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Data Governance and Modes of International Supply of Services under Geoeconomic Fragmentation

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Data Governance and Modes of International Supply of Services under Geoeconomic Fragmentation

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Abstract:

Digitalization and rising geoeconomic tensions are reshaping the international supply of services. This paper examines how variation in countries' data-governance regimes for cross-border data flows—open, conditional, and restrictive—affects the two main modes of international service supply: remote delivery (Mode 1) and commercial presence through foreign affiliates (Mode 3). We estimate a structural gravity model using PPML with high-dimensional fixed effects to identify the effects of (i) data regulatory restrictiveness and (ii) bilateral data regulatory misalignment. The analysis pools all service sectors and tests whether these effects vary with the data intensity of services. Our results show that data-regulatory restrictiveness and greater bilateral misalignment reduce international trade in services, with stronger negative impacts for more data-intensive services. At the same time, regulatory restrictiveness increases reliance on foreign affiliates, and this positive effect is also stronger in more data-intensive activities. Overall, the findings point to a regulatory-driven proximity–distance substitution mechanism through which data governance reconfigures international service-supply networks under conditions of geoeconomic tension.

Keywords: international supply of services, cross-border trade, foreign affiliates, data-intensive services, data governance regimes for cross border data flows.

JEL codes: F13, F21, F23, L86.

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1. Introduction

The rapid expansion of cross-border production that characterized the pre-2008 period has given way to an era of slowbalization in goods trade. Pandemic-related disruptions and renewed geopolitical tensions have reinforced this trend (Aiyar et al., 2023). Yet this deceleration has affected goods more than services. Services continue to increase their weight in the world economy, driven by digital technologies that expand the range of activities that can be supplied internationally (Eichengreen, 2023; Baldwin et al., 2024).

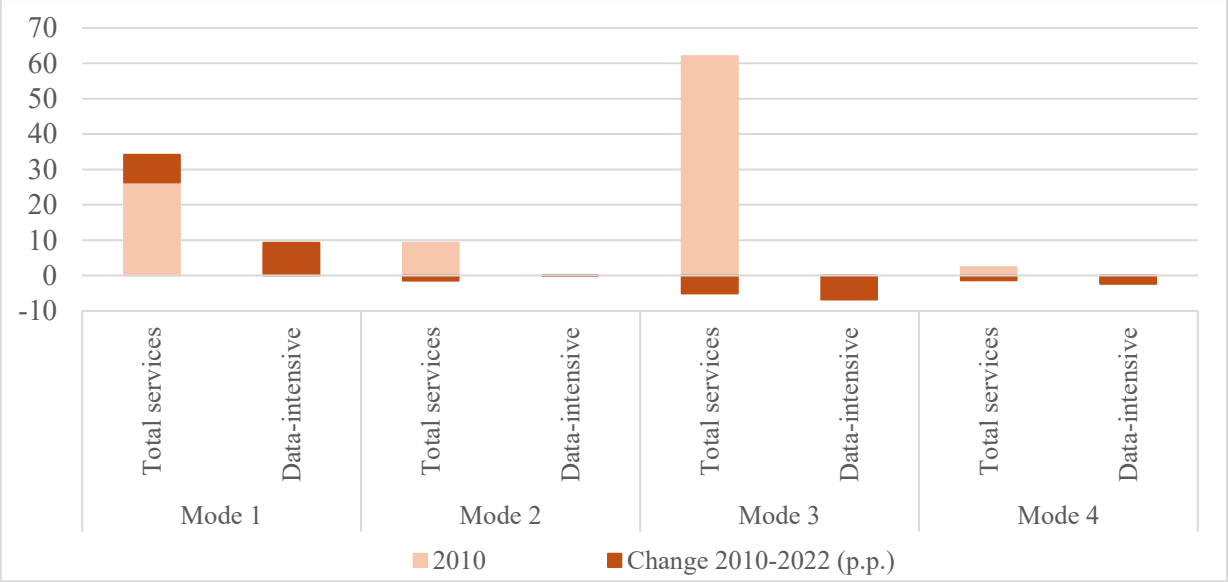
This growing internationalization of services reflects three broad structural forces. First, services play an essential role within global value chains (GVCs), as activities such as transportation, logistics, communications, quality control, and management are critical to the functioning of fragmented production systems. The coordination of increasingly complex and geographically dispersed production networks would not have been possible without major advances in information and communication technologies (ICT). ICT services have therefore been a fundamental enabler of cross-border production sharing (UNCTAD, 2021). Second, digitalization has made a growing range of services tradable and has facilitated the digital sale of products, thereby fostering the expansion of digital trade (WTO, 2018), understood as trade that is digitally ordered and/or digitally delivered (López González et al., 2023). Third, services have become increasingly embedded in manufactured goods. This process of servicification enhances product differentiation through new functionalities, technological upgrading, and quality-related attributes, allowing firms to move away from price-based competition (Miroudot and Cadestin, 2017) while strengthening manufacturing competitiveness at the national level (Blázquez et al., 2020).

ICT services are central to all three dynamics because they facilitate the movement, coordination, and commercialization of services across borders. As a result, digital services have become the most dynamic component of international exchanges (OECD, 2026), while cross-border data flows have emerged as a core pillar of twenty-first-century trade (World Bank, 2021). Since an increasing number of digital services—notably those based on platform architectures, algorithmic decision-making, and personalization—depend on processes that are inherently data-intensive, a large and economically important segment of contemporary digital services can, in practice, be characterized as data-intensive services. WTO-based estimates of digital services show that global exports of data-intensive services have increased fivefold, suggesting that they constitute an important new channel of globalization (Blázquez et al., 2022).

Under the GATS framework, international services are supplied through four modes: cross-border delivery (Mode 1), consumption abroad (Mode 2), commercial presence through foreign affiliates (Mode 3), and the temporary movement of natural persons (Mode 4) (Eurostat, 2024). In practice, Modes 1 and 3 are the dominant channels. Figure 1 shows that Mode 3 is by far the largest throughout 2010–2022, exceeding 60% of total services trade and approaching 80% in data-intensive services, while Mode 1 also accounts for a sizeable and growing share, especially in data-intensive services. This pattern suggests that digitalization is altering the modal mix, enhancing the feasibility of cross-border remote provision and diminishing the role of commercial presence in data-enabled service supply[1].

Figure 1: Structure of International Services Trade by Modes of Supply, 2010-2022

(shares of total trade and change in percentual points)



Note: Data-intensive services include telecommunications, computers, information and audiovisual services.
Source: Authors' calculation based on WTO's TISMOS dataset.

The expansion of international services supply has also been mirrored in the global governance agenda, where the regulation of digital trade and cross-border data flows has gained increasing prominence amid rising geoeconomic fragmentation. In this context, the governance of data flows has become a central policy issue in multilateral, regional, and bilateral forums, as governments increasingly seek to reconcile the economic gains associated with digitally enabled trade with

[1] Khachaturian and Oliver (2021) show that firms frequently combine multiple modes of supply and that commercial presence and cross-border delivery tend to be complementary at the sector level. They also find that higher Mode 3 barriers significantly reduce cross-border services trade, implying a shift toward remote provision when restrictions on commercial presence intensify.

concerns over privacy, cybersecurity, consumer protection, and national sovereignty. Rather than converging toward a single regulatory template, countries have adopted different approaches to cross-border data transfers, ranging from relatively open frameworks to conditional systems based on regulatory safeguards and, in some cases, to more restrictive regimes involving prior authorization requirements or data-localization measures. This data regulatory divergence is especially important for services, which depend heavily on cross-border data transfers for both remote delivery and affiliate-based provision.

