = f_o(\Omega_o) \cdot f_d(\Omega_d) \cdot \frac{Y_o Y_d}{PMR_o \cdot PMR_d \cdot \tau_{od}}. \tag{2}$$

If (i) $f_o(\Omega_o) \cdot f_d(\Omega_d)$ is decreasing in the unobserved origin and destination specific terms Ω_o and Ω_d and (ii) Ω_o and Ω_d are positively correlated with the OECD PMR indicators PMR_o and PMR_d, then the estimated coefficients on the OECD PMR indicators are biased downward. Intuitively, the OECD PMR indicators capture the negative effect of unobserved origin and destination specific variables on bilateral services trade flows so that the estimated coefficient is more negative than the 'true' coefficient. How realistic are conjectures (i) and (ii)? In Anderson and van Wincoop (2003), Ω_o and Ω_d decrease with the sum of a country's bilateral trade costs and are thus interpreted as multilateral openness measures. At given τ_{od}, an increase in the openness of importer d to imports from the world increases the relative price of imports from country o and thus reduces their volume. Similarly, an increase of the world's openness to exports from country o increases the relative price of country o's exports in country d at given τ_{od} and thus reduces their volume. This justifies conjecture (i), the negative relationship between multilateral openess and bilateral trade. Conjecture (ii) assumes that countries that are multilaterally very open have high levels of the OECD PMR indicator. *A priori* there is no reason to expect multilateral openness to be positively correlated with the OECD PMR indicator.[24] Indeed, multilateral openness would be negatively correlated with the OECD PMR indicator if countries that are multilaterally very open on dimensions other than PMR, as for instance geographic centrality, also have a low OECD PMR indicator. In contrast, conjecture (ii) would be true if countries that have on average low bilateral trade costs with their trading partners, for instance because they are geographically central, have high levels of PMR, perhaps to compensate their multilateral openness on the geographical dimension by erecting artificial multilateral trade barriers. In any case, the evidence presented below supports conjectures (i) and (ii) in the sense that the estimated coefficients on the

[24]Remember that the OECD PMR indicator increases with the level of domestic regulation.

OECD PMR indicator become less negative if it is (partly) controlled for the unobserved term $f_o(\Omega_o) \cdot f_d(\Omega_d)$.
To obtain the estimating equation from equation (2) above, suppose that trade costs are given by $\tau_{od} = D_{od} \cdot \exp(L_{od}) \cdot \exp(C_{od})$, with D_{od} denoting distance between o and d, L_{od} denoting an indicator for common language between o and d, and C_{od} denoting an indicator for common border between o and d. If it is further assumed that $f_o(\cdot)$ and $f_d(\cdot)$ are linear, taking logarithms and adding an error term ε_{od} with expected value 0 yields the estimating equation

$$\begin{aligned}\ln X_{od} = \beta_0 \ln \Omega_o + \beta_1 \ln \Omega_d + \beta_2 \ln PMR_o + \beta_3 \ln PMR_d + \beta_4 \ln Y_o + \\ + \beta_5 \ln Y_d + \beta_6 \ln D_{od} + \beta_7 \ln L_{od} + \beta_8 \ln C_{od} + \varepsilon_{od}.\end{aligned} \tag{3}$$

The main difficulty in estimating equation (3) is that the multilateral openness measures Ω_o and Ω_d are unobserved. The 'naive' version of the gravity equation collapses the multilateral openness measures into a constant $\alpha \equiv \Omega_o + \Omega_d$, which amounts to omitting Ω_o and Ω_d from the estimating equation. This may lead to biased estimates or what Baldwin and Taglioni (2006) label the 'gold medal mistake' in gravity equation estimation. Taking standard economic theory and its structural predictions seriously, requires to account properly for the multilateral openness measures Ω_o and Ω_d. One possibility is to include origin and destination country fixed effects. If only a cross section of bilateral services flows is available, only the coefficients on the variables with a bilateral dimension can be estimated: The coefficients on the variables that vary either only with the origin country or with the destination country are absorbed by the origin and destination country fixed effects and are therefore not identified. If a panel in which bilateral services flows are observed repeatedly over time is available, both the coefficients on the variables with only a country specific dimension and the variables with a bilateral dimension are identified in the country fixed effects specification. Identification of the coefficients on the country specific OECD PMR indicators in the country fixed effects specification therefore requires the use of a panel of bilateral services flows. However, including origin and destination specific fixed effects in a panel specification of equation (3) only partly controls for the unobserved multilateral openness measures. More specifically, it controls only for the *time constant* part of the multilateral openness measures and not for the *time varying* part. In other words, the estimated coefficients on the OECD PMR indicators are unbiased when origin and destination specific effects are included in a panel specification of equation (3) if either of the following assumptions is satisfied: (i) The multilateral openness measures do not vary over time or (ii) the time series variation is common to all countries so that it is absorbed by the year dummies. Even though none of these assumptions is likely to be satisfied exactly, it appears plausible that the introduction of origin and destination specific effects removes most of the bias due the omission of the unobserved multilateral openness terms. Firstly, multilateral openness is largely determined by geography which is time constant. Secondly, in the present context the time varying part of multilateral openness is to a large extent determined by a technology shock that is common to all countries in the sample and that is thus absorbed by the year dummies: The unobserved reduction in the cost of telecommunication.

A further difficulty in estimating equation (3) consists in what Baldwin and Taglioni (2006) call the 'bronze medal mistake' in gravity equation estimation, namely the deflation of nominal services trade and GDP values. [25] This is likely to lead to spurious correlations between deflated services trade and GDP values. To avoid this caveat, Baldwin and Taglioni (2006) propose to use nominal services trade and GDP values and to include time dummies in the estimating equation. The results reported in section 5 are obtained by following this proposal: Services exports and GDP are measured in current euros and time dummies are included in all specifications.

The two final difficulties in estimating equation (3) derive from the log linearisation of equation (2). Firstly, taking logarithms of all continuous variables in the model implies that information contained in 0 trade flows is ignored in the estimation. Secondly, De Silva and Tenreyro (2006) argue that performing OLS on the log linearised model amounts to assuming a particular form of heteroskedasticity that appears implausible for trade data. More specifically, OLS assumes that the variance of bilateral exports is proportional to the square of its conditional mean. According to Silva and Tenreyro (2006) this amounts to downweighting large exports by too much, the rationale being that the services export reports by large countries are more reliable than export reports by small countries. The Poisson maximum likelihood estimator (MLE) proposed by De Silva and Tenreyro (2006) resolves the two drawbacks of the OLS estimator by preserving 0 trade flows and assuming that the variance of bilateral exports is proportional to its conditional mean.

