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Can Regulatory Barriers influence Mode 1 Services Imports? Cross-Country Empirical Results from Select Sectors

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Can Regulatory Barriers influence Mode 1 Services Imports? Cross-Country Empirical Results from Select Sectors

Srinka Bose ⁽¹⁾, Debashis Chakraborty ⁽²⁾

Abstract

Import of different services through Cross-Border Supply route (i.e., Mode 1) in an economy can increase with wider internet usage therein. In practice, however, restrictive policy framework often causes a dampening effect on the digitally enabled components of services trade. In a cross-country framework involving 50 countries over 2014-17, the current analysis explores this relationship for six major service categories, which are, along with other channels, supplied significantly through digital medium. The study adds value to the existing literature in the following manner. First, along with the measures for country-level services trade barriers, indices for regulatory heterogeneity have been incorporated in the empirical model. Second, the gravity model in the current context compares two alternative scenarios - one with a smaller number of potential exporters (top 10 exporters) and the other with a more diverse (top 30 exporters) group. The empirical results reveal considerable variations across sectors in direction and magnitude of the effect of deeper internet usage on service imports in the presence of regulatory barriers, with crucial policy implications.

JEL Codes: F13, F14

Keywords: Services imports, Cross-Border Supply, Internet usage, Service Trade Barriers

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1. Introduction

International Trade in services has been increasing at a faster rate than the corresponding figure for merchandise trade. Service exports, which stood at 2.7 trillion US\$ in 2005, have almost trebled to reach 7.13 trillion US\$ in 2022 (UNCTAD, undated). The actual volume of service trade lies even at a higher plane as the figures may not fully cover the largest mode of services delivery, namely, Mode 3 (Commercial Presence).² After Mode 3, the largest volume of service trade transactions occurs through Mode 1 (Cross-Border Supply), which largely, although not necessarily³, can be delivered digitally. While international transactions for various service categories through Mode 1 have been increasing over the years, there exists considerable differences in their relative importance in the total trade basket of countries on one hand and between an economy's export and import patterns on the other. Annex A.1 highlights the existence of considerable differences in the importance of Mode 1 in import and export basket of countries located across different regions. For instance, among the high-income OECD countries over 2005-2017, Ireland (51.5%) and Czech Republic (12.9%) account for the highest and lowest shares in terms of cross-border service imports through the Mode 1 route respectively.⁴ Among the upper-middle income countries, the corresponding highest and lowest import shares are observed in Costa Rica (37.9%) and Colombia (25.9%) in that order. Among the non-OECD countries, India is characterized by the highest import share in this category (71.7%).

While technological advancements have provided an impetus to the supply of services through digital platforms, prevailing services trade policies still continue to impose restrictions on such trade flows. There exists a rich branch of literature that examine the impact of regulatory barriers in general (Beverelli et al., 2015; Nordas, 2018) and that are

² The possible routes of services trade, according to the General Agreement on Trade in Services (GATS) can be classified under four modes. These are Mode 1 (Cross-Border Supply), Mode 2 (Consumption Abroad), Mode 3 (Commercial Presence) and Mode 4 (Movement of Natural Persons).

³ For instance, supply of transport services through Mode 1 is not digitally enabled.

⁴ The service trade figures have been obtained from the mode-level international commercial transaction data, which is available for the period 2005-2017 in the TiSMoS dataset (WTO, undated a). The country-wise information on regulatory barriers on service imports can however be obtained for the period 2014-2022 from the Service Trade Restrictiveness Index (STRI) data, reported in OECD (undated). In the regression analysis, therefore, a shorter period of 2014-2017 is considered, as this corresponds to complementary trade and regulatory policy heterogeneity data required for the analysis.



more specific to the digital environment associated with supply of services on trade patterns in particular (Ferencz & Gonzales, 2019; Bose, 2022). Given the continuation of service trade barriers (Nordas et al., 2020), there is a growing need to empirically validate how existence of such barriers may influence the service import flows across countries. To widen the coverage, the current analysis considers the influence of services trade barriers on imports through Mode 1 in a wider set of countries. The current paper is arranged along the following lines. The section following introduction briefly surveys the existing literature. Section 3 explores the relationship between internet usage and service trade through Mode 1. The description of the empirical model, methodology, variables and data are provided in Section 4. The regression results are reported and discussed in Section 5, based on which certain policy conclusions are drawn in Section 6.

2. Survey of Literature

Several underlying factors, including final demand and structural changes in production linked to development, have led to the expansion of the service-intensities across economies from diverse development spectrum (Francois and Hoekman, 2010). An important accelerator to this transition has been the advances made in information technology (IT) tools over the last three decades, which increasingly facilitated cross-border trade in services categories through digital mediums (Francois and Hoekman, 2010). In this section the literature related to service imports through Mode 1 is briefly reviewed, beginning with a short discussion of earlier studies with a focus on the Modes of service delivery. Next, an overview of the empirical literature on services trade that uses the gravity model framework is provided. Finally, relevant studies on services trade patterns, focussing on regulations and heterogeneity in regulations, have been discussed.

The branch of literature covering services trade was initially relatively narrower as compared to the corresponding field covering merchandise trade.⁵ Technical analysis

⁵ While many studies have focussed on services sectors as a case study, the technical analysis has been limited in the early years. For instance, a relatively narrow branch of literature has focussed on specific service sectors,



of service trade with a focus on Modes of supply were even more limited. Bhagwati et al. (2002) conducted one of the earliest studies with a focus on delivery of services under Mode 1, in order to assuage the apprehensions regarding the labour market effects of technological progress led outsourcing to developing countries, by their developed counterparts. The analysis highlighted that the associated gains from trade affecting employment and wages were not qualitatively different from the corresponding scenario under merchandise trade.

Econometric analysis to explore performance of service sectors through the lens of Modes is relatively recent and still growing. Most of the existing studies have used a gravity or a gravity-like framework to examine the drivers behind growing services trade patterns (Shingal, 2023; Khachaturian and Oliver, 2023; Bose, 2024). Shingal (2023) identified that doubling the restrictiveness at the mean on delivery of Mode 4 services is associated with a 50 per cent decline in corresponding average imports, with adverse effects on other Modes as well. In order to examine whether services trade via Mode 3 is a substitute or complement for the other three Modes, the structural gravity model framework developed by Khachaturian and Oliver (2023) noted that as service exporting firms rely on different Modes, factors influencing one category could impact international transaction under the others through linkage effects. Drawing data from the WTO Trade in Services data by Mode of Supply (TISMoS) dataset, Bose (2024) developed appropriate surrogates for gravity dummies in a unilateral setup and undertakes a cross-sectoral examination of the import performance of nine key service sectors, exploring only the digitally delivered components by using Mode 1 imports as a proxy for this. The analysis concluded that despite deeper internet penetration, trade flows can get hampered by prevailing service trade restrictions in the importing nations.

The above-mentioned studies however have not considered restrictions specific to digital trade. In a departure from these studies and developing a specific digital services

e.g., telecommunications and financial services (Verikios and Zhang, 2004), education and health services (Dihel and Goswami, 2015) and so on.