A commonly used taxonomy distinguishes three broad archetypes—open, conditional, and restrictive or government-controlled regimes—while acknowledging that actual practices lie on a continuum (Casalini and López González, 2019; van der Marel and Ferracane, 2021; Chen, 2021). At one end of the spectrum, open regimes allow relatively free data transfers and rely primarily on private standards and ex post enforcement, thereby offering firms the greatest flexibility in organizing digital transactions across borders. At the other end, restrictive regimes subject international data movements to tighter state control, often through prior authorization requirements, localization obligations, or both, substantially increasing the cost and complexity of operating across jurisdictions. Between these two poles, conditional regimes seek to reconcile openness with regulatory protection by allowing data transfers only when specific safeguards are met, such as adequacy decisions, binding corporate rules, or contractual commitments. According to the World Bank's country classification, more than half of the countries for which information is available follow a conditional approach to cross-border data flows, around one third an open approach, and less than one tenth a restrictive one. The conditional model finds its main point of reference in the European Union and is also observed in countries such as Argentina, Colombia, the Republic of Korea, Senegal, South Africa, and Malaysia; the open model is commonly exemplified by the United States and also characterizes countries such as Canada, Australia, and Chile; while the restrictive model is most closely associated with China and includes countries such as Russia, Nigeria, Vietnam, and Indonesia (World Bank, 2021).

Although these categories are stylized, they capture meaningful differences both in regulatory severity and in the degree of openness granted to international data flows. For service suppliers, such differences are consequential because they affect not only the feasibility of remote delivery but also the incentives to serve foreign markets through commercial presence. Thus, data governance is emerging as a key driver of the international organization of service provision, specially under conditions of heightened geoeconomic tension.

The aim of this paper is to explore how data-governance regimes can affect the two main international modes of supplying services through two analytically distinct dimensions: the

restrictiveness of data governance regime and the degree of bilateral misalignment between countries' data regulatory models. These are separate questions. Regulatory restrictiveness refers to how restrictive a country's data-governance regime is along the open–conditional–restrictive spectrum, whereas bilateral misalignment captures the extent to which service suppliers operate across countries with differing data-governance frameworks. The two dimensions may generate different economic effects and need not affect cross-border trade and commercial presence in the same way.

For Mode 1, greater data regulatory restrictiveness is likely to raise compliance and data-handling costs—especially when transfers are subject to adequacy requirements, prior authorization, or localization obligations—thereby reducing the feasibility and competitiveness of remote delivery in data-intensive activities (World Bank, 2021). This mechanism has not been explored empirically yet. Nevertheless, a related strand of the literature shows that stricter data policies are associated with lower firm-level performance in sectors reliant on electronic data (Ferracane et al., 2020). The second dimension analysed—bilateral misalignment—may further depress cross-border trade by increasing legal uncertainty, duplicative compliance burdens, and the difficulty of transferring data across countries organized around different regulatory logics (Casalini et al., 2021). This mechanism is consistent with previous works that have examined whether sharing the same data-governance models matters for bilateral digital-services trade, finding a positive and statistically significant effect (Ferracane and van der Marel, 2025). When the effect of sharing data-governance models is estimated separately for the three data models, these authors find that common open regimes are associated with stronger trade outcomes, while sharing conditional regimes tends to hinder cross-border exchanges, with no significant effects for restrictive regimes.

For Mode 3, however, the relevant mechanisms differ. Greater regulatory restrictiveness may increase the relative attractiveness of commercial presence, since establishing or expanding local affiliates can become a way to comply with localization or local-processing requirements while preserving access to foreign markets, particularly when the absence of a local presence becomes more costly under restrictive data regimes (World Bank, 2021; Chaisse, 2023). Bilateral misalignment may reinforce this tendency when firms face incompatible data-governance regimes across origin and destination markets, making local establishment a means of internalizing compliance, adapting organizational structures, and managing data operations within the host country (Echandi and Sauvé, 2020). Yet the literature has paid much less attention to this second channel. As a result, it provides relatively direct guidance for Mode 1, but only indirect and still limited support for the Mode 3 channel.

Against this background, our paper contributes to the literature in three main ways. First, whereas existing studies have focused predominantly on digital services trade and, more specifically, on the cross-border channel, we examine jointly how data governance affects both remote delivery (Mode 1) and commercial presence through affiliates (Mode 3). Second, we distinguish explicitly between data regulatory restrictiveness and bilateral data-governance misalignment, clarifying two questions that previous research has often conflated or addressed only partially. Third, we examine whether the effects of data governance vary with the data intensity of services, thereby capturing sectoral heterogeneity.

To examine these mechanisms empirically, we estimate a structural gravity model using PPML with high-dimensional fixed effects and sector-specific border-year dummies to absorb common globalization trends. To identify the effect of the country-specific variable capturing the restrictiveness of a country's data-governance regime on both modes of international service supply, we follow the identification strategy in Beverelli et al. (2024) by interacting this country-specific variable with a time-varying international-border indicator. We complement this approach with a time-varying dyadic measure of regulatory misalignment that captures whether trading partners' data-governance regimes converge or diverge over time.

To preview our results, we find evidence of a regulatory-driven proximity–distance substitution mechanism. Higher data-regulatory restrictiveness regimes and bilateral misalignment are associated with lower cross-border services trade, but with greater reliance on foreign affiliates, consistent with firms shifting from remote delivery toward commercial presence when data-related frictions intensify. This pattern is already visible for total services, but it is considerably stronger in data-intensive sectors, where production and delivery depend more heavily on the ability to move, process, and govern data across countries. More broadly, these findings contribute directly to ongoing debates on geoeconomic fragmentation by showing that regulatory heterogeneity in data governance affects not only the volume of international service transactions, but also the organizational mode through which services are supplied across borders, thereby reconfiguring international service-supply networks.

The remainder of the paper is organized as follows. Section 2 presents the data and descriptive evidence, documenting recent trends in both channels of international service supply and highlighting how data-intensive activities compare with aggregate services. Section 3 details the econometric specification and identification strategy. Section 4 reports the results and robustness checks, emphasizing heterogeneity by mode of supply and data intensity. Section 5 concludes by discussing the implications for the organization and resilience of global service-supply networks.

2. Data and main facts

We begin our empirical analysis by examining the evolution of both types of cross-border supply of services and specifically of data-intensive services.

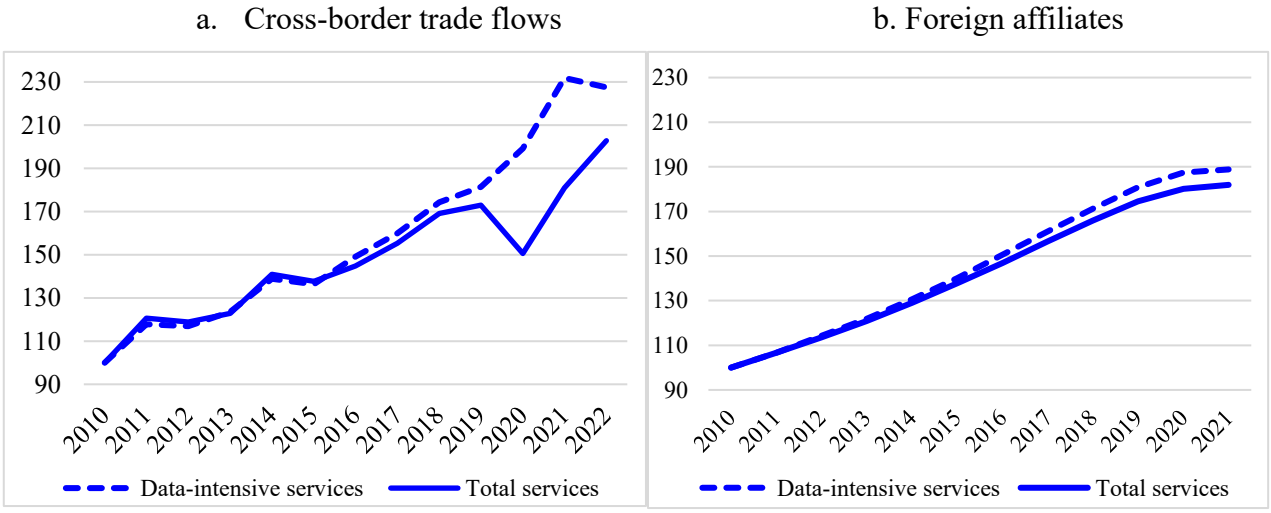
For Mode 1, we rely on the International Trade and Production Database for Estimation (ITPD-E), developed by the U.S. International Trade Commission (USITC) and documented in Borchert et al. (2021) and Larch et al. (2025). It is a harmonized multi-country, multi-sector dataset that provides bilateral trade flows for goods and services, covering more than 260 countries and over 170 sectors. In its latest version (ITPD-E Release 3), the database extends to 2022. Services are classified into seventeen detailed subsectors using a hybrid system that combines the Extended Balance of Payments Services Classification (EBOPS) and the International Standard Industrial Classification (ISIC). As already explained, many digital services are data intensive as their production processes employ a large amount of electronic data that cross borders multiple times before the service is used. Specifically, to identify the degree of data intensity across service sectors, we draw on the sectoral classifications provided by Van der Marel and Ferracane (2021) and Cory and Dascoli (2021). These authors rank service sectors according to their data intensity on the basis of software-expenditure measures derived from the 2011 US Census ICT Survey. In our analysis, we use these rankings—based on capitalised and non-capitalised software expenditures at the 4-digit NAICS level—as a proxy for the relative data intensity of service sectors. According to this methodology, Telecom, Computer and Information services are the most data intensive activities, followed by Financial and Insurance Services and Other Business Services. Within the ITPD-E classification, these correspond to telecommunications, computer, and information services (code 162), financial services (code 160), insurance and pension services (code 159) and other business services (code 163).