5 Results

5.1 Cross Section Estimates

As explained in the previous section, the cross section estimates of the effect of PMR on services trade are likely to be biased because it cannot be controlled for the unobserved multilateral openness measures. Nonetheless, the results from the cross section estimations are reported to verify whether the strong negative correlation between services exports and PMR found by previous studies holds in this data and to allow comparison with the results from the panel estimations reported below. Table 1 reports results from ordinary least squares (OLS) estimation of the log linearised model.[26]

[25] A mistaken averaging of exports from o to d and exports from d to o, labelled the 'silver medal mistake' by Baldwin and Taglioni (2006), does not apply to the present study since equation (3) is estimated using unidirectional exports from o to d as the dependent variable.

[26] Note that the OECD PMR indicators for the years 1999-2002 are obtained by linear interpolation and the OECD PMR indicator for the year 2004 by linear projection. This reduces only the time series variation in the OECD PMR indicators but not the cross sectional variation. Since the coefficients on the OECD PMR indicators in the pooled cross section estimations are essentially identified by their cross section variation, this appears as a valid approximation.

Table 1: OLS pooled cross section estimates (1999-2004)

Dependent Variable	ln bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS
ln GDP, origin	0.960***	0.962***	1	1		
	(0.026)	(0.026)				
ln GDP, dest	0.915***	0.916***	1	1		
	(0.026)	(0.027)				
ln Pop, origin					0.910***	0.912***
					(0.028)	(0.028)
ln Pop, dest					0.879***	0.879***
					(0.029)	(0.029)
ln GDP/Pop, origin					1.303***	1.307***
					(0.076)	(0.080)
ln GDP/Pop, dest					1.150***	1.157***
					(0.073)	(0.077)
ln PMR, origin	-2.165***		-2.149***		-1.447***	
	(0.134)		(0.132)		(0.172)	
ln PMR, dest	-1.428***		-1.361***		-0.907***	
	(0.136)		(0.136)		(0.172)	
PMR, origin		-1.240***		-1.231***		-0.796***
		(0.083)		(0.081)		(0.111)
PMR, dest		-0.812***		-0.774***		-0.490***
		(0.081)		(0.079)		(0.104)
ln avg dist	-1.197***	-1.193***	-1.233***	-1.229***	-1.125***	-1.117***
	(0.040)	(0.040)	(0.039)	(0.039)	(0.040)	(0.040)
Shared Language	0.626***	0.710***	0.573***	0.655***	0.659***	0.726***
	(0.135)	(0.137)	(0.140)	(0.142)	(0.130)	(0.134)
Common Border	-0.047	-0.112	-0.109	-0.171	-0.057	-0.101
	(0.133)	(0.134)	(0.136)	(0.137)	(0.128)	(0.130)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2843	2843	2843	2843	2843	2843
R^2	0.82	0.81	0.65	0.65	0.83	0.82
RMSE	0.99	1.00	1.00	1.01	0.97	0.98

Notes:

Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.

* significant at 10%; ** significant at 5%; *** significant at 1% level

Columns (1) and (2) of table 1 report the estimation results from a parsimonious specification of the gravity equation with origin and destination GDPs and trade costs as included explanatory variables, where trade costs are proxied by distance, common language and common border. The coefficients on origin and destination GDPs are positive and close to 1 as the structural gravity equation (1) would suggest. The estimated coefficients on the OECD PMR indicators, bilateral distance and the shared language dummy are all significant at the 1% level and have the expected signs. Both the estimated coefficients on the exporter PMR indicator and the importer PMR indicator are negative and significant at the 1% level. Moreover, the estimated coefficients on the distance and language variables come close to usual estimates for trade in goods. The coefficient on the common border dummy is insignificant and close to zero which may partly be due to collinearity between the common language and the common border dummy in the present sample. In column (1) the 'naive' specification of the gravity equation is augmented by the logarithm of the OECD PMR indicators which amounts to imposing a constant elasticity of services exports with respect to PMR. Instead, augmenting the 'naive' specification of the gravity equation by the OECD PMR indicators in absolute values in column (2) amounts to imposing an increasing elasticity of services exports with respect to PMR.[27] Since this paper argues that the estimates from the 'naive' specification of the gravity equation are likely to be biased, this section does not intend to discriminate between the two alternative assumptions on the functional form of the elasticity. A more detailed discussion of the appropriate assumption on the functional form of the elasticity is relegated to section 5.2 below. Restricting the GDP elasticities to their theoretical values of 1 in columns (3) and (4) affects the estimated elasticities on the remaining explanatory variables only marginally, which is hardly surprising given that the estimated GDP elasticities in columns (1) and (2) are close to 1. The estimated elasticity of services trade with respect to PMR is reduced by 1/4 for the exporting country and 1/3 for the importing country if it is turned to a specification that includes both a measure of the trading partners' size (population) and their economic development (GDP/capita) in column (5). While it is not directly linked to the structural equation (1), this specification is common in applied empirical studies and confirms that the OECD PMR indicators partly pick up an economic development effect.[28] Nevertheless, the coefficient estimates remain negative and statistically significant at the 1% level even in this specification. The following two thought experiments facilitate the interpretation of the estimated coefficients. Suppose, firstly, that France with a PMR indicator of 2.5 in 1998, had instead had a PMR indicator of 1.1, which in 1998 was the level of the UK. The coefficient on the exporter PMR indicator estimated in column (1) of table 1 would then imply that France's services exports would have been 123.2% higher. Suppose, secondly, that France had reduced the level of its OECD PMR indicator from 2.5 in 1998 to 1.1 in 2003 instead of to 1.7. If the estimates in column (1) of table 1 were taken at face value, then its services exports would have grown by 68.8% instead of 16%.[29] Note that the second thought experiment implicitly assumes that the elasticity estimated using the cross sectional variation of the PMR indicator can be used to infer effects of time series variation in the PMR indicator. As shown in section 4 above, this assumption is likely to be violated if the PMR indicators are correlated with unobserved determinants of services trade. In any case, the potentially biased estimates of the effect of PMR on services trade from a 'naive' gravity equation appear to be substantial.

Table 2 reports results from Poisson MLE that preserves zero trade flows and downweights small export flows by more than OLS on the log linearised model.