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trade restrictive index, Ferencz and Gonzales (2019) observed, for a group of G20 countries, that improving communications infrastructure and lowering burdensome measures that affect data transfer would enhance service trade performance. Moreover, better use of the internet was found to facilitate diversification of service exports more effectively (Gnangnon, 2020). Strict data protection policies were shown to be negatively associated with imports of data-intense services (Marel & Ferracane, 2021). Thus, countries embracing restrictive data policies are more likely to be subject to lower volume of cross-border trade through digital mediums (i.e., covering Mode 1). Moreover, given the growing ‘servicification’ phenomenon in the global canvas⁶, this is likely to hurt manufacturing exports in the importing countries as well (Pant and Chakraborty, 2024; Yang et al., 2024).

The literature discussed so far have primarily employed the gravity framework or an adaptation of the same for the empirical analysis (Anderson and van Wincoop, 2003). The gravity specification, which was developed initially for exploring trade in goods, has over the period found an applicability to trade in services as well and often considered as an even better fit for explaining the same (Kimura and Lee, 2006; Head et al., 2010; Anderson et al., 2018). Although initially the studies conducting estimation of the gravity model were majorly based on Ordinary Least Square (OLS) framework, the more recent literature embraces the Poisson Pseudo Maximum Likelihood (PPML) estimator as a more robust method (Santos Silva and Tenreyro, 2006; Dettmer, 2015; Benz et al., 2017; Nordas, 2018; Shingal, 2023).

The major focus of this study is to analyse, for crucial service sectors, the effect of trade barriers and heterogeneity of regulations and their interactions, given the level of internet usage of the economy, on service imports through Mode 1. The research on this branch of literature is relatively nascent. The empirical results of the early studies

⁶ ‘Servicification’ is the name given to the emerging phenomenon of increasing use of different service segments as inputs in the merchandise production process in general and manufacturing sector operations in particular (Lodefalk, 2014; Thangavelu et al., 2018). While the phenomenon was more prominent in the developed countries in the earlier period, it has become an integral part of the industrial exports originating from developing countries in the recent period (Pant and Chakraborty, 2024).



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revealed that exports are negatively affected by the stringency in regulatory heterogeneity index (Kox and Lejour, 2007; Kox and Nordas, 2009; Nordas, 2016). The outcome has been attributed to a combination of fixed qualification costs, and international regulatory heterogeneity, which result in lesser effective market entry potential and higher prices, than would otherwise have been the case. These country-level variations in regulations end up suppressing foreign competition as well as the influx of foreign service suppliers of new services or innovative working methods in the importing country. Therefore, the choices available to domestic firms who intend to purchase these services are, thus, implicitly restricted, which in turn might lead to cost escalation and loss of competitiveness (Kox and Nordas; 2009).

Assessing the influence of sectoral regulatory barriers on services trade, as measured by the Service Trade Restrictiveness Index (STRI) prepared by the Organisation for Economic Co-operation and Development (OECD), Nordas and Rouzet (2017) covered a wide range of sectors for 42 countries (primarily OECD members). Employing several estimators including One-way fixed effects, OLS, PPML and Gamma PML, the analysis observed that differences in regulatory standards can significantly impede bilateral services trade flows. In a relatively recent study, Ahmed (2019) provided evidence in favour of enhanced regulatory cooperation being specifically beneficial for facilitating digital services trade.

The review of literature highlights the importance of addressing issues related to cross-border trade in services, in the context of the rapidly increasing trade through this channel and the potential concerns in terms of country-level impediments restricting its coverage. Given this backdrop, the present study adapts the gravity model of international trade to a cross-country analysis using ‘surrogate’ measures for common dummy variables in the associated literature. The choice of the gravity model for sectoral comparison draws support from the existing literature (Anderson and van Wincoop, 2003). The following analysis has been conducted in the current paper. First, with the aid of a single-country and two-sector illustration, it explains the way these ‘surrogate’ measures have been created, in line with Bose (2024). These constructed



measures are then used to examine cross-country sectoral imports through Mode 1 when only a small set of the most relevant exporters are considered, and the results are then compared to the case when a much larger number of potential trading partners are involved.⁷ Finally, the regression model to explore the trade impact of heterogeneity in regulations, in addition to import barriers, addresses a gap in the literature by undertaking this analysis at the modal level.

3. Relation between and Internet Usage and Cross-Border (Mode 1) Imports of Services

This section highlights the relationship between internet usage and the volume of cross-border imports through Mode 1 across countries.⁸ The scatter diagram in Figure 1 shows the presence of a positive correlation between the number of individuals (per 100 of the population) using the internet (reported in horizontal axis) and the level of aggregate service imports through Mode 1 (reported in vertical axis). This positive relationship could however also be shaped by other factors influencing both variables. Therefore, Mode 1 service imports need to be analysed in conjunction with other drivers, which has been undertaken in the empirical analysis reported in Section 4. An interesting observation that can be drawn from the scatter plots is the way in which the relation has evolved over the years for different income groups.

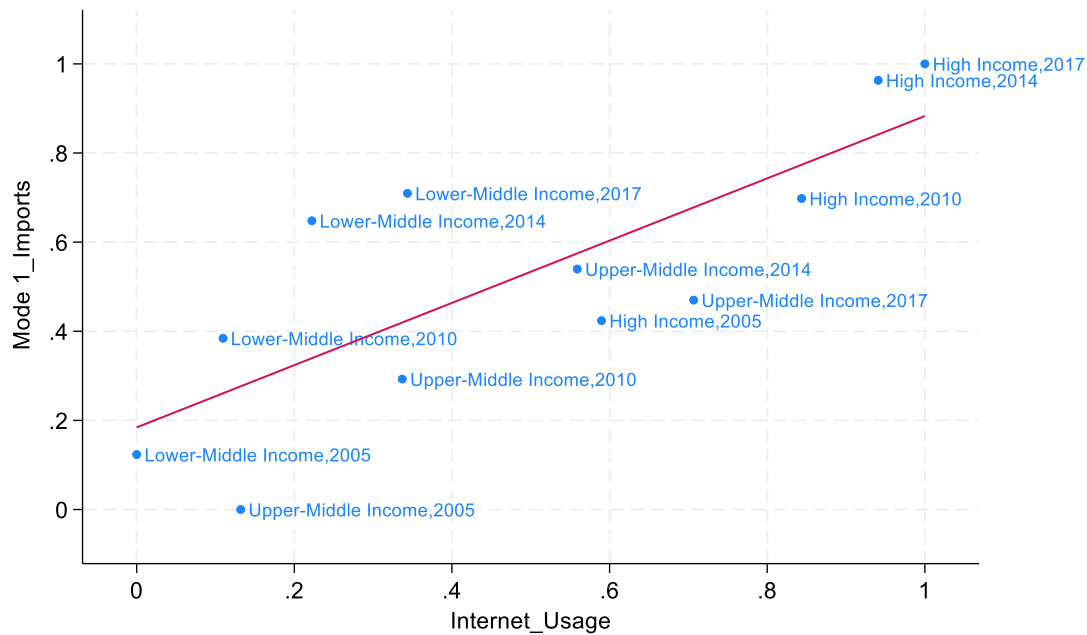
Through an analysis of the WDI data, it is observed that both high-income and lower-middle income countries display an improvement in their internet usage pattern as well as imports through Mode 1 route over the entire study period. However, the corresponding figures for middle-income countries declined in 2017, in comparison to the corresponding 2014 values. Moreover, imports of Mode 1 services by lower-middle income countries improved at a higher rate in comparison to that of the other

⁷ Imports of selected service categories, rather than exports, are examined in the current context as the restrictiveness indices obtained from the OECD STRI database (OECD, undated) are reported for the importing economies.

