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Bilateral Trade in Services: Insights from A New Research Dataset

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ABSTRACT: This paper introduces the Bilateral Trade in Services (BiTS) research dataset. BiTS draws primarily on the non-estimated trade values from the OECD-WTO Balanced Trade in Services (BaTIS) database, which serves as the cornerstone of this work. By harmonizing BaTIS data with information from the UNCTAD-WTO Trade in Services Database, UN Comtrade, Eurostat, and other official sources under a consistent BPM6 classification standard, BiTS enables analysis of bilateral services trade patterns over an extended time period from 1985-2023. The dataset covers bilateral trade across 12 major services categories, 9 of which are further disaggregated into 26 distinct subcategories, all harmonized under a consistent BPM6 classification standard for the period 1985-2023. We illustrate the uses of this dataset through two applications. The first shows that "gravity forces" have become less powerful in explaining services trade patterns over time, due to a shift in the composition of trade towards less distance-sensitive services. The second documents that overall services trade remains resilient to growing geopolitical fissures, but that modern services appear more sensitive to geopolitical alignment than traditional services.

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WORKING PAPERS

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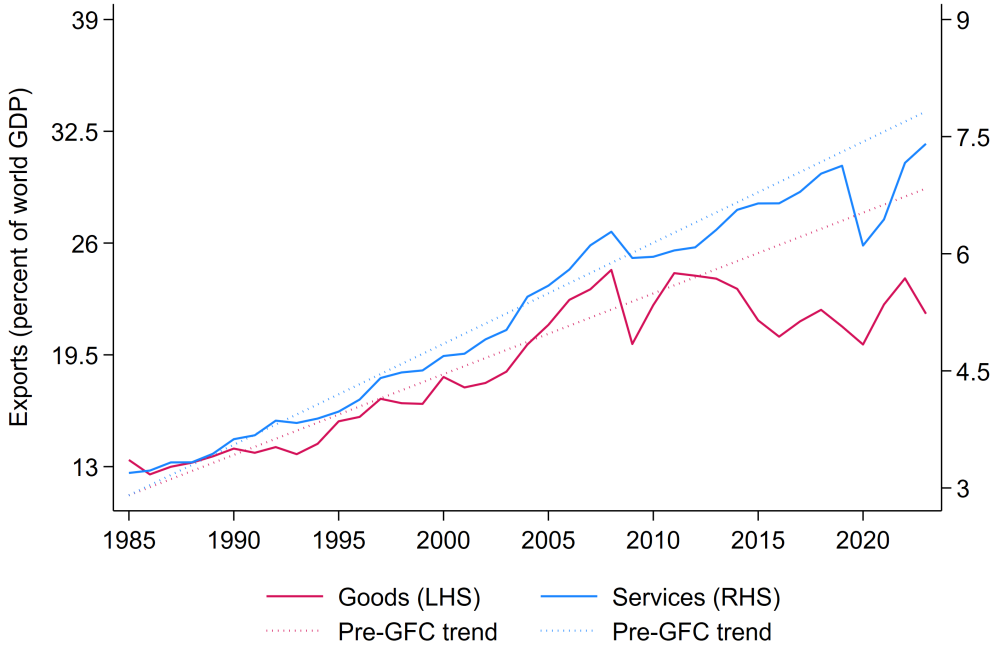
1 Introduction

The importance of cross-border trade in services to the global economy is growing. As shown in Figure 1, the value of services exports as percent of world GDP has more than doubled over the last four decades, from just 3.2 percent in 1985 to 7.4 percent in 2023. While goods trade still accounts for the bulk of international trade, services trade has expanded faster relative to world GDP. It has also continued its advance since the Global Financial Crisis, defying the "slowbalization" or deglobalization trends observed in goods trade (Baldwin *et al.*, 2024).

Figure 1: World trade since 1985



Note: Figure shows world exports of goods (left-hand axis) and world exports of services (right-hand axis), both expressed as percentage of world GDP, from the IMF World Economic Outlook (WEO) database. Dashed lines represent the respective linear trend based on data for 1985-2008, prior to the Global Financial Crisis (GFC).