[27]The elasticity of services exports with respect to PMR is estimated to be $\widehat{\sigma}_{exp,pmr} = \widehat{\beta}_{pmr} \cdot pmr$.

[28]See, for instance, Head, Mayer and Ries (2006), Kimura and Lee (2006), or Walsh (2006) for studies that include both measures of the trading partners' size and their economic development. As a measure of economic size, population has the advantage over GDP that it avoids the accounting relationship between GDP and exports.

[29]The calculation is as follows: $\Delta = \sigma_{exp,pmr}(\widetilde{p} - p)$, where Δ denotes the difference between the hypothetical and the observed growth rate in services exports, $\sigma_{exp,pmr}$ denotes the elasticity of services exports with respect to the OECD PMR indicator, and $\widetilde{p} - p$ denotes the difference between the hypothetical and the observed percentage decrease in the OECD PMR indicator.

Table 2: PMLE pooled cross section estimates (1999-2004)

Dependent Variable	bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	PMLE	PMLE	PMLE	PMLE	PMLE	PMLE
ln GDP, origin	0.844***	0.851***	1	1		
	(0.042)	(0.041)				
ln GDP, dest	0.761***	0.760***	1	1		
	(0.064)	(0.064)				
ln Pop, origin					0.822***	0.833***
					(0.039)	(0.039)
ln Pop, dest					0.725***	0.728***
					(0.064)	(0.064)
ln GDP/Pop, origin					1.183***	1.161***
					(0.172)	(0.178)
ln GDP/Pop, dest					1.272***	1.264***
					(0.135)	(0.141)
ln PMR, origin	-1.432***		-1.146***		-1.174***	
	(0.174)		(0.178)		(0.172)	
ln PMR, dest	-0.746***		-0.297*		-0.336*	
	(0.198)		(0.174)		(0.195)	
PMR, origin		-0.941***		-0.770***		-0.768***
		(0.129)		(0.122)		(0.130)
PMR, dest		-0.508***		-0.216**		-0.213
		(0.132)		(0.107)		(0.134)
ln avg dist	-0.715***	-0.718***	-0.909***	-0.910***	-0.694***	-0.699***
	(0.047)	(0.048)	(0.048)	(0.048)	(0.044)	(0.045)
Shared Language	0.444**	0.489***	0.569***	0.594***	0.526***	0.566***
	(0.177)	(0.174)	(0.196)	(0.190)	(0.169)	(0.167)
Common Border	0.119	0.063	-0.138	-0.171	0.023	-0.030
	(0.154)	(0.151)	(0.180)	(0.176)	(0.155)	(0.152)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2989	2989	2989	2989	2989	2989

Notes:

Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.

* significant at 10%; ** significant at 5%; *** significant at 1% level

It can be seen that the Poisson MLE generally yields point estimates that are closer to zero than OLS estimates. In particular, the coefficient on the OECD PMR indicator of the exporter is reduced by approximately 1/4 with respect to the OLS estimates and the coefficient on the importer's OECD PMR indicator is reduced by between 1/2 and 2/3. Note that the estimated coefficient of the importer is not significant in specification (6) of table 2 but that the coefficient on the exporter remains negative and significant at the 1% level. To illustrate the magnitude of the estimated elasticities in table 2, it is useful to repeat the above thought experiments. If France had had a PMR indicator of 1.1 in 1998, the UK's 1998 level, instead of 2.5, then its services exports would have been by 78.4% higher according to the estimates in column (1) of table 2. If France had reduced its OECD PMR indicator to 1.1 instead of to 1.6 between 1998 and 2003, its services exports would have grown by 49.6% instead of 16% according to column (1) of table 2. Note that the obtained elasticities from both the pooled OLS and the Poisson MLE estimations are similar to the ones obtained on a comparable dataset by Kox and Nordas (2007) who find that the elasticity of services exports with respect to domestic regulation is around 1.7. Overall, the Poisson MLE estimations are closer to zero than the OLS estimates but they are still likely to be biased as illustrated in section 4 above.

5.2 Panel Estimates

From the theoretical discussion in section 4, it is clear that the basic assumptions underlying the estimations in the previous section are likely to be violated. The critical literature review in section 2 has also illustrated that estimation methods that attempt to control for the unobserved multilateral openness terms in the cross section suffer from serious drawbacks. From a theoretical viewpoint, the inclusion of origin and destination country fixed effects in an estimation that exploits the panel structure of the bilateral services trade at hand appears therefore as the most appropriate estimation method. A sufficient number of bilateral services trade flows are observable for the period 1999-2004 but the OECD PMR indicators are only available for the years 1998 and 2003. One possibility to exploit the panel structure of the bilateral services trade data at hand would thus be to use interpolated values for the OECD PMR indicators. Since this artificially reduces the variance over time of these indicators, it appears preferable to use only the first and the last available year of the services trade data in conjunction with the first and the last year of the OECD PMR indicators: In effect the first lags of the OECD PMR indicators are thus used in the country fixed effects estimations. Given that appropriate instruments for the OECD PMR indicators are unavailable, using their first lags can be considered as a first step in reducing potential endogeneity bias.[30] In any case, the aggregate OECD PMR indicators are endogenous to services exports only to a limited extent as has been argued above. Further, the first lags of the origin and the destination countries' GDPs are used in the country fixed effects estimations to avoid endogeneity bias due to the simultaneous determination of services exports and GDP. The country fixed effects estimator then identifies the coefficients on the unidimensional variables through their variance over time. Given that the time series variation of the OECD PMR indicators is comparable to their cross section variation,[31] there is no *a priori* reason to expect these estimators to have less explanatory power than the cross section estimators. Instead, a lower explanatory power of the OECD PMR indicators in the panel estimations can be fully attributed to controlling for the constant part of the unobserved multilateral openness measures. The results from these estimations are reported in table 3:[32]

[30] With autocorrelation in the residuals, the first lags of the OECD PMR indicators cannot be considered as valid instruments but more appropriate instruments are unavailable.

[31] See section 3.2.

[32] As noted by Wooldridge (2002:274), there is no need to correct for autocorrelation in the residuals of the fixed effects estimator in panels with two time periods. To see this, suppose that the residual in period 1 is given by $e_1 \equiv \varepsilon_1$, where ε_1 is i.i.d., and that the residual in period 2 is correlated with the period 1 residual so that $e_2 = \rho e_1 + \varepsilon_2$. After defining $\alpha = \rho e_1$, e_1 can be written as $e_1 = \alpha + (1-\rho)\varepsilon_1$ and e_2 as $e_2 = \alpha + \varepsilon_2$. The fixed effects estimator absorbs α and the remaining error components are uncorrelated since $cov(\varepsilon_1, \varepsilon_2) = 0$.