⁸ The sample considered in the current analysis comprises of 50 countries belonging to high-income, upper-middle income and lower-middle income categories. The STRI database accessed for the study however does not currently provide measures for any of the Low-Income countries.

income groups, which is an indicator of their deeper association with the global economic architecture and value chains (Heusar and Mattoo, 2017).

Figure 1 Scatter Plots - Internet Usage and Mode 1 Imports (2017)



Source: Own construction

Note:

1. *Mode_1 Imports* data is obtained from *TiSMoS* database (WTO, undated a).
2. *Internet_Usage* data is obtained from *World Development Indicators* database (World Bank, undated).
3. For comparability, values of both variables have been re-scaled between 0 and 1.

The scatter plots shown in Figure 1 have been generated, on the basis of a broader grouping of countries. Substantial differences can however be observed when location of individual countries within the sample are considered. For example, among the high-income countries, in Iceland more than 98% of the population have been using the internet during the study period (2014-2017). Conversely for Italy, also a high-income country, the corresponding figure was 55.6% and 63.1% in 2014 and 2017 respectively (World Bank, undated). Among the upper-middle income countries, the highest and lowest proportion of the population using the internet in 2014 were noted in Russia (70.5%) and Thailand (34.9%) respectively. In the year 2017, the



corresponding countries were Malaysia (80.1%) and Peru (50.4%). Among the lower-middle income countries, Vietnam was characterized by the highest internet usage (41% in 2014 and 58.1% in 2017), while India was placed at the bottom (13.5% in 2014 and 18.2% in 2017). The transitions in the relative position of the countries on the internet penetration scale depict the evolving dynamics in these territories.

An important development in the pattern of internet usage is that the erstwhile limited access to the same in the lower-middle income countries is changing fast with an average annual growth rate of 15.8% between 2014 and 2021. This is far more as compared to the corresponding figures for high-income and upper-middle income economies, who are characterized by the average annual growth rates of 1.9% and 6.9% respectively.⁹ It is apparent that countries like India are likely to increase their cross-border service imports substantially, in line with the growth pattern in recent years.¹⁰ The scope of the current analysis is however limited to the period 2014-2017, given the pattern of data availability.

Based on the observations made from the scatter plots, the current study now seeks to examine whether the relationship between internet usage and Mode 1 service imports holds good, when other factors influencing the import flows are also considered. Moreover, given that the relationship projected in Figure 1 is based on aggregate service imports through Mode 1, the study further explores whether there is a difference in the relationship patterns prevailing across different sectors.¹¹

⁹ The average annual growth rates were calculated by using data from World Development Indicators (World Bank, undated).

¹⁰ The average annual service import growth rate for India over 2014-21 is found to be 7.3 times that of the corresponding median of the sample and second only to Indonesia, which was 7.6 times the median value.

¹¹ While the TISMoS dataset reports information for a wider array of service sectors, a number of them had been dropped from the analysis. For instance, some sectors which have a very limited number of observations (e.g., heritage and recreational services), have not been considered. Similarly, although transport service contributes to a large volume of Mode 1 trade, it has not been considered here as the present study focuses only on those cross-border service categories, which are digitally enabled.



4. Empirical Model and Methodology

The empirical analysis is based on a gravity-like model framework, with variables capturing services regulations, internet usage and their interactions. Gravity equations are used extensively in empirical studies on trade. The framework, in its simplest form, interprets the volume of trade between country dyads through their trade costs and their relative market size. Bilateral trade patterns are positively related to the size of the trading countries and negatively with their bilateral distance, which is usually taken as the distance between their capitals. Rather than considering the simpler form, the recent studies are based on the structural gravity setup (Anderson and van Wincoop, 2003). This section provides an outline of the choice of estimator, the model, data sources and a brief description of how the variables were constructed.

4.1. Model and Variables

In recent literature on services trade employing gravity framework, the econometric analysis tends to embrace the PPML model. Prior to the introduction of the PPML framework, use of a log-linearised OLS framework to estimate the gravity model of international trade was a common practice. The current analysis, given its gravity-like structure, adopts the PPML framework in line with recent trends (Santos Silva and Tenreyro, 2006; Nordas, 2018; Shingal, 2023). The dependent variable is thus, service imports and not logarithm of imports as is usually considered while employing the OLS model.¹² The model also incorporates the relevant year fixed effects and sector dummies for six different services covered in the current analysis, namely, distribution, education, health, insurance & financial, business services and telecommunication & information.

¹² The paper also estimated the OLS model for comparing the results with the PPML version. The OLS estimates undertaken were, however, not much different in direction and significance vis-à-vis the reported PPML results. However, they varied to some extent in terms of magnitude of the coefficients.

The sample covers 50 economies for the period 2014-2017. The choice of these countries was determined by the availability of measures for trade restrictiveness and regulatory heterogeneity values. Among the economies included in the sample, 38 are from the OECD list and 12 are non-OECD countries. The classification of the selected countries, based on income-groups and regions and comparison of performance in Mode 1 exports and imports, have been summarized in Annex A.1.

This study estimates regression equation (1) to examine the dependence of imports on the set of relevant independent variables. The main coefficient of interest is γ_1 , the interaction term between trade restrictiveness and internet usage.¹³ The description of the variables is reported in the following:

$$\begin{aligned} Imports_{jt}^s = & \alpha_0 + \alpha_1 GDP_{jt} + \alpha_2 Mkt_{penetration_{jt}} + \alpha_3 Border_{jt} \\ & + \alpha_4 Language_{jt} + \alpha_5 Colony_{jt} + \alpha_6 Colonizer_{jt} \\ & + \alpha_7 RTA_{jt} + \beta_1 Reg_Heterogeneity_{jt} \\ & + \beta_2 Internet_Usage_{jt} + \gamma_1 Trade_Res_{jt} X Internet_Use_{jt} \\ & + \epsilon_{jt}^s \end{aligned} \quad (1)$$

$Imports_{jt}^s$	Cross-Border (Mode 1) imports by country j in sector s at time t . s refers to the six different services considered for the analysis. The Import values are obtained from <i>TiSMoS</i> database (WTO, undated a).
GDP_{jt}	Gross Domestic Product of country j at time t . Values are in logs and drawn from <i>World Development Indicators</i> (World Bank, undated).
$Mkt_{penetration_{jt}}$	Weighted distance of all countries with importer j , the weights being their GDP at time t . Values are in logs and constructed using <i>World Development Indicators</i> (World Bank, undated) and <i>CEPII</i> databases (CEPII, undated).
$Border_{jt}$	A constructed unilateral measure for the conventional gravity dummy for a common geographical border of importer j at time t .

¹³ The regression models have been estimated separately for top 10 and top 30 potential exporters, so as to compare the difference in results. Accordingly, the top 10 and top 30 potential exporters are considered, respectively, while constructing unilateral measures for common gravity dummies. The construction methodology of Border, Language, Colony, Colonizer and RTA dummies are described in Section 4.2. The list of the countries considered in the current context is provided in Annex A.2.