For Mode 3, we use data from the Multinational Revenue, Employment, and Investment Database (MREID). This dataset provides comprehensive and consistent information on international and domestic bilateral revenues, costs, employment, numbers of affiliates, and investment variables of MNEs for the pairings of 185 countries, across 25 NAICS 2-digit industries (14 of them are service sectors), and 12 years from 2010 to 2021 (Ahmad et al, 2023). From the MREID dataset and consistent with the sectoral data-intensity rankings discussed above, we identify the Information

sector (NAICS 51) as the most data-intensive service sector[2], followed by Finance and Insurance (NAICS 52), and legal services (NAICS 54).

To illustrate how both modes of international supply of services have evolved in last years, Figure 2 shows the trends from 2010 onward, a starting point chosen to facilitate comparability in the analysis, distinguishing between (a) cross-border trade, measured through the value of exports of services, and (b) commercial presence through the number of foreign affiliates operating in international markets, both for total services sector and for data-intensive service sectors. The two panels reveal a consistent pattern: since 2010, international supply of services has expanded through both cross-border trade and foreign affiliates, with growth systematically stronger in data-intensive services than in the services aggregate. Cross-border trade flows follow an upward trajectory, with data-intensive services reaching a higher index level by 2021, indicating their growing weight within overall trade in services. At the same time, the number of foreign affiliates increases steadily throughout the period, nearly doubling between 2010 and 2021, with data-intensive services consistently slightly above the total services series, pointing to a sustained expansion of commercial presence abroad in these activities.

Figure 2: Evolution of international supply of services by mode
(Index number, 2010=100)



Source: Authors' calculation based on ITPD-E and MREID databases.

When focusing on regulatory restrictiveness, Figure 3 shows the evolution of the international supply of services by mode of supply and by regulatory model. We classify countries according to

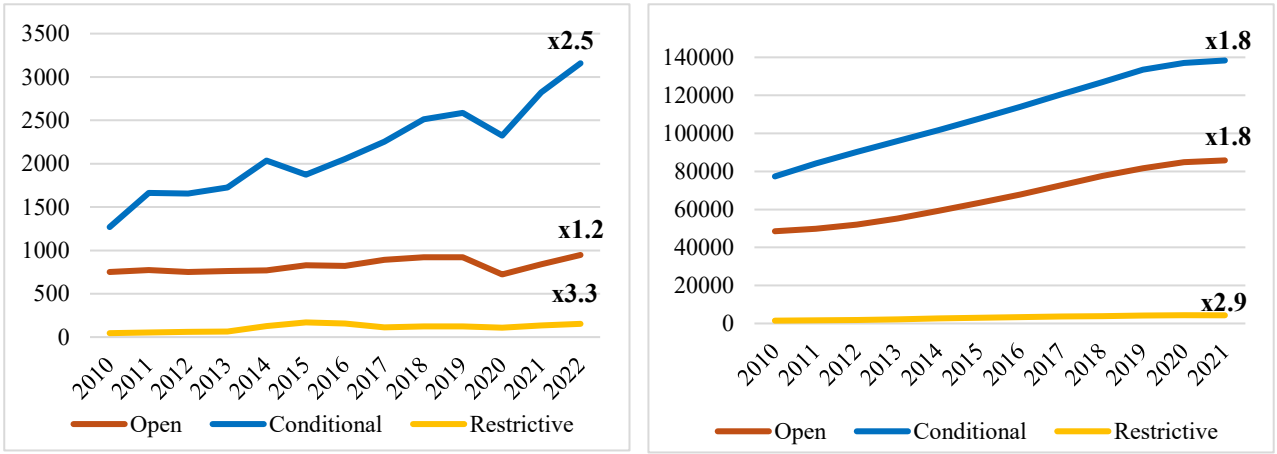
[2] Information sector includes services such as publishing, audiovisual and broadcasting activities (ISIC Rev. 4 Division J, codes 58, 59, and 60), telecommunications (code J61), and IT and other information services (codes J62–63).

the widely used taxonomy that distinguishes three broad types of data-governance regimes: open, conditional, and restrictive or government-controlled[3]. The results reveal some differences between the patterns observed in cross-border trade and those associated with commercial presence through foreign affiliates.

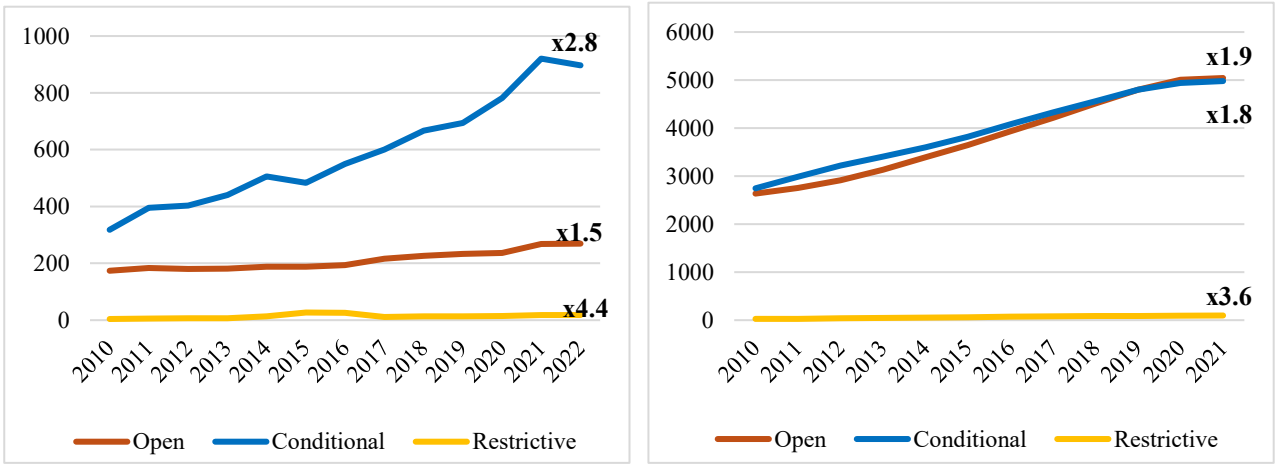
Figure 3: Evolution of international supply of services by mode of supply and by data regulatory model (billion USD, number of affiliates)

a. Cross-border trade flows b. Foreign affiliates

Total services



Data-intensive services



Source: Authors' calculation based on ITPD-E and MREID databases.