Table 3: Country fixed effects estimates (1999, 2004)

Dependent Variable	ln bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled OLS	Pooled OLS	FE OLS	FE OLS	FE OLS	FE OLS
lag (ln GDP), origin	0.950***	0.951***	2.590***	2.534***	1	1
	(0.028)	(0.028)	(0.458)	(0.447)		
lag (ln GDP), dest	0.909***	0.910***	2.639***	2.570***	1	1
	(0.029)	(0.030)	(0.396)	(0.380)		
lag (ln PMR), origin	-2.220***		-1.190**		-0.879*	
	(0.146)		(0.488)		(0.486)	
lag (ln PMR), dest	-1.516***		-1.163***		-0.913**	
	(0.143)		(0.438)		(0.456)	
lag PMR, origin		-1.208***		-0.593***		-0.541***
		(0.086)		(0.159)		(0.158)
lag PMR, dest		-0.813***		-0.570***		-0.534***
		(0.080)		(0.171)		(0.178)
ln avg dist	-1.173***	-1.176***	-1.013***	-1.027***	-0.998***	-1.013***
	(0.046)	(0.046)	(0.069)	(0.069)	(0.069)	(0.069)
Shared Language	0.624***	0.741***	0.021	0.040	0.008	0.026
	(0.146)	(0.148)	(0.123)	(0.123)	(0.123)	(0.124)
Common Border	-0.058	-0.154	0.248*	0.230	0.263*	0.245
	(0.145)	(0.145)	(0.150)	(0.148)	(0.152)	(0.151)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	884	884	884	884	884	884
R^2	0.82	0.82	0.90	0.90	0.80	0.80
RMSE	1.01	1.01	0.77	0.76	0.77	0.77

Notes:

Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.

* significant at 10%; ** significant at 5%; *** significant at 1% level

Note that it is important to make sure that differences between the coefficients estimated from the 'naive' gravity equation specification and from the country fixed effects specifications are fully attributable to differences in estimation procedures and not to differences between the samples underlying table 1 and table 3. Therefore, columns (1) and (2) report the results from the estimation of a 'naive' gravity equation on the sample that pools only the years 1999 and 2004. The estimated coefficients are very close to the coefficients estimated on the pooled sample in table 1. Columns (3)-(6) report the results from the country fixed effects estimations Consider first the logarithmic specification in column (3). The estimated coefficients on origin and destination country GDPs are somewhat higher than expected, the distance coefficient is close to the one from the cross section OLS estimations, the coefficient on shared language is insignificant, and the common border is now estimated to have a positive effect on bilateral services exports. The coefficients on the variables of interest, the OECD PMR indicators, are approximately reduced by one half for the exporter and by one third for the importer with respect to the cross section OLS estimates. It appears therefore that the large elasticities of services exports with respect to PMR from the cross section OLS estimations are to a large extent due to not controlling for the constant part of the unobserved multilateral openness measures in equation (1). Note that the identification problem does not appear to be too severe even with only two time periods at the analyst's disposal: The fact that the estimated GDP and importer PMR elasticities are significant at the 1% level and the exporter PMR elasticity at the 5% level indicates that there is sufficient time series variation to identify the effect of country specific variables. The reduction in the coefficients in the semi logarithmic specification in column (4) is similar to the one in the semi logarithmic specification: They are approximately reduced by one half for the exporter and by one third for the importer with respect to the estimated coefficients from cross section OLS. This is confirmed in columns (5) and (6) in which the GDP elasticities are normalised to their theoretical values of one. The semi logarithmic specification appears to be somewhat more robust than the logarithmic specification in the sense that the coefficients are estimated more precisely and are more stable across columns (4) and (6). In other words, the elasticity of services trade with respect to domestic regulation appears to increase with the level of domestic regulation. This implies that economies with a high level of domestic regulation are likely to reap higher benefits from deregulation than economies with an already low level of regulation. Note that, as in the 'naive' version of the gravity equation, the estimated coefficient on the PMR indicator of the exporter is negative and significant in all the specifications and of a similar order of magnitude as the coefficient on the importer. This implies that an economy that reduces its domestic level of regulation increases its services exports by approximately the same proportion as its services imports. According to the estimates in column (4) of table 3, France, that had an above average value of the OECD PMR indicator of 2.5 in 1998, had an implied elasticity of services trade with respect to the domestic PMR indicator of $\sigma_{exp,pmr} = \widehat{\beta}_{pmr} \cdot pmr \approx -0.59 \cdot 2.5 \approx -1.48$. The country with the lowest OECD PMR indicator in 1998, the UK, had an implied elasticity of $\sigma_{exp,pmr} \approx -0.59 \cdot 1.1 \approx -0.65$. To illustrate the order of magnitude of these estimated elasticities, it is useful to repeat the thought experiment in section 5.1 with the estimated coefficients in column (4) of table 3. Suppose that France had reduced the level of its OECD PMR indicator from 2.5 to 1.1, the level of the UK in 1998, instead of to 1.7. Then, its services exports would have grown by 52% instead of 16%. While this still appears as a large estimate of the additional increase in services exports, it has to be emphasised that the thought experiment also assumes a large additional reduction in the OECD PMR indicator. Further, note that the counterfactual 52% increase in services exports for France would be similar to the overall inrease in services exports of 51% for all the countries in the sample. The effect of domestic deregulation on services trade is smaller for economies with an already low level of regulation. If the UK had not decreased its PMR indicator from 1.1 to 0.9, its services exports would have grown by 50% instead of 62%.

Note also that the positive effect of common language on services trade vanishes in the specification with origin and destination specific fixed effects. In the light of the results from trade in goods, where the inclusion of exporter and importer fixed effects reduces the effect of common language by approximately 1/3 only, this may appear as a surprising result. Note that the estimates from the country fixed effects specification have nonetheless to be considered more trustable due to the omission of the multilateral openness terms in the 'naive' specification of the gravity equation. Further note that the insignificance of the common language dummy is with certainty not due to problems related to identification through time series variation since the effect of common language is identified through cross section variation.[33] Instead, the insignificance of the common language dummy may be due to the fact that this study uses only the subset of exporters and importers for which the OECD

[33]Strictly speaking, it is identified through cross section variation and attrition.

PMR indicators are available.