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$Language_{jt}$	A constructed unilateral measure for the conventional gravity dummy for a common official language of importer j at time t .
$Colony_{jt}$	A constructed unilateral measure for the conventional gravity dummy of importer j at time t , the importer being under similar colonial rule as the potential exporters.
$Colonizer_{jt}$	A constructed unilateral measure for the conventional gravity dummy of importer j at time t , the importer having been a colony of / colonizer of potential exporters.
Rta_{jt}	A constructed unilateral measure for a dummy where the importer j at time t is part of a trade agreement that incorporates a services component with potential exporters.
$Reg_Heterogeneity_{jt}$	Constructed country measures of services regulatory heterogeneity for importer j at time t . The measures are weighted average of STRI heterogeneity indices of the countries. Values are in logs and constructed using <i>STRI Heterogeneity Indices</i> (OECD, undated) and <i>CEPII</i> (CEPII, undated) databases.
$Internet_Usage_{jt}$	The number of individuals (per cent of population) of importer j at time t using the internet. Values are in logs and constructed using <i>World Development Indicators</i> (World Bank, undated).
$Trade_Res_{jt}$	Constructed country measures of services trade restrictions for importer j at time t . The measures are weighted average of STRI scores of the countries. Values are in logs and constructed using <i>STRI</i> (OECD, undated) and <i>CEPII</i> (CEPII, undated) databases.
ϵ_{jt}^s	Error Term.

4.2. Developing Country Level Gravity Setup with Unilateral Indices

In the current paper, the dependent variable is cross-border service imports for 50 countries over 2014-2017. The GDP of the importing country has been incorporated in the model as a proxy for economic size (Park and Park, 2011; Dettmer, 2015; Lee and Park, 2016; Chaney, 2018). Spread of Internet usage has been considered as a facilitating factor for importing services through digital routes (Freund and Weinhold, 2002; Choi, 2010; Tay, 2018). STRI indices has been incorporated in the model as a

measure of regulatory restrictiveness (Nordas and Rouzet, 2017; Nordas et al., 2020). The trade restrictiveness indices are constructed as weighted country averages, with the weights being the import shares of sectors, by drawing data from OECD (undated).¹⁴ Market_Penetration and Reg_Heterogeneity variables have been constructed by taking into consideration all exporting countries. For the Market_Penetration variable, the values are the weighted averages of the distance of each importing country from all trade partners, with the weights being their GDP. For the Reg_Heterogeneity variable, the values are the weighted averages of the regulatory heterogeneity of each importing country, with the weights being their export share for that sector and the modes.

It is common for research papers adopting the gravity framework to introduce dummy variables covering historical incidents, geographical reality and trade agreements (e.g. Shingal, 2023). The current study introduces these variables not as dummies but rather as counts of the number of countries among the top 10 (or top 30) exporters characterizing a fact, e.g., number of economies with whom the importing country shares a common border (Border), a common language (Language), colonial past (Colony), colony / colonizer relation (Colonizer) and trade agreement partnership with a services component (RTA). An example comparing the top exporters for distribution and education services has been provided with help of Annex A.2 and Annex A.3 here, for better illustration of the methodology used for construction of these dummies.

The names of the top 30 exporting economies to India, covering only Mode 1 (cross-border) exports for distribution and education services categories, have been provided in Annex A.2. The list has been prepared in the sequence of ranks, reporting the first and last years of the study sample (2014 and 2017).¹⁵ The purpose of this table is only

¹⁴ As there is no exact correspondence between the sectors for the trade data and the restrictiveness indices, only some of the important sectors have been considered in the current context. For example, OECD STRI scores for telecommunication and distribution services are available but corresponding data are not there for health and education services.

¹⁵ Distribution services can also be supplied through Mode 3 (commercial establishment) and education services through all the other modes (consumption abroad, commercial presence and movement of natural persons). However, the other Modes are not covered in the current context.



to provide an illustration of the dummy generation mechanism followed in the current analysis. Annex A.3 explains the unilateral indices for the gravity dummies in the Indian context. For instance, in 2014 India had the common official language with three of the largest exporters (included among the top 10 category) of distribution services through Mode 1, namely: USA, UK and Hong Kong.¹⁶ In 2017, the corresponding number increased to four as Singapore made its entry among the top 10 exporter countries in the distribution services category for that year. Like the case for distribution services, India also had a common official language with three of the top exporters for education services in 2014 (USA, UK and Australia). In 2017, while the number remained unchanged at 3, Israel replaced Australia in the list.¹⁷

The example of the Indian case, comparing two sectors and using two measures (Border and Language) offers an idea of the method used for constructing the dummies. In the analysis the total number of countries and number of sectors are 50 and six respectively. Each of the five dummy variables are constructed for the period of 2014-2017 (4 years). Thus, a total of 6000 ($= 50 \times 6 \times 5 \times 4$) values corresponding to dummies in bilateral gravity models have been constructed in the current context.

5. Regression Results

The regression results based on equation (1) are presented in Tables 1 (involving top 10 potential exporters) and 2 (involving top 30 potential exporters) respectively. Each table reports the estimated coefficients for the six services, with cross-border (Mode 1) imports being the dependent variable. For each service sector, two different model specifications have been considered – while Column (b) includes the regulatory heterogeneity variable, Column (a) excludes the same.

¹⁶ For the analysis, only the number of potential exporters, as revealed from trade orientation (proxied by ranking), has been considered.

¹⁷ Australia's rank as an exporter of education services through Mode 1 fell to 24th position in 2017 from the 8th position in 2014. Thus, it was considered in the analysis incorporating the top 30 exporting countries, but not in the analysis involving the top 10 countries.



Before analysing the internet usage, heterogeneity and the interaction terms, a brief discussion of the results for the variables commonly used in a gravity setup is undertaken. In line with the past studies, larger GDP of the importing country encourages service imports, while growing distance lowers the same. While the role of economic growth in facilitating trade is self-explanatory, the negative coefficient of distance can be linked to the dampening effect of narrowing cultural proximity. Sharing a common official language (Language), a geographical border (Border) and having been in a colony / colonizer (Colonizer) with potential exporters, is observed to increase the trade flows. It should however be noted that the coefficients of the dummies reported in Table 1 are higher, being almost double in case of some sectors, when the top 10 potential exporters are considered, vis-à-vis the case when a larger number of countries (top 30) are taken into consideration (reported in Table 2). The colony variable has comparatively ambiguous coefficients in some of the models, presumably due to lack of trade-enhancing complementarities among the country pairs. Interestingly, the coefficients for RTA are not significant but show the expected positive sign. The result can be explained by the fact that unlike the case of merchandise trade, the role of trade facilitation requirements under RTAs for the service sectors are relatively limited in scope.

Turning attention to the core variable of interest, heterogeneity in regulations is found to lower imports substantially and significantly across all sectors. Overall, other than the importance of the importer country GDP, the role of regulatory compatibility appears to be most important driver of services trade. In absolute terms the coefficient of the variable is only slightly lesser than the corresponding figure for the importer country GDP. An interesting change is observed in the Market_Penetration term when the regulatory heterogeneity variable is introduced.¹⁸ Although the sign of the coefficient continues to be negative, it is no longer found to be significant. One possible explanation of the result is the prevalence of lesser regulatory heterogeneity

¹⁸ The variable has been introduced in Column (b) of all the models reported in Tables 1 and 2.



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among the countries, which are geographically closer. The contention draws some support from the values of the indices reported in the STRI database (OECD, undated).