In cross-border trade, the conditional regulatory model is overwhelmingly dominant for both total services and data-intensive services. Trade among conditional-model countries consistently accounts for more than 60% of total flows, and this importance intensifies over time, reaching around three-quarters by the end of the period. In absolute terms, these cross-border trade flows multiply by

[3] The list of the countries is displayed in Table A1 of the Statistical Appendix.

roughly 2.5 over the period, with the increase being even more pronounced in the case of data-intensive services. By contrast, the open model plays a secondary role, with more moderate expansion (its flows increase by only about a factor of 1.2) and its relative weight declines over time, falling from more than 30% of global flows at the beginning of the period to around 20% by the end. Meanwhile, the restrictive model remains marginal throughout, even though it grows by a factor of about 3.3 in total services and by approximately 4.4 in data-intensive services.

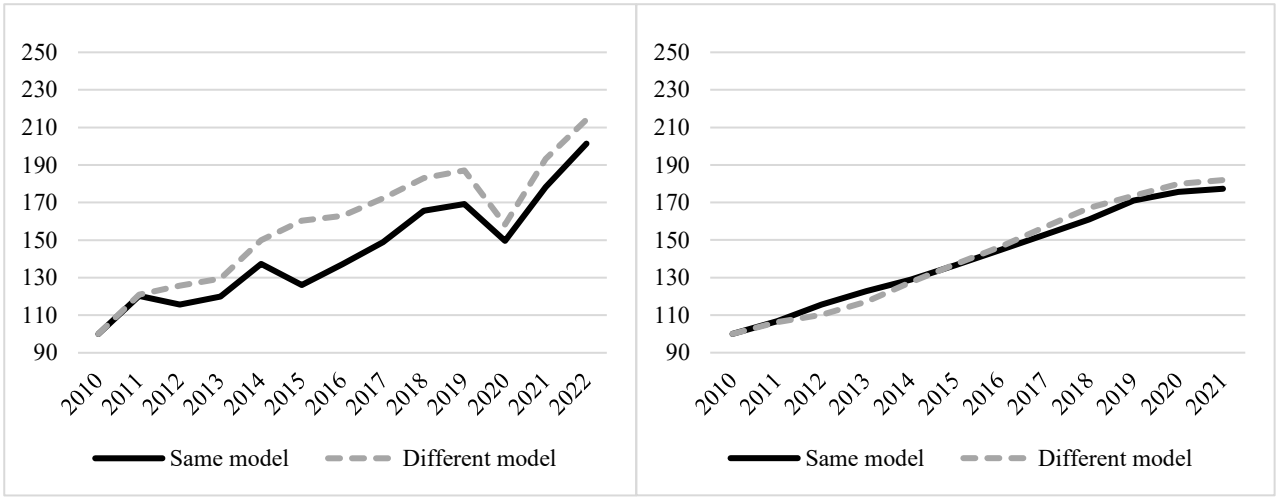
For foreign affiliates, the figures also display distinct growth trajectories across data regulatory models. For both total services and data-intensive services, again the conditional model leads throughout the period, with the number of affiliates increasing steadily (by a factor of 1.8) and its relative importance remaining broadly stable at around 60% of the total, although in data-intensive services its share is slightly lower and closely matched by that of the open model. The open model also shows sustained expansion, accounting for roughly 40%-50% of affiliates across the period and likewise doubling its initial level. The restrictive model, conversely, remains negligible in absolute terms, although it grows by a factor of about 2.9 in total services and by somewhat more—around 3.6—in data-intensive services.

Next, we examine whether sharing similar cross-border data-transfer rules is associated with higher levels of cross-border trade flows and with greater commercial presence abroad through foreign affiliates, both in overall services and specifically in data-intensive services. Figure 4 shows the evolution of international service supply by mode of delivery, distinguishing countries that share the same data regulatory model and those that operate under different regulatory models. This figure reveals that both categories of flows increase over time, but growth is consistently stronger for exchanges across heterogeneous data regulatory models. In both total services and data-intensive services, and for both cross-border trade and foreign affiliates, cross-model flows expand at a faster pace—doubling relative to 2010—while same-model flows exhibit more moderate growth. These patterns suggest that data regulatory heterogeneity does not necessarily constrain international service provision and may, in fact, be associated with more dynamic forms of cross-border activity.

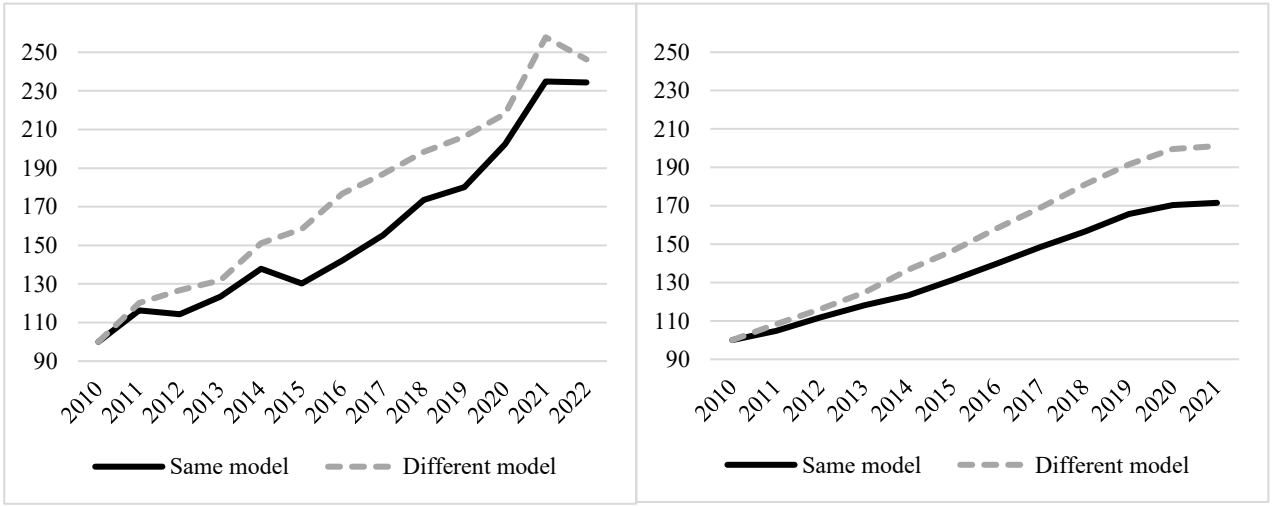
Figure 4: Evolution of international supply of services by mode of supply and sharing o not data-governance models (Index number, 2010=100)

a. Cross-border trade flows b. Foreign affiliates

Total services



Data-intensive services



Source: Authors' calculation based on ITPD-E and MREID databases.

3. Model specification

To examine how restrictiveness in data governance regimes and data-regulatory misalignment between countries shape Modes 1 and 3 of international service supply, we adopt a structural gravity framework. We propose to estimate four specifications. Specifications (1a) and (1b) assess the effect of the restrictiveness of a country's data-regulatory model on both modes of service supply by interacting the country-specific data-governance variable with an international-border dummy.