Finally, note that Silva and Tenreyro (2006) develop their Poisson MLE in the context of a cross section gravity equation. They show that the Poisson MLE is superior to OLS when the identification of the parameters of interest is achieved through cross section variation. However, Silva and Tenreyro (2006) do not show that the Poisson MLE is superior to OLS when the identification is achieved through time series variation, as is the case of the coefficients on the OECD PMR indicators in the country fixed effects specification. The results from the Poisson MLE are therefore relegated to the robustness checks.

5.3 Robustness Checks

To check the robustness of the results reported in table 3, the following tests are performed. Firstly, the exporter report instead of the importer report is used by default both in the pooled cross section regressions and in the country fixed effect regressions. Table A.2 indicates that the estimated coefficients are similar to the ones reported in table 1 for the pooled cross section regressions. In the country fixed effects regressions the estimated coefficients on the OECD PMR indicators are closer to 0 when the exporter report instead of the importer report is used by default. Even though the results reported in table A.3 do not reject the results reported in table 3 due to the large standard errors attached to them, the insignificance of the estimated coefficients on the OECD PMR indicators in some specifications calls for a prudent interpretation of the estimates reported in the main text. As in the main text, the semi logarithmic specification of the gravity equation appears to be more robust than the logarithmic one indicating that the effect of domestic regulation on services trade is nonlinear in the sense that it increases with the level of domestic regulation. Secondly, the panel estimations are performed on exports of 'residual services' and 'other commercial services' instead of exports of 'other services'. The estimated coefficients on the OECD PMR indicators for 'residual services' reported in table A.4 are similar to the ones for other services reported in table 3 above. For 'other commercial services', the country fixed effects estimates from the logarithmic specification are closer to 0 than for 'other services' and no longer statistically significant. The coefficients estimated from the semi logarithmic specification are significant at the 10% level (at the 11% level if the GDP elasticities are normalised to 1) and close to the coefficients reported for 'other services' in the main text. The lower precision of the estimates for 'other commercial services' is due to the fact that the sample size is reduced by approximately 40% with respect to 'other services' and the identification of the coefficients therefore difficult. In any case, the estimates for 'other commercial services' do not contradict the estimates for 'other services' reported in table 3 above. Again, the semi logarithmic specification appears to be more robust than the logarithmic one. Finally, the results from the Poisson MLE country fixed effects specification are reported in table A.6. As noted in section 5.2., Silva and Tenreyro (2006) show that Poisson MLE is superior to OLS if the identification of the parameters of interest is achieved through cross section variation but do not show that this is the case if the identification is achieved through time series variation. The preferred estimation method for the country fixed effects specification is therefore OLS and the Poisson MLE results are only reported for matters of completeness.

It can be seen from table A.6 that the estimated coefficient on the OECD PMR indicators are close to the ones from the OLS country fixed effects estimations.

6 Conclusions

The main contribution of this paper is twofold. It firstly confirms previous results on the negative correlation between domestic regulation and services trade using previously unexploited data. Simple bivariate correlations in levels and differences between services trade and domestic regulation appear to weakly support the claim that domestic regulation may act as a barrier to services trade. As found by previous studies, the negative correlation between services trade and domestic regulation becomes overwhelming in a ‘naive’ specification of the gravity equation. The second contribution of this paper is to show that the overwhelming negative correlation between services trade and domestic regulation in the ‘naive’ specification may, to a large extent, be due to the omission of variables suggested by recent theoretical derivations of the gravity equation: Instead of capturing a causal effect of domestic regulation on services trade, the estimated coefficient on the indicator of domestic regulation may be capturing the effect of unoberserved multilateral openness. Taking recent theoretical advances seriously and controlling for multilateral openness by country fixed effects, it is found that the estimated effect of domestic regulation on services trade is reduced by a factor of 1.5 to 2. Even though the thus estimated elasticities of services trade with respect to domestic regulation of around one appear more plausible in the light of the presented bivariate correlations, it is emphasised that the drawing of robust policy conclusions requires further improvements in data quality and availability and further empirical research: Due to the unreliability of services trade data and the small number of available observations, the results are less robust than estimates on the effect of trade liberalisation in physical goods. One particular caveat for policy makers is that the effect of domestic deregulation on services trade in the above results appears to be nonlinear in the sense that domestic deregulation appears to have stronger effects in highly regulated economies than in already deregulated ones. Given the generalised trend towards domestic deregulation in OECD economies over the sample period, it is not clear whether in the majority of the OECD economies under consideration future domestic deregulation would have any sizeable effects on services trade. Clearly, this does not invalidate the commonsense claim that specific domestic regulations may act as barriers to services trade. However, a more promising avenue of research than the cross country regression approach would be to identify episodes in which a specific regulation was either imposed or removed exogenously and to quantify the effect at a more disaggregate level.

References

[1] Anderson, J. E. and E. van Wincoop (2003), ‘Gravity with gravitas: A solution to the border puzzle,’ American Economic Review 93(1): 170-192.

[2] Baldwin, R. and D. Taglioni (2006), 'Gravity for dummies and dummies for gravity equations,' NBER Working Paper 12516.

[3] Banerjee, A., A. Deaton, N. Lustig, K. Rogoff and E. Hsu (2006), 'An evaluation of World Bank research, 1998-2005,' Washington D.C. `http:\\tinyurl.com/yck7wc`

[4] Barth, J. R., G. Caprio and R. Levine (2006), *Rethinking Bank Regulation: Till Angels Govern*, Cambridge University Press.

[5] Burnside, C. and D. Dollar (2000), 'Aid, policies and growth,' *American Economic Review* 90(4): 847-868.

[6] Cheng, I. and H. Wall (2005), 'Controlling for heterogeneity in gravity models of trade and integration,' *Federal Reserve Bank of St. Louis Review* 87(1): 49-63.

[7] Conway, P., V. Janod and G. Nicoletti (2005), 'Product market regulation in OECD countries,' Economics Department Working Papers No. 419, OECD: Paris.

[8] Eaton, J. and S. Kortum (2002), 'Technology, geography and trade,' *Econometrica* 70(5): 1741-1779.

[9] Egger, P. (2005), 'Alternative techniques for estimation of cross-section gravity models,' *Review of International Economics* 13(5): 881-891.

[10] Findlay, C. and F. Warren (2000), *Impediments to Trade in Services: Measurement and Policy Implications*, Routledge: London.

[11] Hausman, J. and W. Taylor (1981), 'Panel data and unobservable individual effects,' *Econometrica* 49: 1377-1398.