There are several further reasons to pay attention to services trade. First, recent developments in information and communications technology—accelerated by the pandemic—have made it possible to trade services that were previously considered non-tradable, by "unbundling" service delivery from physical presence (Baldwin, 2016). Second, services trade offers substantial growth potential, especially for developing economies. In these countries, the services sector has accounted for two-thirds of total growth over the last three decades, yet much of this expansion has been domestically driven rather than export-led (World Bank, 2024).[1] Understanding frictions

[1] In addition to the direct income gains from the liberalization of services trade, there is evidence that such liberal-

that shape services trade may reveal new growth and diversification opportunities. Third, services trade is relevant for the interpretation of trade (im)balances, which have become a prominent concern for policy makers. Countries with a persistent trade deficit in goods, such as the United States, often run surpluses in services (Boz *et al.*, 2019). This pattern may reflect both comparative advantages and asymmetries in trade barriers.[2]

Despite its growing importance, services trade remains under-researched, mainly because data sources are scarce and disjoint, especially for *bilateral* (source-destination) service trade flows over extended time periods. The Bilateral Trade in Services (BiTS) research dataset makes a contribution towards addressing this gap by harmonizing and combining existing data sources to provide consistent coverage of bilateral services trade from 1985 to 2023. The coverage includes both total bilateral flows and flows broken down by detailed service categories, which are harmonized to make them consistent with the sixth edition of the IMF Balance of Payments and International Investment Position Manual (BPM6). Moreover, BiTS is based only on officially reported bilateral trade statistics, without estimated or interpolated values.[3] This makes it especially suitable for the estimation of gravity regressions of the kind commonly used in the analysis of goods trade.

BiTS is assembled by combining officially reported bilateral trade flows from four main sources: the OECD-WTO Balanced Trade in Services (BaTIS) Database, which serves as the cornerstone and primary data source; the UNCTAD-WTO Trade in Services Database (henceforth "the UNCTAD database" for brevity); UN Comtrade; and Eurostat. The data from these sources is carefully reconciled and mapped into a common categorization of services-trade flows following BPM6. The result is a dataset with a broad coverage of bilateral services trade across country pairs and time. In particular, it covers bilateral services trade across 12 broad categories, 9 of which are further disaggregated into 26 distinct subcategories, for up to 245 countries and geographic entities. For a subset of advanced economies, bilateral services trade coverage extends back to 1985. For most major economies, the bilateral trade values contained in BiTS cover virtually the entire value of their multilateral services exports and imports from the early 2000s onwards. By construction, BiTS covers all modes of services trade delivery except Mode 3 (via "commercial presence"), which is not captured in Balance of Payments Statistics.

BiTS complements a small set of existing databases available to researchers for the study of services trade. By far the most important of these is the OECD-WTO BaTIS database (OECD, 2025). BaTIS builds on a carefully curated collection of official bilateral services trade statistics, extending these through the use of estimation and balancing techniques to provide a full matrix of bilateral trade flows. As noted above, BaTIS serves as the cornerstone of our dataset and provides the vast majority of bilateral trade flows. BiTS only draws on the officially reported, non-estimated

ization may have sizeable productivity spillovers for the manufacturing sector (Arnold *et al.*, 2011; Fiorini *et al.*, 2023).

[2]The globalization wave of the early 2000s disproportionately lowered trade barriers for goods relative services, and some studies have suggested that this may have contributed to the persistent trade and current account deficits of countries with a comparative advantage in services (Barattieri, 2014; Joy *et al.*, 2018).

[3]However, in blending data from different sources and service category classifications, we employ some proportionality assumptions described in more detail in Section 2.2.

trade values from BaTIS, expanding on this by filling some data gaps from other sources, and by harmonizing data from these sources and from different editions of BaTIS under a single BPM6 standard to enable analysis over extended time periods. This delivers a unified dataset for empirical research whose country and time coverage nests prominent existing bilateral services trade datasets.[4]

Compared with the ITPD-E dataset by Borchert et al. (2021, 2022), BiTS offers a longer time series of bilateral services trade flows for some country pairs and categories, and further disaggregation of bilateral trade in 9 of the 12 broad BPM6 service categories. However, unlike ITPD-E, it does not complement trade data with information on domestic production to facilitate the calculation of domestic services trade.[5]

This companion paper describes the construction and properties of the BiTS dataset. It also provides two illustrative research applications, involving the study of bilateral services trade. While bilateral goods trade has been studied extensively, it is not obvious that insights from this literature readily carry over to services, due to several unique features of services trade. First, traded services span a highly diverse range of activities—including tourism, finance, licensing and artistic creation. Since many of these activities involve the supply of non-storable intangibles, their delivery has traditionally required proximity between the supplier and consumer ("the proximity burden"; Hill, 1977). Second, services are typically more labor-intensive than manufacturing, which may affect the nature of trade costs and competitiveness, as well as the invoicing currency choices of providers (Li and Meleshchuk, 2024). Third, unlike for goods, barriers to services trade are non-tariff, behind-the-border and highly specific to the category of service activity (Francois and Hoekman, 2010; Miroudot *et al.*, 2013; Hoekman and Shepherd, 2019).

Our research applications are designed to highlight some notable differences between goods and services trade. The first shows that traditional "gravity forces"—such as economy size and distance—are less powerful in explaining bilateral services trade than goods trade. We document that services trade has become less gravity-bound over time, and that this primarily reflects a compositional shift towards service categories that are less sensitive to geographic distance. The second research application establishes that, unlike for goods, there is no evidence yet that geopolitical considerations are increasingly reshaping services trade. However, we find that trade in some fast-growing modern services is especially sensitive to geopolitical alignment. These applications illustrate that much remains to be learned about the drivers of services trade, and that BiTS can be a useful resource in this endeavor.