Specifications (2a) and (2b), in turn, focus on the effect of bilateral regulatory misalignment in data governance on these modes of supply. Within each pair, equations (a) estimate the average effect across pooled service sectors[4], whereas equations (b) examine whether this effect varies with sectoral data intensity. The corresponding specifications are as follows:

$$Y_{ij,t}^{k} = exp\big(\beta_1 EIA\_woEU_{ij,t} + \beta_2 EU + \beta_3 WTO_{ij,t} + \beta_4 BIT_{ij,t} + \beta_5 ADEQUACY_{ij,t} + \beta_6\, Reg\_restrictiviness_c \times BRDR_{ij} + \textstyle\sum_t \beta_t INTER_{ij,t}^{k} + \mu_{ij}^{k} + \chi_{i,t}^{k} + \lambda_{j,t}^{k}\big) \times \epsilon_{ij,t}^{k} \quad (1a)$$

$$Y_{ij,t}^{k} = exp\big(\beta_1 EIA\_woEU_{ij,t} + \beta_2 EU + \beta_3 WTO_{ij,t} + \beta_4 BIT_{ij,t} + \beta_5 ADEQUACY_{ij,t} + \beta_6\, Reg\_restrictiviness_c \times BRDR_{ij} \times Data\_intensity^{k} + \textstyle\sum_t \beta_t INTER_{ij,t}^{k} + \mu_{ij}^{k} + \chi_{i,t}^{k} + \lambda_{j,t}^{k}\big) \times \epsilon_{ij,t}^{k} \quad (1b)$$

$$Y_{ij,t}^{k} = exp\big(\beta_1 EIA\_woEU_{ij,t} + \beta_2 EU + \beta_3 WTO_{ij,t} + \beta_4 BIT_{ij,t} + \beta_5 ADEQUACY_{ij,t} + \beta_6\, Reg\_misalignment_{ij,t} + \textstyle\sum_t \beta_t INTER_{ij,t}^{k} + \mu_{ij}^{k} + \chi_{i,t}^{k} + \lambda_{j,t}^{k}\big) \times \epsilon_{ij,t}^{k} \quad (2a)$$

$$Y_{ij,t}^{k} = exp\Big(\beta_1 EIA_{woEU\,ij,t} + \beta_2 EU + \beta_3 WTO_{ij,t} + \beta_4 BIT_{ij,t} + \beta_5 ADEQUACY_{ij,t} + \beta_6\, Reg\_misalignment_{ij,t} \times Data\_intensity^{k} + \textstyle\sum_t \beta_t INTER_{ij,t}^{k} + \mu_{ij}^{k} + \chi_{i,t}^{k} + \lambda_{j,t}^{k}\Big) \times \epsilon_{ij,t}^{k} \quad (2b)$$

We estimate the gravity equations in its multiplicative form, rather than in logarithmic form, using the Poisson Pseudo Maximum Likelihood (PPML) estimator with high-dimensional fixed effects (exporter×sector×year, importer×sector×year, and country-pair×sector). This approach effectively addresses the presence of zero flows and controls for heteroscedasticity, while absorbing multilateral resistance terms.

In our empirical model, the dependent variable, $Y_{ij,t}^{k}$, represents the value of bilateral trade flows between countries *i* and *j* in service sector *k* in year *t* when analysing Mode 1 trade, and the number of affiliates from country *i* established in country *j* in sector *k* in year *t* when analysing commercial presence through foreign affiliates. Accordingly, the four specifications described above are estimated twice: using ITPD-E bilateral trade flows and, separately, MREID affiliate counts as dependent variables. Following the recommendations of Yotov et al. (2016) and Yotov (2022), we include both international and domestic trade flows in the estimation to avoid the bias that may arise when intranational trade is omitted[5]. By the same logic, and given that such information is available in the

[4] Using pooled sector-level data, rather than estimating the model on the sectoral aggregate, is motivated by the fact that aggregation is not innocuous in gravity settings, as aggregate coefficients may embed composition effects and need not coincide with those obtained at more disaggregated levels of analysis (Redding and Weinstein, 2019).

[5] Larch et al. (2025) note that several service categories—namely Manufacturing services on physical inputs owned by others; Maintenance and repair services n.i.e.; Charges for the use of intellectual property n.i.e.; Government goods and services n.i.e.; and Services not allocated—do not have a domestic-trade counterpart. As a result, although the ITPD-E distinguishes 17 service sectors, the number of sectors pooled in our trade estimations falls to 12, as domestic trade observations are unavailable for these five sectors.

MREID, we also include observations on domestic affiliates when analysing commercial presence through foreign affiliates

Our explanatory variables of interest are $Reg\_restrictiviness_c$ (in equation 1a) and $Reg\_misaligment_{ij,t}$ (in equation 2a). The variable $Reg\_restrictiviness_c$ captures the degree of restrictiveness of a country *c*'s data-governance regime, where *c* denotes the country whose regulatory regime is being considered (i.e. country *i* as the origin or country *j* as the destination, depending on the specification. Specifically, we construct an ordinal variable coded as 1 for countries with open regulatory regimes, 2 for conditional regimes, and 3 for restrictive regimes, so that higher values indicate a more restrictive approach to data governance. From an econometric perspective, the effect of a country-specific variable cannot be estimated in a gravity equation with country-specific fixed effects since they are perfectly collinear. To address this issue, and following Berverelli et al. (2024), we identify the effect of $Reg\_restrictiviness_c$ by interacting it with an international-border dummy ($Reg\_restrictiviness_c \times BRDR_{ij}$). This interaction identifies how the restrictiveness of a country's data-governance regime affects international trade (or foreign affiliates) relative to domestic trade (or domestic affiliates). Because the corresponding origin- and destination-side interaction terms cannot be included jointly in the same specification due to collinearity, we estimate them separately. The variable $Reg\_misaligment_{ij,t}$ in turn, captures bilateral regulatory misalignment in data governance between partner countries. Its temporal dimension (t) arises because some countries change their regulatory model over time, as documented by Ferracane and van der Marel (2021). This time variation is essential for identification, since without it the variable would be perfectly collinear with pair fixed effects, making it impossible to estimate its impact. It is defined as a binary variable that takes the value 1 when countries *i* and *j* adopt different data-governance models, and 0 otherwise.

To isolate the effects of data-governance restrictiveness and regulatory misalignment, we control for a set of bilateral factors that combine standard gravity variables with additional covariates relevant to international service supply. In this context, the specification includes a control for joint WTO membership matters because the GATS constitutes the core multilateral framework for trade in services and establishes disciplines that are relevant for measures affecting cross-border service provision, including those related to data flows. To control for this, we include a dummy variable $WTO_{ij,t}$ that takes the value 1 when both countries in the pair are WTO members, and 0 otherwise. The data come from the CEPII Gravity database.

Beyond WTO membership, countries may also participate into other agreements —most notably regional trade agreements and bilateral investment treaties— that affect both trade and foreign

affiliates. Trade agreements are relevant because they are increasingly used as instruments to enable cross-border data flows under conditions of trust. Many agreements now include provisions on digital trade, including rules on cross-border data transfers, electronic transactions, and data localization. However, these provisions differ markedly in legal depth, ranging from broad non-binding cooperation clauses to binding commitments to permit data flows, with the latter becoming more prevalent in recent agreements (Casalini et al., 2021). As a result, they may shape bilateral service flows directly and may also affect firms' organizational choices across modes of supply. Including this control variable therefore allows us to identify more cleanly the effects of regulatory restrictiveness and bilateral misalignment in data governance. The variable $EIA\_woEU_{ij,t}$ is a dummy that takes the value 1 if the country pair ij has any preferential trade agreement in force, excluding cases in which both partners are EU members, and 0 otherwise. The data come from Larch's Regional Trade Agreements Database (Egger and Larch, 2008).

We also include a variable capturing the existence of bilateral investment treaties (BITs), constructed with information from the UNCTAD Investment Policy Hub. These treaties provide a regulatory framework that reduces uncertainty surrounding foreign investment, helping to create a more stable and predictable environment (Bergstrand and Egger, 2013). Kox and Rojas Romagosa (2020) note that relying only on a PTA variable may still lead to biased estimates if other bilateral, time-varying factors also play a role in determining foreign investment. For this reason, they include BITs as an additional policy control, and we follow the same approach in our setting. Moreover, following Larch and Yotov (2024), we also include BITs in the trade specification. Although BITs are not designed to liberalise trade, Larch and Yotov justify their inclusion in the trade equation on three grounds: to ensure symmetry with the FDI equation, to account for a possible substitution between trade and investment, and to reflect the possibility that BITs may increase intra-firm trade through higher FDI. Therefore, we define $BIT_{ij,t}$ as a binary variable that takes the value 1 when a bilateral investment treaty is in force between countries *i* and *j* in year *t*, and 0 otherwise.