[12] Head, K., T. Mayer and J. Ries (2006), 'How remote is the offshoring threat?' mimeo, CEPII.

[13] Kimura, F. and H.-H. Lee (2006), 'The gravity equation in international services trade,' *Review of World Economics* 142(1): 92-121.

[14] Kox, H. and A. Lejour (2005), 'Regulatory heterogeneity as obstacle for international services trade,' CPB Working Paper No. 49.

[15] Kox, H. and H. Nordas (2007), 'Services trade and domestic regulation,' OECD Trade Policy Working Paper No. 49.

[16] Krugman, P. (1980), 'Scale economies, product differentiation, and the pattern of trade,' *American Economic Review* 70: 950-959.

[17] Nicoletti, G., S. Golub, D. Hajkova, D. Mirza and K.-Y. Woo (2003a), 'The influence of policies on trade and foreign direct investment,' *OECD Economic Studies* 36(1): 7-83.

[18] Nicoletti, G., S. Golub, D. Hajkova, D. Mirza and K.-Y. Woo (2003b), 'Policies and international integration: Influences on trade and foreign direct investment,' OECD Economics Working Papers No. 359.

[19] Nicoletti, G. and D. Mirza (2004), 'What is so special about services trade?' GEP Research Paper 2004/02, University of Nottingham.

[20] Nicoletti, G. and F. Pryor (2006), 'Subjective and objective measures of governmental regulations in OECD nations,' *Journal of Economic Behavior & Organization* 59: 433-449.

[21] Silva, J. and S. Tenreyro (2006), 'The log of gravity,' *Review of Economics and Statistics* 88(4): 641-658.

[22] United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations Conference on Trade and Development and World Trade Organization (2002), 'Manual on Statistics of International Trade in Services,' Statistical Papers No. 86 (Series M), United Nations Department of Economic and Social Affairs.

[23] Walsh, K. (2006), 'Trade in services: Does gravity hold? A gravity model approach to estimating barriers to services trade,' IIIS Discussion Paper No. 183, Trinity College Dublin.

[24] Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

A Appendix

A.1 Data Sources and Construction

Services trade
The Eurostat ITS database can be downloaded `http://epp.eurostat.ec.europa.eu/` under the *Economy and Finance* theme as *Balance of Payments - International Transactions, International Trade in Services (since 1985)*. The following BoP positions are used: (i) The directly reported BoP position 981 ('other services'), (ii) BoP positions 200 ('total'), 205 ('transport'), and 236 ('travel') to construct the aggregate 'residual services' by substracting BoP positions 205 and 236 from BoP position 200, and (iii) BoP position 291 to construct the aggregate 'other commercial services' by substracting BoP position 291 from BoP position 981. Negative reports are considered as reporting errors and are dropped from the sample before constructing the aggregates 'other services' and 'other commercial services'. 0 reports are imputed for missing disaggregate reports for which there is a 0 report at a higher level of aggregation. All reports are rounded to the nearest million of euros.

Trade cost proxies
Distance, common language and the common border dummy are from the CEPII bilateral database that can be downloaded from `http://www.cepii.fr/anglaisgraph/bdd/distances.htm`. Distance is a population weighted average of the great circle distances between the 20 largest cities in the origin and destination countries (distw in the

CEPII database). Common language is based on the ethnologues' definition and equals 1 if a language is spoken by at least 9% of the population in both countries.

Population and GDP
The population and GDP data are provided by the World Development Indicators Online Database (`http://devdata.worldbank.org/dataonline/`). In case the information is missing in the World Development Indicators Online Database, it is complemented by the International Monetary Fund World Economic Outlook Database (`http://www.imf.org/external/pubs/ft/weo/2006/02/data/index.aspx`).

PMR indicators
The OECD PMR Indicators database can be downloaded from `www.oecd.org/eco/pmr`. The indicator for overall PMR that consists of a weighted sum of disaggregated indicators is used. It is available for 27 OECD member states in 1998 and for all 30 OECD member states in 2003.

Table A.1 summarises the number of yearly nonmissing bilateral services export flows by BoP position for which all explanatory variables are available.

Table A. 1: Number of nonmissing observations

BoP position	1998	1999	2000	2001	2002	2003	2004
981	203	283	324	468	575	697	642
200-205-236	179	276	318	415	506	631	608
981-291	175	255	300	322	283	289	328

A.2 Estimation Results for Creditor Report as Default

Table A. 2: OLS pooled cross section for creditor report as default (1999-2004)

Dependent Variable	In bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS
ln GDP, origin	0.947***	0.949***	1	1		
	(0.026)	(0.026)				
ln GDP, dest	0.935***	0.936***	1	1		
	(0.027)	(0.027)				
ln Pop, origin					0.894***	0.895***
					(0.029)	(0.029)
ln Pop, dest					0.900***	0.900***
					(0.029)	(0.029)
ln GDP/Pop, origin					1.316***	1.330***
					(0.076)	(0.080)
ln GDP/Pop, dest					1.155***	1.167***
					(0.076)	(0.080)
ln PMR, origin	-2.183***		-2.151***		-1.416***	
	(0.136)		(0.134)		(0.173)	
ln PMR, dest	-1.568***		-1.523***		-1.072***	
	(0.136)		(0.134)		(0.170)	
PMR, origin		-1.245***		-1.227***		-0.757***
		(0.083)		(0.081)		(0.110)
PMR, dest		-0.882***		-0.857***		-0.568***
		(0.083)		(0.081)		(0.106)
ln avg dist	-1.204***	-1.198***	-1.238***	-1.232***	-1.130***	-1.119***
	(0.040)	(0.040)	(0.039)	(0.039)	(0.040)	(0.040)
Shared Language	0.614***	0.705***	0.563***	0.653***	0.647***	0.721***
	(0.136)	(0.138)	(0.140)	(0.142)	(0.131)	(0.136)
Common Border	-0.044	-0.113	-0.103	-0.168	-0.054	-0.101
	(0.136)	(0.138)	(0.140)	(0.142)	(0.132)	(0.134)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2842	2842	2842	2842	2842	2842
R^2	0.81	0.81	0.64	0.64	0.82	0.82
RMSE	1.02	1.03	1.02	1.03	1.00	1.01

Notes:
Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.
* significant at 10%; ** significant at 5%; *** significant at 1% level

Table A. 3: OLS country fixed effects for creditor report as default (1999, 2004)