An increase in the number of individuals using the internet (Internet_Usage) increases imports for all service sectors for both specifications. However, the coefficient is found to be larger for all cases and better in terms of significance, when only the 10 largest potential exporters are considered in the model (Table 1). Only in the case of business services, the coefficients are found to be at the comparable level in Table 1 (10 largest exporters) and Table 2 (30 largest exporters), irrespective to the construction of the gravity dummy variables. The result can be explained by the fact that the top 10 exporters account for a substantial proportion (more than 60%) of exports of most services and are more likely to define import patterns in the sample countries.¹⁹

The empirical results can be interpreted in the following manner. The main purpose of the analysis is to gauge whether the import-facilitating impact of growing internet usage is getting dampened in the presence of regulatory import barriers. In line with the earlier results (Bose, 2024), there are considerable sectoral differences in direction of these coefficients with consumer services showing a positive relationship, while producer services, or those that can be majorly used as intermediate inputs in the value chain of other sectors, are showing a negative one. Thus, while higher regulatory restrictions do not mitigate the import-improving impact of wider internet usage significantly for distribution, insurance & financial services and business services, the relationship is to the contrary for health and education services. The coefficients for telecommunications & information services are not significant in the empirical analysis.

One possible reason for more stringent import restrictions absorbing some of the trade-creating effects of higher internet usage for consumer services (i.e., health and

¹⁹ Among the sectors considered for this study, for the year 2017, the top 10 exporting countries accounted for a minimum of 52% in case of exports of distribution services and a maximum of 79% in case of exports of insurance & financial services in (TiSMoS database (WTO, undated a)).



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education services) could be explained by the fact that all the producer services (i.e., distribution, insurance & financial services and business services) generally have deeper linkages with the other sectors. Thus, barriers to these producer services could be lowering imports in those sectors, consequently further hurting demand for imports in the downstream sectors as well, through a kind of multiplier effect. In addition, another reason for the interaction coefficients being substantially larger in absolute terms for consumer services could have been shaped by the manner in which the trade barrier variable has been constructed in the STRI (OECD, undated). The variable is constructed as weighted averages of sectors, which are more inclined to be producer services (Pant and Huria, 2019).

In addition, the coefficients of the interaction terms involving internet usage and trade restrictiveness are slightly higher in absolute scale, when the Top 10 exporters are considered in developing the geographic and historical variables. For example, for health services and business services, the coefficients of the interaction terms, when heterogeneity is included are 0.889 and -0.061 respectively (Top 10 country case in Table 1), while the corresponding values are 0.886 and -0.058 in that order (Top 30 country case in Table 2).²⁰ The differences in the coefficients further underline the relative importance of the top exporters in services trade patterns.

6. Conclusion

The current analysis explores the factors impeding imports of services through Mode 1 for a range of important sectors. Its key focus is on a comparison of the influence of regulatory barriers on services trade imposed by an economy, given its internet usage pattern on Mode 1 imports, i.e., through the digital route. This study compares import patterns across six important service sectors for a diverse panel of 50 countries, drawn from different income groups and geographical regions of the world. The analysis contributes to existing literature by examining the relationship with the variables when

²⁰ The coefficients are reported in Columns 3(b) and 5(b) of Tables 1 and 2 respectively.



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heterogeneity in regulations is considered along with the importing country's regulatory environment.

As the empirical analysis has been conducted through an adapted gravity-like model framework, surrogate measures for historical and geographical dummies and dummies for trade agreements has been constructed in line with the existing literature. Differences in import patterns are investigated by considering relatively narrower and wider set of potential exporters separately for the analysis. The coefficients of the variables of the adapted gravity model are meaningful intuitively and have values which are comparable to those on bilateral gravity model results on services trade, thereby lending support to the model choice. The empirical findings show considerable variations across sectors in the direction and magnitude of the impact of wider internet usage on cross-border imports of services in the presence of barriers on one hand, and in presence of regulatory heterogeneity on the other. Overall, education and health services, which are more inclined to be consumer rather than producer services, are less adversely influenced by the restrictive services policies in the presence of wider internet usage, as compared to services with wider intermediate usage (e.g., insurance and financial services).

The study is limited in its choice of countries and period of analysis due to availability constraint for comparable trade and policy data. Future country-level studies may analyse longer timespans for which some of the key service-oriented economies, e.g., India and New Zealand, also collect and disseminate detailed information. Another alternative approach could possibly focus on a cross-sectional analysis drawing on trade policy databases, like the Integrated Trade Intelligence Portal (I-TIP) database (WTO, undated b), covering a wider set of countries going beyond the high-income OECD members. An interesting extension would also be to consider the impact of trade restrictiveness on digital medium and its comparison with the overall services trade restrictiveness for a wider set of countries, on sectoral cross-border trade patterns.



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Table 1 Regression Results for Sectoral imports (Top 10 potential exporters)

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
	Distribution		Education		Health		Insurance & Financial		Business Services		Telecom. & Information	
<i>Importer_GDP</i>	0.619*** (0.05)	0.715*** (0.07)	0.623*** (0.05)	0.718*** (0.07)	0.628*** (0.05)	0.718*** (0.07)	0.618*** (0.05)	0.708*** (0.07)	0.617*** (0.05)	0.716*** (0.07)	0.618*** (0.05)	0.707*** (0.07)
<i>Market_Penetration</i>	-0.249*** (0.08)	-0.075 (0.09)	-0.237*** (0.08)	-0.073 (0.10)	-0.274*** (0.08)	-0.124 (0.09)	-0.240*** (0.08)	-0.084 (0.10)	-0.251*** (0.08)	-0.073 (0.09)	-0.243*** (0.08)	-0.089 (0.10)
<i>Border</i>	0.235*** (0.07)	0.232*** (0.07)	0.204*** (0.07)	0.204*** (0.07)	0.160** (0.07)	0.153** (0.07)	0.218*** (0.07)	0.216*** (0.07)	0.216*** (0.06)	0.212*** (0.06)	0.219*** (0.07)	0.218*** (0.07)
<i>Language</i>	0.197*** (0.04)	0.191*** (0.04)	0.178*** (0.04)	0.173*** (0.04)	0.172*** (0.04)	0.169*** (0.04)	0.178*** (0.04)	0.173*** (0.04)	0.174*** (0.04)	0.166*** (0.04)	0.187*** (0.04)	0.182*** (0.04)
<i>Colony</i>	-0.091 (0.08)	-0.088 (0.08)	-0.117 (0.09)	-0.117 (0.09)	-0.134 (0.08)	-0.139* (0.08)	-0.109 (0.09)	-0.111 (0.09)	-0.078 (0.08)	-0.077 (0.08)	-0.116 (0.09)	-0.117 (0.09)
<i>Colonizer</i>	0.124 (0.09)	0.131 (0.09)	0.241** (0.10)	0.254** (0.11)	0.169* (0.09)	0.175* (0.10)	0.153 (0.09)	0.161* (0.10)	0.145 (0.09)	0.154* (0.09)	0.145 (0.10)	0.152 (0.10)
<i>RTA</i>	0.095 (0.09)	0.121 (0.09)	0.063 (0.09)	0.091 (0.09)	0.069 (0.09)	0.096 (0.09)	0.072 (0.09)	0.098 (0.09)	0.090 (0.08)	0.114 (0.09)	0.079 (0.09)	0.104 (0.09)
<i>Reg_Heterogeneity</i>		-0.473*** (0.18)		-0.458*** (0.18)		-0.433** (0.18)		-0.437** (0.19)		-0.488*** (0.17)		-0.431** (0.19)
<i>Internet_Usage</i>	0.502*** (0.17)	0.389** (0.18)	0.527*** (0.17)	0.427** (0.18)	0.466*** (0.17)	0.367** (0.18)	0.431** (0.18)	0.330* (0.18)	0.521*** (0.17)	0.408** (0.17)	0.424** (0.18)	0.325* (0.18)
<i>Trade_Res # Internet use</i>	-0.088*** (0.01)	-0.062*** (0.01)	0.824*** (0.11)	0.838*** (0.11)	0.886*** (0.13)	0.889*** (0.11)	-0.031** (0.02)	-0.006 (0.02)	-0.088*** (0.01)	-0.061*** (0.01)	-0.017 (0.02)	0.009 (0.02)