We also control for joint membership in the EU. When both countries belong to the EU, bilateral exchanges take place within a common institutional and regulatory framework characterised by the absence of internal tariffs and border controls, as well as a high degree of regulatory harmonisation. This common setting may affect bilateral service flows and commercial presence through foreign affiliates independently of the data-governance variables of interest. By including the variable $EU_{ij,t}$, we seek to capture the effects associated with the EU Single Market in services, including the reduction of barriers to establishment and cross-border service provision under the Services Directive (2006/123/EC), as well as the facilitation of professional mobility under the framework on the

recognition of professional qualifications and to avoid attributing to data-governance variables effects that are instead driven by the broader institutional framework of the EU.

Following Ferracane et al. (2026), we include the binary variable $ADEQUACY_{ij,t}$ to identify whether a third country or jurisdiction benefits from an adequacy decision issued by the European Commission[6]. An EU adequacy decision certifies that a third country or jurisdiction ensures a level of personal-data protection essentially equivalent to that of the EU, thereby allowing personal data to flow freely from the EU and from the European Economic Area—Norway, Iceland and Liechtenstein—to that country without the need for additional safeguards. In practice, this removes the need for further transfer mechanisms and reduces the compliance costs associated with cross-border data transfers. Since this reduction in frictions may affect data-intensive service flows, we control for EU adequacy through a dummy that takes the value 1 when country pair *ij* is covered by an EU adequacy decision, and 0 otherwise.

In addition, following Bergstrand et al. (2015), we control for common globalization trends These authors show that estimates of trade agreements and other policy variables in gravity models may be biased upward if they also absorb global changes affecting all countries. To address this issue, we include both international and domestic trade flows in the specifications for Mode 1, and both foreign and domestic affiliate observations in the specifications for Mode 3, together with a full set of time-varying border dummies, denoted by $INTER_{ij,t}$. These dummy variables take the value 1 for international observations ($i \neq j$) and 0 for domestic observations ($i = j$), and captures global changes such as improvements in transport, communication, and technology that affect the relative cost of international versus domestic transactions.

To address potential endogeneity concerns associated with trade policy variables, we follow Baier and Bergstrand (2007) and include bilateral fixed effects. The pooling of multiple service industries implies that these bilateral fixed effects are sector -specific (μ^{k}_{ij}). These fixed effects absorb all time-invariant bilateral determinants of two modes of international supply of services, thereby, both observable and unobservable, capturing persistent frictions or barriers that may otherwise bias our estimates, in line with the arguments in Egger and Nigai (2015) and Agnosteva et al. (2014). In addition, as highlighted by Anderson and van Wincoop (2003), properly accounting for multilateral resistance terms is essential to prevent biased gravity coefficients. We therefore incorporate

[6] Between 2000 and 2026, the European Commission adopted adequacy decisions for 16 third countries and jurisdictions. Of these, only 15 fall within our period of analysis. Among those 15, only 11 appear in our dataset, as we do not observe bilateral trade or the presence of foreign affiliates with some adequate jurisdictions, such as the Faroe Islands, the Isle of Man, Jersey, and Guernsey. The list of countries with an adequacy decision are listed in Table A2 of the Statistical Appendix. This information is available at Data protection adequacy for non-EU countries.

time-varying country-sector fixed effects on both the exporter and importer sides, following the approach of Olivero and Yotov (2012). Specifically, $\chi^{k}_{i,t}$ denotes exporter–sector–time fixed effects, while $\lambda^{k}_{j,t}$ captures the corresponding importer–sector–time fixed effects, thereby controlling for all observable and unobservable country-sector characteristics that vary over time. Finally, following Egger and Tarlea (2015), standard errors are clustered in three dimensions—origin country, destination country, and country pair—to ensure correct inference. Due to the rich structure of fixed effects included in our specifications, the error term ($\epsilon^{k}_{ij,t}$) is pure noise.

Lastly, in equations (1b) and (2b), we augment the model by interacting our two key explanatory variables with the sector-level data-intensity classification reported by Ferracane and van der Marel (2025), in order to examine whether their effects vary systematically across service sectors with different degrees of data intensity.

4. Estimation results

We present our main empirical findings in Tables 1 and 2. Table 1 reports the results for specifications (1a) and (1b) which analyze the impact of the restrictiveness of a country's data-regulatory model on both modes of international service supply. Columns (1A) and (2A) in Table 1 present the baseline specifications for Mode 1 and 3, respectively, from the origin-country perspective, using the interaction between the country *i*'s data-regulatory framework and the international-border variable[7]. Columns (1B) and (2B) in Table 1 extend these specifications by introducing an additional interaction with sectoral data intensity. Table 2 reports the results for specifications (2a) and (2b), which evaluate the effect of bilateral regulatory misalignment in data governance. As in Table 1, columns (1A) and (1B) in Table 2 present the baseline specifications for Mode 1, whereas columns (2A) and (2B) report the corresponding results for Mode 3.

Turning to Table 1, we first focus on our main variables of interest. Since $Reg\_restrictiviness_c$ is coded from 1 to 3, with higher values denoting more restrictive data-governance regimes, the coefficient on $Reg\_restrictiviness_c \times BRDR_{ij,t}$ captures the impact of data regulatory restrictiveness on international trade (or foreign affiliates) relative to domestic trade (or domestic affiliates). In Mode 1, the negative and statistically significant coefficients indicate that more restrictive regulatory models are associated with lower international trade flows (column 1A). However, in the case of commercial presence abroad (Mode 3), the positive and statistically

[7] For brevity, the tables report only the origin-side estimates. The corresponding destination-side estimates lead to the same qualitative conclusions and are available upon request.

significant coefficients may suggest that more restrictive regulatory models are associated with relatively higher number of foreign affiliates (column 2A).

We next examine whether this relationship becomes stronger in more data-intensive sectors, our results suggest that the role of data regulatory restrictiveness differs across the two modes of supply. In Mode 1, the negative and statistically significant interaction term suggests that more restrictive regimes are associated with lower international trade flows, especially in more data-intensive service sectors (column 1B). In Mode 3, by contrast, the positive and statistically significant interaction term indicates that more restrictive data-governance regimes are more strongly associated with commercial presence abroad in more data-intensive service sectors (column 2B).

Regarding the control variables, $\text{EIA\_woEU}_{ij,t}$ has a positive and statistically significant coefficient in Mode 1, whereas the corresponding coefficient in Mode 3 is not statistically significant. Quantitatively, the estimates for Mode 1 imply increases of approximately 8.9% and 7.8% in bilateral services trade flows in columns (1A) and (1B), respectively, based on the standard transformation $[\exp(\beta)-1]\times 100$. This suggests that the existence of a preferential trade agreement outside the EU is associated with higher trade flows in services, while no statistically significant association is found for commercial presence abroad.

EU membership displays an opposite-sign pattern across the two modes of supply. In the case of Mode 1, the coefficient is positive and highly significant, corresponding to increases of around 52.8% and 51.7% in columns (1A) and (1B). This is consistent with the view that joint EU membership intensifies intra-EU trade in services by facilitating cross-border exchanges within a common institutional and regulatory framework. By contrast, in the case of commercial presence abroad, the coefficient on EU is negative and statistically significant in both specifications, implying reductions of approximately 4.6% and 5.2% in columns (1B) and (2B), respectively. This may suggest that participation in the EU Single Market does not promote commercial presence abroad and may instead be associated with lower Mode 3 supply, possibly reflecting the fact that regulatory harmonisation and the reduction of barriers within the Single Market favour alternative forms of cross-border service provision.

A similar opposite-sign pattern emerges for the variable $ADEQUACY_{ijt}$. In the case of Mode 1, the coefficient is positive and statistically significant in both specifications. By contrast, in the case of Mode 3, the coefficient is negative and statistically significant in both specifications. This suggests that EU adequacy is associated with higher cross-border trade flows, while it is negatively associated with commercial presence through foreign affiliates in our sample. The positive coefficient in Mode

1 is in line with Ferracane et al. (2026), who find that EU adequacy decisions are associated with higher bilateral digital trade. More broadly, the opposite-sign pattern across modes is consistent with the idea that trade and FDI may respond differently, and even in opposite directions, to the same regulatory or policy setting (Bergstrand and Paniagua, 2024).