Dependent Variable	In bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled OLS	Pooled OLS	FE OLS	FE OLS	FE OLS	FE OLS
lag (ln GDP), origin	0.947***	0.948***	2.487***	2.472***	1	1
	(0.028)	(0.028)	(0.477)	(0.472)		
lag (ln GDP), dest	0.925***	0.926***	2.511***	2.433***	1	1
	(0.029)	(0.030)	(0.420)	(0.408)		
lag (ln PMR), origin	-2.230***		-0.818		-0.526	
	(0.144)		(0.502)		(0.480)	
lag (ln PMR), dest	-1.682***		-1.013**		-0.784*	
	(0.149)		(0.450)		(0.467)	
lag PMR, origin		-1.206***		-0.480***		-0.430**
		(0.083)		(0.186)		(0.178)
lag PMR, dest		-0.893***		-0.417***		-0.386**
		(0.087)		(0.160)		(0.171)
ln avg dist	-1.187***	-1.189***	-1.015***	-1.026***	-1.002***	-1.013***
	(0.045)	(0.045)	(0.068)	(0.068)	(0.069)	(0.069)
Shared Language	0.614***	0.742***	-0.001	0.014	-0.013	0.001
	(0.146)	(0.148)	(0.125)	(0.126)	(0.126)	(0.127)
Common Border	-0.086	-0.187	0.266*	0.252	0.279*	0.266*
	(0.148)	(0.148)	(0.157)	(0.156)	(0.159)	(0.158)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	884	884	884	884	884	884
R^2	0.81	0.81	0.90	0.90	0.80	0.80
RMSE	1.02	1.03	0.78	0.78	0.79	0.78

Notes:
Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.
* significant at 10%; ** significant at 5%; *** significant at 1% level

A.3 Estimation Results for Other BoP Positions

Table A. 4: 'Residual services'

Dependent Variable	ln bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled OLS	Pooled OLS	FE OLS	FE OLS	FE OLS	FE OLS
lag (ln GDP), origin	0.938***	0.939***	2.869***	2.793***	1	1
	(0.029)	(0.029)	(0.458)	(0.449)		
lag (ln GDP), dest	0.894***	0.894***	2.244***	2.221***	1	1
	(0.029)	(0.029)	(0.430)	(0.409)		
lag (ln PMR), origin	-2.164***		-1.294**		-0.872*	
	(0.151)		(0.507)		(0.504)	
lag (ln PMR), dest	-1.463***		-0.888*		-0.760	
	(0.142)		(0.474)		(0.492)	
lag PMR, origin		-1.191***		-0.653***		-0.587***
		(0.087)		(0.162)		(0.157)
lag PMR, dest		-0.805***		-0.499***		-0.480***
		(0.079)		(0.174)		(0.182)
ln avg dist	-1.170***	-1.176***	-1.067***	-1.085***	-1.051***	-1.071***
	(0.044)	(0.043)	(0.072)	(0.073)	(0.073)	(0.073)
Shared Language	0.614***	0.713***	-0.005	0.013	-0.018	0.000
	(0.148)	(0.149)	(0.123)	(0.123)	(0.123)	(0.124)
Common Border	0.039	-0.057	0.214	0.190	0.231	0.209
	(0.156)	(0.153)	(0.150)	(0.149)	(0.152)	(0.151)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	849	849	849	849	849	849
R^2	0.81	0.82	0.90	0.90	0.81	0.81
RMSE	1.00	0.99	0.75	0.75	0.76	0.76

Notes:
Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.
* significant at 10%; ** significant at 5%; *** significant at 1% level

Table A. 5: 'Other commercial services'

Dependent Variable	ln bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled OLS	Pooled OLS	FE OLS	FE OLS	FE OLS	FE OLS
lag (ln GDP), origin	0.989***	0.987***	2.161***	2.145***	1	1
	(0.033)	(0.033)	(0.566)	(0.550)		
lag (ln GDP), dest	0.956***	0.955***	1.712***	1.748***	1	1
	(0.033)	(0.034)	(0.496)	(0.475)		
lag (ln PMR), origin	-2.223***		-0.750		-0.373	
	(0.158)		(0.643)		(0.607)	
lag (ln PMR), dest	-1.709***		-0.455		-0.308	
	(0.167)		(0.561)		(0.552)	
lag PMR, origin		-1.156***		-0.407*		-0.326
		(0.088)		(0.208)		(0.199)
lag PMR, dest		-0.887***		-0.411*		-0.378
		(0.093)		(0.229)		(0.232)
ln avg dist	-1.307***	-1.308***	-1.089***	-1.108***	-1.070***	-1.089***
	(0.060)	(0.062)	(0.100)	(0.100)	(0.098)	(0.099)
Shared Language	0.528***	0.650***	-0.160	-0.155	-0.172	-0.168
	(0.203)	(0.210)	(0.180)	(0.182)	(0.180)	(0.181)
Common Border	-0.032	-0.154	0.412*	0.382*	0.440*	0.411*
	(0.202)	(0.206)	(0.226)	(0.223)	(0.226)	(0.222)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	531	531	531	531	531	531
R^2	0.83	0.82	0.91	0.91	0.81	0.81
RMSE	0.98	0.98	0.75	0.75	0.75	0.75

Notes:
Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.
* significant at 10%; ** significant at 5%; *** significant at 1% level

A.4 Estimation Results for Poisson MLE Country Fixed Effects

Table A. 6: PMLE country fixed effects

Dependent Variable	bilateral services exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	Pooled PMLE	Pooled PMLE	FE PMLE	FE PMLE	FE PMLE	FE PMLE
lag (ln GDP), origin	0.847***	0.854***	1.881***	1.926***	1	1
	(0.042)	(0.042)	(0.592)	(0.574)		
lag (ln GDP), dest	0.741***	0.739***	0.769**	0.910***	1	1
	(0.065)	(0.064)	(0.386)	(0.348)		
lag (ln PMR), origin	-1.363***		-0.752		-0.366	
	(0.181)		(0.768)		(0.756)	
lag (ln PMR), dest	-0.702***		-0.739		-0.894*	
	(0.194)		(0.546)		(0.527)	
lag PMR, origin		-0.855***		-0.396*		-0.289
		(0.131)		(0.220)		(0.211)
lag PMR, dest		-0.465***		-0.613***		-0.636***
		(0.122)		(0.208)		(0.214)
ln avg dist	-0.727***	-0.729***	-0.797***	-0.798***	-0.797***	-0.799***
	(0.047)	(0.048)	(0.056)	(0.056)	(0.057)	(0.056)
Shared Language	0.461***	0.502***	0.235**	0.229**	0.237**	0.227**
	(0.175)	(0.170)	(0.098)	(0.098)	(0.101)	(0.100)
Common Border	0.075	0.028	-0.029	-0.023	-0.029	-0.020
	(0.162)	(0.156)	(0.145)	(0.142)	(0.148)	(0.144)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	925	925	925	925	925	925

Notes:

Robust standard errors in parentheses to take into account clustering of standard errors within country pairs.