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<i>Constant</i>	-11.57*** (1.60)	-13.82*** (1.94)	-11.71*** (1.65)	-13.99*** (2.03)	-11.61*** (1.65)	-13.75*** (2.03)	-11.28*** (1.70)	-13.42*** (2.05)	-11.54*** (1.60)	-13.87*** (1.98)	-11.29*** (1.71)	-13.40*** (2.07)
<i>Year Dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
<i>Pseudo R²</i>	0.4511	0.4585	0.4581	0.4649	0.4511	0.4571	0.3833	0.3894	0.4625	0.4704	0.3814	0.3874

Source: Own estimation. The Poisson Pseudo Maximum Likelihood (PPML) estimator has been used for all regressions. Robust standard errors are in parenthesis. ***, ** and * indicate p values of 1%, 5% and 10% respectively.



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Table 2 Regression Results for Sectoral imports (Top 30 potential exporters)

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
	Distribution		Education		Health		Insurance & Financial		Business Services		Telecom. & Information	
<i>Importer_GDP</i>	0.544*** (0.05)	0.644*** (0.07)	0.554*** (0.06)	0.649*** (0.08)	0.568*** (0.05)	0.652*** (0.08)	0.552*** (0.06)	0.643*** (0.08)	0.574*** (0.05)	0.677*** (0.08)	0.551*** (0.06)	0.641*** (0.08)
<i>Market_Penetration</i>	-0.227*** (0.09)	-0.025 (0.10)	-0.211** (0.09)	-0.022 (0.11)	-0.274*** (0.09)	-0.103 (0.11)	-0.213** (0.10)	-0.033 (0.11)	-0.263*** (0.09)	-0.053 (0.10)	-0.216** (0.10)	-0.038 (0.11)
<i>Border</i>	0.107*** (0.04)	0.117*** (0.04)	0.106*** (0.04)	0.117*** (0.03)	0.070* (0.04)	0.080** (0.04)	0.111*** (0.04)	0.121*** (0.04)	0.083*** (0.03)	0.095*** (0.03)	0.110*** (0.04)	0.120*** (0.04)
<i>Language</i>	0.109*** (0.02)	0.101*** (0.02)	0.088*** (0.02)	0.080*** (0.02)	0.104*** (0.02)	0.097*** (0.02)	0.097*** (0.02)	0.090*** (0.02)	0.095*** (0.02)	0.085*** (0.02)	0.100*** (0.02)	0.093*** (0.02)
<i>Colony</i>	-0.016 (0.03)	-0.008 (0.03)	-0.021 (0.03)	-0.012 (0.03)	-0.049 (0.03)	-0.040 (0.03)	-0.027 (0.03)	-0.019 (0.03)	-0.044 (0.04)	-0.032 (0.03)	-0.028 (0.03)	-0.020 (0.03)
<i>Colonizer</i>	0.059 (0.04)	0.063* (0.04)	0.071** (0.04)	0.075** (0.04)	0.070* (0.04)	0.073** (0.04)	0.070* (0.04)	0.074** (0.04)	0.085** (0.04)	0.090** (0.04)	0.069* (0.04)	0.073* (0.04)
<i>RTA</i>	-0.025 (0.04)	-0.005 (0.04)	-0.008 (0.04)	0.012 (0.04)	-0.034 (0.04)	-0.016 (0.04)	-0.020 (0.04)	-0.001 (0.04)	-0.037 (0.03)	-0.013 (0.04)	-0.019 (0.04)	0.000 (0.04)
<i>Reg_Heterogeneity</i>		-0.503*** (0.19)		-0.477*** (0.19)		-0.426** (0.19)		-0.454** (0.19)		-0.518*** (0.18)		-0.449** (0.19)
<i>Internet_Usage</i>	0.465*** (0.19)	0.344* (0.19)	0.456*** (0.19)	0.347* (0.19)	0.428** (0.18)	0.334* (0.19)	0.403** (0.19)	0.299 (0.20)	0.522*** (0.19)	0.407** (0.19)	0.397** (0.19)	0.295 (0.20)
<i>Trade_Res # Internet use</i>	-0.082*** (0.01)	-0.056*** (0.01)	0.772*** (0.09)	0.787*** (0.09)	0.882*** (0.12)	0.886*** (0.12)	-0.035** (0.01)	-0.010 (0.02)	-0.085*** (0.01)	-0.058*** (0.01)	-0.009 (0.02)	0.017 (0.02)
<i>Constant</i>	-9.38*** (1.65)	-11.72*** (2.11)	-9.54*** (1.82)	-11.79*** (2.26)	-9.86*** (1.77)	-11.86*** (2.21)	-9.38*** (1.83)	-11.54*** (2.27)	-10.37*** (1.81)	-12.81*** (2.29)	-9.36*** (1.85)	-11.49*** (2.30)



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<i>Year Dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
<i>Pseudo R²</i>	0.4489	0.4569	0.4526	0.4596	0.4572	0.4628	0.3842	0.3906	0.4597	0.468	0.3804	0.3866

Source: Own estimation. The Poisson Pseudo Maximum Likelihood (PPML) estimator has been used for all regressions. Robust standard errors are in parenthesis. ***, ** and * indicate p values of 1%, 5% and 10% respectively



References

- Ahmed, U. (2019). The Importance of cross-border regulatory cooperation in an era of digital trade. *World Trade Review*, 18(S1), S99-S120.
- Anderson, J. E., & van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, 93(1), 170-192.
- Anderson, J. E., Borchert, I., Mattoo, A., & Yotov, Y. V. (2018). Dark costs, missing data: Shedding some light on services trade. *European Economic Review*, 105, 193-214.
- Benz, S., Khanna, A., & Nordas, H. K. (2017). Services and performance of the Indian economy: Analysis and policy options. OECD Trade Policy Paper, No. 196, OECD Publishing, Paris.
- Beverelli, C., Fiorini, M., & Hoekman, B. (2015). Services trade restrictiveness and manufacturing productivity: The role of institutions. Working Paper, No. 63, Robert Schuman Centre for Advanced Studies, European University Institute, Fiesole.
- Bhagwati, J., Panagariya, A., & Srinivasan, T. N. (2002). The muddles over outsourcing. *Journal of Economic Perspectives*, 18(4), 93-114.
- Bose, S. (2022). Trade Barriers to Digitally Enabled Services: Cross-Sectoral Evidence. *Empirical Economics Letters*, 21(12), 165-172.
- Bose, S. (2024). Service sectors and trade through a digital medium: a modified gravity approach. *Applied Economics Letters*, available at: <https://www.tandfonline.com/doi/full/10.1080/13504851.2024.2364006> (accessed August 21, 2024).
- Centre d'Etudes Prospectives et d'Informations Internationales (undated). CEPII database, available at: https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele.asp (accessed August 21, 2024).
- Chaney, T. (2018). The gravity equation in international trade: An explanation. *Journal of Political Economy*, 126(1), 150-177.
- Choi, C. (2010). The effect of the Internet on service trade. *Economics Letters*, 109(2), 102-104.
- Dettmer, B. (2015). Trade effects of the European Union's service directive: Contrasting ex ante estimates with empirical evidence. *The World Economy*, 38(3), 445-478.
- Dihel, N. C., & Goswami, A. G. (2015). Internationalizing Sub-Saharan Africa's education and health services. Working Paper No. 99654, World Bank, Washington DC.
- Egger, H., Kreickemeier, U., & Wrona, J. (2015). Offshoring domestic jobs. *Journal of International Economics*, 97(1), 112-125.
- Freund, C., & Weinhold, D. (2002). The Internet and international trade in services. *American Economic Review*, 92(2), 236-240.
- Ferencz, J., & Gonzales, F. (2019). Barriers to trade in digitally enabled services



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in the G20.OECD Trade Policy Papers, No. 232. Organisation for Economic Co-operation and Development, Paris.