Our estimates do not reveal any statistically significant impact of WTO membership or BITs for both modes of trade.

Table 1: Data-regulatory restrictiveness and international service-supply modes. Baseline PPML estimates.

	Mode 1 (Trade flows)		Mode 3 (No. of affiliates)	
Variables	**(1A)**	**(1B)**	**(2A)**	**(2B)**
$Reg\_restrictiviness_i$#$BRDR_{ij}$	-0.421		0.059	
	(0.063)***		(0.027)**	
$Reg\_restrictiviness_i$#$BRDR_{ij}$# $Data\_intensity^k$		-0.150		0.037
		(0.038)***		(0.016)**
EIA_woEU_{ijt}	0.085	0.075	-0.002	-0.005
	(0.036)**	(0.035)**	(0.011)	(0.011)
EU_{ijt}	0.424	0.417	-0.047	-0.053
	(0.093)***	(0.092)***	(0.021)**	(0.022)**
WTO_{ijt}	0.093	0.097	-0.012	0.043
	(0.077)	(0.078)	(0.054)	(0.053)
BIT_{ijt}	0.046	0.043	0.023	0.028
	(0.036)	(0.036)	(0.026)	(0.026)
$ADEQUACY_{ijt}$	0.055	0.056	-0.043	-0.043
	(0.024)**	(0.024)**	(0.011)***	(0.012)***
Observations	350,635	350,635	191,972	176,059

Notes. The regressand is the yearly value of trade flows (columns 1a and 1b) and the yearly number of affiliates (columns 1c and 1d) in sector *k* from country *i* to country *j*. Robust standard errors, clustered by origin country, destination country, and dyad, are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. All regressions include country-sector-pair fixed effects, as well as source country-sector -time and destination country-sector-time fixed effects. To control for global trends in international trade, $INTER^k$ij,t dummies are also included. All fixed effects and globalizations dummies are not reported for brevity.

Turning to Table 2, we again focus on our main variables of interest. The coefficient on $Reg\_misalignment_{ij,t}$ is negative and statistically significant, indicating that countries following different data regulatory models exhibit lower bilateral services trade flows (column 1A). The magnitude of the coefficient implies a reduction of approximately 17.6% ([exp(−0.194)-1]×100). This result is consistent with previous studies showing that differences in data-governance frameworks can limit cross-border trade in data-intensive sectors. In particular, Ferracane and van der Marel (2025) show that sharing different data models is associated with lower digital services trade in several cases. In Mode 3 (column 2A), by contrast, the coefficient is negative but not statistically significant, suggesting no clear association between data regulatory divergence and commercial presence abroad.

We next examine whether the effect of data regulatory divergence is amplified in more data-intensive sectors in columns (1B) and (2B). The coefficient of the interaction between $Reg\_misalignment_{ij,t}$ and the intensity of date is negative and statistically significant in Mode 1, suggesting that data regulatory misalignment has a stronger negative association with cross-border trade, particularly in more data-intensive service sectors. By contrast, in Mode 3, the interaction term is negative but not statistically significant, indicating that we do not find evidence of a differential effect of regulatory divergence on commercial presence through foreign affiliates across sectors with different levels of data intensity.

The coefficients on the control variables remain highly stable in Table 2. The variable $EIA\_woEU_{ij,t}$ continues to be positive and statistically significant only in Mode 1, whereas EU membership and adequacy remain statistically significant with opposite signs across Mode 1 and Mode 3. Again, WTO membership and BITs are not statistically significant in any specification.

Table 2. Data-regulatory misalignment and international service-supply modes. Baseline PPML estimates.

	Mode 1 (Trade flows)		**Mode 3 (No. of affiliates)**	
Variables	**(1A)**	**(1B)**	**(2A)**	**(2B)**
$Reg\_misalignment_{ij,t}$	-0.194		-0.013	
	(0.038)***		(0.011)	
$Reg\_misalignment_{ij,t}$#$Data\_intensity^{k}$		-0.084		-0.004
		(0.021)***		(0.006)
EIA_woEU_{ijt}	0.075	0.072	-0.004	-0.006
	(0.036)**	(0.035)**	(0.011)	(0.011)
EU_{ijt}	0.413	0.411	-0.047	-0.053
	(0.092)***	(0.092)***	(0.021)**	(0.022)**
WTO_{ijt}	0.087	0.086	0.048	0.057
	(0.077)	(0.076)	(0.054)	(0.055)
BIT_{ijt}	0.042	0.041	0.023	0.027
	(0.037)	(0.036)	(0.025)	(0.025)
$ADEQUACY_{ijt}$	0.057	0.057	-0.042	-0.043
	(0.024)**	(0.024)**	(0.011)***	(0.012)***
Observations	393,107	393,107	213,272	195,036

Notes: See notes in Table 1.

To assess the robustness of our main results, we perform two sensitivity analyses, one for equations related to Mode 1 and another for those related to Mode 3. First, we re-estimate the model after excluding from the Mode 1 sample those countries for which no domestic trade is observed. Although the sample was restricted to the 12 ITPD-E service industries for which intranational trade is reported, a careful inspection of the data shows that around half of the countries in this restricted sample report no intranational flows during 2010–2022. The results, shown in Table 3, appear robust:

both variables of interest retain their sign and statistical significance with only minor changes in coefficient magnitudes.

Table 3. Effect of Data-regulatory restrictiveness and Misalignment on Mode 1 international service-supply. PPML estimates excluding countries without intranational trade data.

	Mode 1 (Trade flows)			
Variables	**(1A)**	**(1B)**	**(2A)**	**(2B)**
$\text{Reg\_restrictiviness}_c \# BRDR_{ij}$	-0.431			
	(0.064)***			
$\text{Reg\_restrictiviness}_c \# BRDR_{ij} \# \text{Data\_intensity}^k$		-0.153		
		(0.040)***		
$\text{Reg\_misalignment}_{ij,t}$			-0.220	
			(0.071)***	
$\text{Reg\_misalignment}_{ij,t} \# \text{Data\_intensity}^k$				-0.073
				(0.041)*
EIA_woEU_{ijt}	0.094	0.079	0.083	0.074
	(0.040)**	(0.040)**	(0.039)**	(0.039)*
EU_{ijt}	0.398	0.386	0.386	0.380
	(0.087)***	(0.087)***	(0.087)***	(0.087)***
WTO_{ijt}	0.105	0.110	0.101	0.103
	(0.074)	(0.075)	(0.078)	(0.074)
BIT_{ijt}	0.044	0.041	0.033	0.032
	(0.074)	(0.074)	(0.074)	(0.074)
ADEQUACY_{ijt}	0.046	0.048	0.047	0.048
	(0.023)**	(0.023)**	(0.022)**	(0.022)**
Observations	254,498	254,498	281,900	281,900

Notes. See notes in Table 1.

As a second robustness check, since our MREID-based proxy of commercial presence is closely related to FDI activity, it is important to account for phantom FDI which may account for almost 40% of global FDI. Phantom FDI is investment routed through entities with little or no substantive economic activity in the host economy, as opposed to real FDI, which is linked to productive business activity (Damgaard et al. 2019). Using this distinction as a benchmark, we re-estimate all equations related to Mode 3 under two alternative thresholds based on the share of real FDI in total FDI at the country-pair level. In a restrictive scenario, we retain only country pairs with at least 60% real FDI, thereby allowing for no more than 40% phantom FDI. In a more moderate scenario, we retain country pairs with at least 30% real FDI, thereby allowing for up to 70% phantom FDI. The estimation results are reported in Table 4. Under the moderate scenario, the coefficients on the main variables of interest largely retain both their expected sign and their statistical significance, thereby lending strong support to the baseline findings. Under the more restrictive threshold, these coefficients continue to exhibit the same sign, although their statistical significance weakens and, in some cases, disappears altogether. This loss of precision is consistent with the much tighter sample restriction imposed by the restrictive filter, which reduces both the number of observations and the variation available for

identification. Even so, the overall interpretation of their effects on Mode 3 results remains broadly the same.