* significant at 10%; ** significant at 5%; *** significant at 1% level

LIST OF WORKING PAPERS RELEASED BY CEPII[1]

No	*Title*	*Authors*
2007-07	The location of domestic and foreign production affiliates by French multinational firms	T.Mayer I. Méjean B. Néfussi
2007-06	Specialisation across Varieties within Products and North-South Competition	L. Fontagné, G. Gaulier & S. Zignago
2007-05	Trade Costs and the Home Market Effect	M. Crozet & F. Trionfetti
2007-04	The Impact of Regulations on Agricultural Trade: Evidence from SPS and TBT Agreements	A.-C. Disdier, L. Fontagné & M. Mimouni
2007-03	International Comparisons of Living Standards by Equivalent Incomes	M. Fleurbaey & G. Gaulier
2007-02	Does Risk Aversion Drive Financial Crises? Testing the Predictive Power of Empirical Indicators	V. Coudert & M. Gex
2007-01	Asian Catch Up, World Growth and International Capital Flows in the XXIst Century : A Prospective Analysis with the INGENUE 2 Model	M. Aglietta, V. Borgy, J. Château, M. Juillard, J. Le Cacheux, G. Le Garrec & V. Touzé
2006-27	Current Account Reversals and Long Term Imbalances: Application to the Central and Eastern European Countries	K. Benhima & O. Havrylchyk
2006-26	On Legal Origins and Brankruptcy Laws: the European Experience (1808-1914)	J. Sgard
2006-25	Taux d'intérêt et marchés boursiers : une analyse empirique de l'intégration financière internationale	V. Borgy & V. Mignon
2006-24	Changing Patterns of Domestic and Cross-Border	A. Bénassy-Quéré

[1] Working papers are circulated free of charge as far as stocks are available; thank you to send your request to CEPII, Sylvie Hurion, 9, rue Georges-Pitard, 75015 Paris, or by fax : (33) 01 53 68 55 04 or by e-mail Hurion@cepii.fr. Also available on: \\www.cepii.fr. Working papers with * are out of print. They can nevertheless be consulted and downloaded from this website.

[1] Les documents de travail sont diffusés gratuitement sur demande dans la mesure des stocks disponibles. Merci d'adresser votre demande au CEPII, Sylvie Hurion, 9, rue Georges-Pitard, 75015 Paris, ou par fax : (33) 01 53 68 55 04 ou par e-mail Hurion@cepii.fr. Egalement disponibles sur : \\www.cepii.fr. Les documents de travail comportant * sont épuisés. Ils sont toutefois consultable sur le web CEPII.

	Fiscal Policy Multipliers in Europe and the US	& J. Cimadomo
2006-23	Market Access Impact on Individual Wage: Evidence from China	L. Hering & S. Poncet
2006-22	FDI in Chinese Cities: Spillovers and Impact on Growth	N. Madariaga & S. Poncet
2006-21	Taux d'intérêt et marchés boursiers : une analyse empirique de l'intégration financière internationale	V. Borgy & V. Mignon
2006-20	World Consistent Equilibrium Exchange Rates	A. Bénassy-Quéré, A. Lahrèche-Révil & V. Mignon
2006-19	Institutions and Bilateral Asset Holdings	V. Salins & A. Bénassy-Quéré
2006-18	Vertical Production Networks: Evidence from France	M. Fouquin, L. Nayman & L. Wagner
2006-17	Import Prices, Variety and the Extensive Margin of Trade	G. Gaulier & I. Méjean
2006-16	The Long Term Growth Prospects of the World Economy: Horizon 2050	S. Poncet
2006-15	Economic Integration in Asia: Bilateral Free Trade Agreements Versus Asian Single Market	M. H. Bchir & M. Fouquin
2006-14	Foreign Direct Investment in China: Reward or Remedy?	O. Havrylchyk & S. Poncet
2006-13	Short-Term Fiscal Spillovers in a Monetary Union	A. Bénassy-Quéré
2006-12	Can Firms' Location Decisions Counteract the Balassa-Samuelson Effect?	I. Méjean
2006-11	Who's Afraid of Tax Competition? Harmless Tax Competition from the New European Member States	A. Lahrèche-Révil
2006-10	A Quantitative Assessment of the Outcome of the Doha Development Agenda	Y. Decreux & L. Fontagné
2006-09	Disparities in Pension Financing in Europe: Economic and Financial Consequences	J. Château & X. Chojnicki
2006-08	Base de données CHELEM-BAL du CEPII	H. Boumellassa & D. Ünal-Kesenci
2006-07	Deindustrialisation and the Fear of Relocations in the Industry	H. Boulhol & L. Fontagné

2006-06	A Dynamic Perspective for the Reform of the Stability and Gowth Pact	C. Deubner
2006-05	China's Emergence and the Reorganisation of Trade Flows in Asia	G. Gaulier, F. Lemoine & D. Ünal-Kesenci
2006-04	Who Pays China's Bank Restructuring Bill?	G. Ma

CEPII
DOCUMENTS DE TRAVAIL / WORKING PAPERS

Si vous souhaitez recevoir des Documents de travail,
merci de remplir le coupon-réponse ci-joint et de le retourner à :

Should you wish to receive copies of the CEPII's Working papers,
just fill the reply card and return it to:

Sylvie HURION – Publications
CEPII – 9, rue Georges-Pitard – 75740 Paris – Fax : (33) 1.53.68.55.04
sylvie.hurion@cepii.fr

M./Mme / Mr./Mrs ....

Nom-Prénom / Name-First name ....

Titre / Title ....

Service / Department..

Organisme / Organisation ....

Adresse / Address...

Ville & CP / City & post code..
Pays / Country.. Tél.......................................
Your e-mail ....

Désire recevoir les **Document de travail** du CEPII n° :

*Wish to receive the **CEPII's Working Papers No**:*...

....

....

....

....

....

....

....

....

☐ Souhaite être placé sur la liste de diffusion permanente (**pour les bibliothèques**)
*Wish to be placed on the standing mailing list **(for Libraries)**.*