- Francois, J., & Hoekman, B. (2010). Services trade and policy. *Journal of Economic Literature*, 48(3), 642-692.
- Gnangnon, S. K. (2020). Effect of the internet on services export diversification. *Journal of Economic Integration*, 35(3), 519-558.
- Head, K., Mayer, T., & Ries, J. (2010). The erosion of colonial trade linkages after independence. *Journal of International Economics*, 81(1), 1-14.
- Heuser, C. & Mattoo, A. (2017). Services trade and global value chains. Chapter 6 in the Global Value Chain Development Report 2017: Measuring and analyzing the impact of GVCs on Economic Development. pp. 141-160. World Bank, Washington DC.
- Khachaturian, T., & Oliver, S. (2023). Intangible trade: Understanding the relationship between trade barriers and mode of supply in services sectors. *The World Economy*, 46(5), 1189-1234.
- Kimura, F., & Lee, H. H. (2006). The gravity equation in international trade in services. *Review of World Economics*, 142, 92-121.
- Kox, H. L., & Nordas, H. K. (2009). Regulatory harmonization and trade in services: Volumes and choice of mode. Forum for Research in International Trade (FREIT) Working Paper No. 040, available at: <http://www.eiit.org/WorkingPapers/Papers/TradePolicyMultilateral/FREIT040.pdf> (accessed August 21, 2024).
- Kox, H., & Lejour, A. (2007). Regulatory heterogeneity as obstacle for international services trade. CPB Discussion Paper, No. 49. CPB Netherlands Bureau for Economic Policy Analysis, The Hague.
- Lodefalk, M. (2014). The role of services for manufacturing firm exports. *Review of World Economics*, 150(1), 59–82.
- Lee, C. W., & Park, S. (2016). Does religious similarity matter in international trade in services? *The World Economy*, 39(3), 409-425.
- Nordas, H. K. (2016). Services trade restrictiveness index (STRI): The trade effect of regulatory differences. OECD Trade Policy Paper, No. 189, Organisation for Economic Co-operation and Development, Paris.
- Nordas, H. K. (2018). What drives trade in services? Lessons from the Nordics. *Applied Economics*, 50(33), 3532-3545.
- Nordas, H. K., & Rouzet, D. (2017). The impact of services trade restrictiveness on trade flows. *The World Economy*, 40(6), 1155-1183.
- Nordas, H. K., Benz, S. & Ferencz, J. (2020), ‘Regulatory barriers to trade in services: A new database and composite indices. *The World Economy*, 43(6): 1-20.



WPS No. EC-24-74

- Organisation for Economic Co-operation and Development (undated). Service Trade Restrictiveness Index (STRI), available at: https://www.oecd-ilibrary.org/trade/data/stri_3f419c86-en (accessed August 21, 2024).
- Pant, M. & Huria, S. (2019). (2019). Quantification of Services Trade Restrictions - A new Approach. Working Paper No. 40. Indian Institute of Foreign Trade, New Delhi.
- Pant, S. & Chakraborty, D. (2024). Is Service Orientation Benefitting Manufacturing Exports from Low-Middle Income Countries? Firm-level Empirical Evidence from WBES Data, *Global Business Review*, available at: DOI: 10.1177/09721509241245544 (accessed August 23, 2024).
- Park, I., & Park, S. (2011). Regional liberalisation of trade in services. *The World Economy*, 34(5), 725-740.
- Shingal, A. (2023). Mode 4 restrictiveness and services trade. *Review of World Economics*, 159(3), 757-786.
- Silva, J. S., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88(4), 641-658.
- Tay, C. (2018). The impact of information and communication technologies on bilateral trade in services. *International Journal of Services Operations and Informatics*, 9(1), 40-61.
- Thangavelu, S. M., Wang, W., & Oum, S. (2018). Servicification in global value chains: Comparative analysis of selected Asian countries with OECD. *The World Economy*, 41(11), 3045–3070.
- UNCTAD (undated). Trade in Services, available at: <https://hbs.unctad.org/international-trade-in-services> (accessed August 22, 2024).
- Van der Marel, E., & Ferracane, M. F. (2021). Do data policy restrictions inhibit trade in services? *Review of World Economics*, 157(4), 727-776.
- Verikios, G., & Zhang, X. G. (2004). The economic effects of removing barriers to trade in telecommunications. *The World Economy*, 27(3), 435-458.
- World Bank (undated). World Development Indicators, available at: <https://databank.worldbank.org/source/world-development-indicators> (accessed August 21, 2024).
- World Trade Organization (undated a). Trade in Services data by Mode of Supply (Tismos), available at: https://www.wto.org/english/res_e/statistics_e/trade_datasets_e.htm (accessed August 21, 2024).
- World Trade Organization (undated b). Integrated Trade Intelligence Portal - Services, available at: <https://itip-services-worldbank.wto.org/default.aspx> (accessed August 21, 2024).
- Yang, F., Wang, Y., & Whang, U. (2024). Trade restrictions on digital services and the impact on manufacturing exports. *The Journal of International Trade & Economic Development*, 33(4), 523-550.



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Annex A.1 Total Cross-Border (Mode 1) Export and Import Shares of Countries, 2005-2017