Table 4. Effect of Data-regulatory restrictiveness and Misalignment on Mode 3 international service-supply. PPML estimates excluding Phantom FDI.

	Mode 3 (No. of affiliates)							
	Moderate scenario				Restrictive scenario			
Variables	**(1A)**	**(2A)**	**(3A)**	**(4A)**	**(1B)**	**(2B)**	**(3B)**	**(4B)**
$Reg\_restrictiviness_c$ $\#BRDR_{ij}$	0.068				0.015			
	(0.025)***				(0.022)			
$Reg\_restrictiviness_c$ $\#BRDR_{ij}\#$								
$Data\_intensity^k$		0.044				0.027		
		(0.015)***				(0.020)		
$Reg\_misalignment_{ij,}$			-0.010				-0.025	
			(0.011)				(0.015)*	
$Reg\_misalignment_{ij,}$ #$Data\_intensity^k$				-0.003				-0.006
				(0.006)				(0.008)
EIA_woEU_{ijt}	0.001	-0.003	-0.001	-0.004	-0.001	-0.001	-0.003	-0.002
	(0.011)	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)	(0.015)	(0.015)
EU_{ijt}	-0.039	-0.046	-0.039	-0.046	-0.044	-0.046	-0.044	-0.046
	(0.024)	(0.025)*	(0.024)	(0.025)*	(0.027)	(0.027)*	(0.026)*	(0.026)*
WTO_{ijt}	0.034	0.105	0.129	0.143	0.063	0.090	0.078	0.105
	(0.048)	(0.049)**	(0.055)**	(0.057)**	(0.040)	(0.048)*	(0.048)	(0.059)*
BIT_{ijt}	0.023	0.028	0.027	0.033	0.014	0.020	0.017	0.025
	(0.026)	(0.026)	(0.025)	(0.025)	(0.027)	(0.027)	(0.025)	(0.026)
$ADEQUACY_{ijt}$	-0.044	-0.044	-0.042	-0.043	-0.047	-0.048	-0.046	-0.047
	(0.012)***	(0.012)***	(0.012)***	(0.012)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***
Observations	160,094	146,984	167,474	153,403	124,686	114,587	131,000	120,012

Notes. See notes in Table 1.

5. Concluding remarks and policy implications

This paper has examined how two distinct dimensions of data governance regimes—regulatory restrictiveness and bilateral regulatory misalignment—shape the two dominant modes of international service supply: cross border trade (Mode 1) and commercial presence through foreign affiliates (Mode 3). By estimating a structural gravity model using PPML with high-dimensional fixed effects, we separately identify the effects of country-specific data-governance restrictiveness and bilateral regulatory divergences, while assessing whether these effects vary with the degree of data intensity across service sectors.

Our results show that data governance has become a central determinant of the international organization of service provision, particularly under conditions of growing geoeconomic fragmentation. First, we find that more restrictive data governance regimes reduce cross border services trade, an effect that is substantially stronger in data intensive sectors. By contrast, more

restrictive regimes increase the reliance on commercial presence abroad, suggesting a regulatory driven proximity–distance substitution mechanism: as frictions to cross border data transfers intensify, firms reorganize their international activity by establishing or expanding foreign affiliates.

Second, we show that bilateral data regulatory misalignment depresses Mode 1 trade flows, again with a stronger impact in data intensive activities. However, regulatory misalignment does not exhibit a significant effect on Mode 3, indicating that divergence across regulatory models primarily operates as a barrier to cross border trade rather than as a factor inducing a shift toward foreign establishment.

These findings provide systematic evidence that countries data governance regimes—through both their restrictiveness and their degree of alignment with foreign partners—play a key role in shaping not only the level of international service exchange, but also the organizational mode chosen by firms to serve foreign markets. The identification of a regulatory driven substitution between remote delivery and commercial presence contributes to a deeper understanding of how firms adjust their international strategies in response to data related frictions.

From a policy perspective, the empirical results convey several implications grounded directly in the econometric evidence. First, because regulatory restrictiveness is shown to reduce Mode 1 trade while increasing Mode 3 activity, policymakers should carefully calibrate restrictions on cross-border data transfers to avoid unintentionally inducing firms to rely on commercial presence as a compliance-driven rather than efficiency-driven strategy. This concern is especially relevant in data-intensive sectors, where our estimates indicate the largest trade-reducing effects.

Second, the negative and statistically significant effect of bilateral regulatory misalignment on cross-border trade—combined with the absence of compensatory effects on foreign establishment—suggests that regulatory divergence generates net efficiency losses. This result underscores the potential benefits of initiatives aimed at reducing misalignment through enhanced interoperability, the adoption of common safeguards or transfer mechanisms, or the development of cooperative frameworks that limit duplicative compliance burdens without requiring full regulatory harmonization.

Third, the positive effect of adequacy-type arrangements on Mode 1 and their negative effect on Mode 3 indicate that mechanisms reducing the need for additional transfer safeguards can effectively support cross-border service provision while diminishing the necessity of establishing a local commercial presence. These findings highlight the usefulness of adequacy frameworks and

similar instruments in lowering uncertainty and compliance costs in international markets, particularly where data-intensive activities are concerned.

Overall, the evidence presented in this paper suggests that mitigating the frictions arising from restrictive and heterogeneous data-governance regimes could help preserve the efficiency of global service-supply networks in an increasingly fragmented international environment. Policies fostering regulatory predictability, interoperability, and proportionate data-governance frameworks would contribute to sustaining the growth of digitally enabled trade while limiting the distortive organizational adjustments identified in our empirical analysis.

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Statistical Appendix

Table A1. Countries included in the sample.

Regulatory blocs	Countries
Open model (38 countries)	AFG, ARE, AUS, BGD, BOL, CAN, CMR, COD, EGY, ETH, GHA, GMB, HKG, HND, HTI, IRQ, JOR, KHM, LAO, LBN, LBR, LKA, MEX, MMR, MWI, NPL, NZL, OMN, PAK, PHL, PNG, QAT, RWA, SAU, SLE, TWN, TZA, USA
Conditional model (66 countries)	AGO, ARG, ARM, AUT, BEL, BEN, BFA, BGR, BRA, CHE, CHL, COL, CRI, CYP, CZE, DEU, DNK, DOM, ESP, EST, FIN, FRA, GAB, GBR, GEO, GRC, HRV, HUN, IND, IRL, ISL, ISR, ITA, JPN, KGZ, KOR, LTU, LUX, LVA, MAR, MDA, MDG, MLI, MLT, MUS, MYS, NIC, NLD, NOR, PER, POL, PRT, ROU, SEN, SGP, SVK, SVN, SWE, TGO, THA, TJK, TUR, UGA, UKR, URY, ZAF
Restrictive model (12 countries)	BRN, CHN, CIV, IDN, IRN, KAZ, KEN, NGA, RUS, TUN, UZB, VNM

Note: The blocs are based on Ferracane and van der Marel (2021).

Table A2. List of countries for which the European Commission has issued an EU adequacy decision, 2000–2026

Country/Jurisdiction	Year of adoption
Switzerland	2000
United States – Safe Harbor (SH)	2000 (repealed in 2015)
Canada (commercial organisations)	2002
Argentina	2003
Guernsey	2003
Isle of Man	2004
Jersey	2008
Faroe Islands	2010
Andorra	2010
Israel	2011
Uruguay	2012
New Zealand	2013
United States – Privacy Shield (PS)	2016 (repealed in 2020)
Japan	2019
United Kingdom	2021
South Korea	2021
United States – Data Privacy Framework (DPF)	2023
Brazil	2026

Source: Authors' elaboration based on Data protection adequacy for non-EU countries