		Share of Mode 1 Exports				Share of Mode 1 Imports		
	Regions	Maximum	Minimum	Average		Maximum	Minimum	Average
COUNTRIES	OECD Countries							
High-Income								
<i>Australia</i>	EAP	0.12	0.09	0.11		0.23	0.18	0.20
<i>Austria</i>	ECA	0.38	0.31	0.35		0.27	0.22	0.25
<i>Belgium</i>	ECA	0.60	0.52	0.56		0.48	0.34	0.41
<i>Canada</i>	NA	0.26	0.17	0.21		0.23	0.20	0.21
<i>Chile</i>	LAC	0.59	0.36	0.46		0.36	0.31	0.33
<i>Czech Republic</i>	ECA	0.58	0.53	0.55		0.20	0.13	0.15
<i>Denmark</i>	ECA	0.49	0.38	0.45		0.32	0.27	0.29
<i>Estonia</i>	ECA	0.33	0.21	0.28		0.34	0.27	0.32
<i>Finland</i>	ECA	0.40	0.26	0.33		0.36	0.30	0.33
<i>France</i>	ECA	0.25	0.20	0.22		0.29	0.24	0.26
<i>Germany</i>	ECA	0.25	0.21	0.23		0.27	0.20	0.24
<i>Greece</i>	ECA	0.59	0.44	0.51		0.26	0.19	0.22
<i>Hungary</i>	ECA	0.55	0.49	0.53		0.27	0.20	0.23
<i>Iceland</i>	ECA	0.38	0.15	0.29		0.30	0.23	0.27
<i>Ireland</i>	ECA	0.44	0.34	0.40		0.52	0.34	0.40
<i>Israel</i>	MENA	0.34	0.25	0.28		0.37	0.27	0.31
<i>Italy</i>	ECA	0.23	0.17	0.20		0.23	0.19	0.20
<i>Japan</i>	EAP	0.25	0.19	0.22		0.39	0.33	0.36
<i>Korea, Republic of</i>	EAP	0.39	0.26	0.33		0.33	0.25	0.28
<i>Latvia</i>	ECA	0.61	0.53	0.58		0.26	0.21	0.24
<i>Lithuania</i>	ECA	0.58	0.48	0.53		0.32	0.24	0.29
<i>Luxembourg</i>	ECA	0.58	0.35	0.48		0.40	0.29	0.35
<i>Netherlands</i>	ECA	0.21	0.11	0.16		0.44	0.34	0.39
<i>New Zealand</i>	EAP	0.25	0.19	0.21		0.31	0.25	0.28
<i>Norway</i>	ECA	0.43	0.36	0.40		0.21	0.16	0.18
<i>Poland</i>	ECA	0.57	0.51	0.54		0.20	0.16	0.18
<i>Portugal</i>	ECA	0.32	0.21	0.25		0.25	0.18	0.21
<i>Slovak Republic</i>	ECA	0.63	0.56	0.61		0.27	0.18	0.22
<i>Slovenia</i>	ECA	0.47	0.36	0.41		0.32	0.29	0.31
<i>Spain</i>	ECA	0.26	0.20	0.23		0.31	0.23	0.26
<i>Sweden</i>	ECA	0.37	0.29	0.32		0.25	0.23	0.24
<i>Switzerland</i>	ECA	0.12	0.07	0.10		0.26	0.17	0.21
<i>United Kingdom</i>	ECA	0.44	0.40	0.42		0.19	0.16	0.17
<i>United States of America</i>	NA	0.24	0.21	0.23		0.25	0.20	0.23
Upper-Middle Income								
<i>Colombia</i>	LAC	0.41	0.30	0.34		0.34	0.26	0.28
<i>Costa Rica</i>	LAC	0.40	0.24	0.34		0.38	0.26	0.33
<i>Mexico</i>	LAC	0.52	0.39	0.45		0.31	0.26	0.28
<i>Turkey</i>	ECA	0.40	0.29	0.34		0.37	0.31	0.34
Non-OECD Countries								
High-Income								
<i>Singapore</i>	EAP	0.51	0.36	0.41		0.46	0.37	0.41
Upper-Middle Income								
<i>Brazil</i>	LAC	0.41	0.29	0.34		0.26	0.19	0.23
<i>China</i>	EAP	0.39	0.22	0.30		0.36	0.21	0.29



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<i>Kazakhstan</i>	ECA	0.65	0.48	0.57		0.40	0.25	0.30
<i>Malaysia</i>	EAP	0.52	0.34	0.39		0.59	0.41	0.47
<i>Peru</i>	LAC	0.49	0.39	0.43		0.42	0.36	0.38
<i>Russian Federation</i>	ECA	0.44	0.28	0.34		0.34	0.27	0.29
<i>South Africa</i>	SSA	0.49	0.40	0.43		0.39	0.19	0.27
<i>Thailand</i>	EAP	0.53	0.30	0.40		0.53	0.42	0.47
Lower-Middle Income								
<i>India</i>	SA	0.71	0.61	0.66		0.72	0.61	0.67
<i>Indonesia</i>	EAP	0.60	0.40	0.48		0.51	0.35	0.40
<i>Viet Nam</i>	EAP	0.60	0.52	0.55		0.58	0.42	0.49

Source: Own compilation based on TiSMoS database (WTO, undated a)

Note:

1. The shares have been arrived at by dividing values for Mode 1 exports (and imports) of services by the corresponding value of total exports (and imports) of services data, derived by summation of all four modes. Maximum, Minimum and Average values are reported for the entire period covered in the TiSMoS database (2005-2017), rather than the study period (2014-2017).
2. Colombia and Costa Rica have been named under OECD countries but were not part of the group during the period of study (2014 -2017) and were inducted later.
3. The regions are based on six of the seven World Bank regional divisions. EAP, ECA, LAC, MENA, NA and SA refer to East-Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle-East & North Africa, North America and South Asia respectively. No country from the Sub-Saharan region is a part of the sample.
4. The Income Groups are based on three of the four World Bank classified income groups (2022). No country from the Low-Income group is a part of the sample.



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Annex A.2 Top 30 Mode 1 Exporters of Distribution and Education Services to India (2014 and 2017)

Exporter Rank	2014		2017	
	Distribution	Education	Distribution	Education
1	China	Cuba	China	United States of America
2	United States of America	United States of America	United States of America	Cuba
3	Germany	United Kingdom	Germany	India
4	Belgium	India	Netherlands	United Kingdom
5	Japan	Turkey	Japan	Malaysia
6	Netherlands	France	France	Germany
7	United Kingdom	Malaysia	Hong Kong, China	Netherlands
8	Hong Kong, China	Brazil	United Kingdom	Israel
9	France	Australia	Belgium	Belgium
10	Spain	Germany	Singapore	France
11	Singapore	Russian Federation	Spain	Turkey
12	Russian Federation	Belgium	Korea, Republic of	Egypt
13	Korea, Republic of	Denmark	Italy	Spain
14	Italy	Israel	Mexico	Russian Federation
15	Canada	Switzerland	Chinese Taipei	Canada
16	Mexico	Spain	Russian Federation	Brazil
17	Chinese Taipei	Qatar	Canada	Indonesia
18	United Arab Emirates	Canada	Luxembourg	Switzerland
19	Saudi Arabia, Kingdom of	Netherlands	India	China
20	India	Indonesia	United Arab Emirates	Denmark
21	Luxembourg	Egypt	Denmark	Poland
22	Australia	Korea, Republic of	Thailand	Lebanese Republic
23	Thailand	Norway	Australia	Portugal
24	Brazil	Sweden	Brazil	Australia
25	Denmark	Malta	Saudi Arabia, Kingdom of	Austria
26	Sweden	Italy	Viet Nam	Philippines
27	Malaysia	Poland	Switzerland	Greece
28	Austria	Portugal	Sweden	Italy
29	Switzerland	Austria	Austria	Qatar
30	Turkey	New Zealand	Malaysia	Sweden

Source: Own computation using TiSMoS dataset (WTO, undated a)



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Annex A.3 Number of top Mode 1 exporters in Select categories (distribution, education) having common shared values with India

VARIABLES	Top Exporters of Distribution and Education Services, 2014				Top Exporters of Distribution and Education Services, 2017			
	Top10	Top30	Top10	Top30	Top10	Top30	Top10	Top30
	Distribution		Education		Distribution		Education	
<i>Border</i>	1	1	0	0	1	1	0	1
<i>Language</i>	3	6	3	7	4	6	3	6
<i>Colony</i>	1	1	1	1	1	1	1	1
<i>Colonizer</i>	1	4	1	4	2	4	2	3
<i>RTA</i>	0	3	3	3	1	6	3	5

Source: Own computation using TiSMoS dataset (WTO, undated a)



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