The remainder of this paper is structured as follows. Section 2 described the construction of the BiTS research dataset. Section 3 gives an overview of the data coverage and its main properties. Section 4 details the findings from our two research applications. Section 5 provides some

[4]Some of these datasets in turn revamp and extend the discontinued Trade in Services Database (TSD) by Francois and Pindyuk (2013), which covered bilateral services flows up to 2010. Loungani *et al.* (2017) provide BPM6-harmonized data on only *multilateral* exports and imports of different services categories for the period 1970-2014.

[5]Yotov (2022) describes the benefits of estimating gravity equations with domestic trade flows included, consistent with their theoretical foundations.

concluding remarks.

2 Constructing BiTS

2.1 Data sources

The services trade data in BiTS is primarily sourced from the OECD-WTO Balanced Trade in Services datasbase (BaTIS; OECD, 2025), and it is supplemented by data from UNCTAD-WTO, Eurostat, and UN Comtrade's historical records.

BaTIS offers a comprehensive and harmonized matrix of international trade in services statistics. The current edition, aligned with BPM6 service category classifications, covers 202 economies and 26 service categories from 2005 to 2023. An earlier edition, based on BPM5, includes 191 economies and 11 service categories for the period 1995-2012. Due to differences in classification standards, the two editions are not directly compatible. BaTIS reports three types of bilateral flows: reported, adjusted/imputed, and balanced. The latter two include model-based estimates intended to improve coverage. Since our objective is to construct a dataset for empirical research on bilateral services trade, we retain only the original *reported* flows and exclude the adjusted, imputed and balanced values.

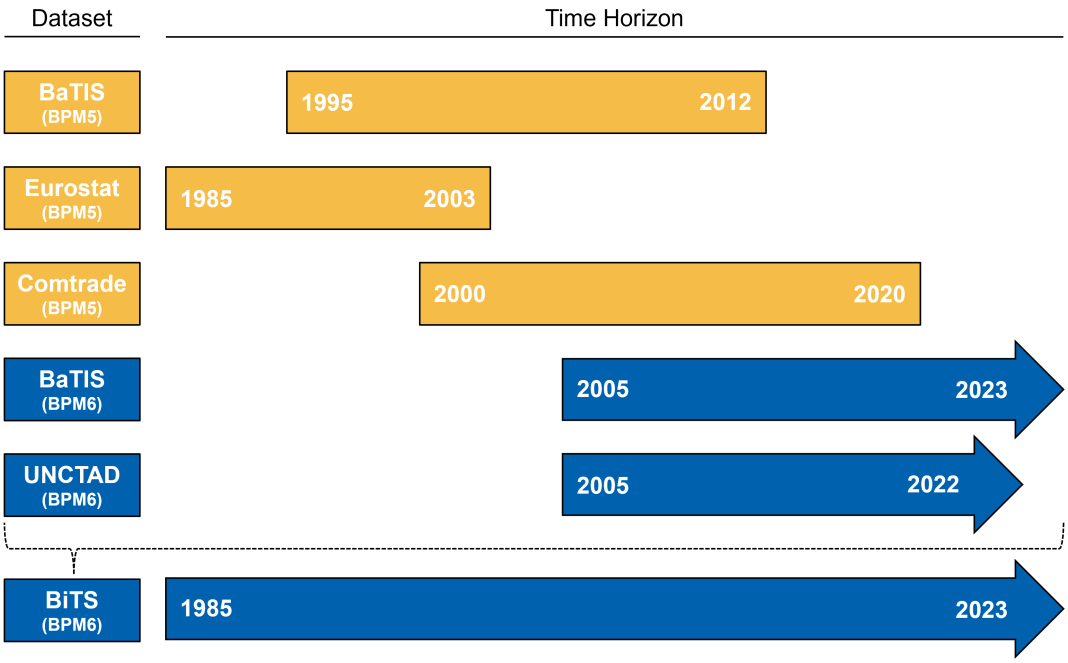
To address gaps in time, country and category coverage and to facilitate harmonization under the BPM6 standard, we supplemented BaTIS with additional sources. The UNCTAD database, based on BPM6, spans 2005-2022, covering 226 economies and 106 service categories. Eurostat data, based on BPM5, contributes observations for 1985-2003 across 66 economies and 85 categories. Finally, UN Comtrade provides data for 2000-2020, covering 244 economies and 101 service categories, also under BPM5. These additional sources help extend BiTS' historical coverage and increase its sectoral granularity.

As described below, we use a novel concordance to convert the BPM5 datasets to align with BPM6 standards. We then apply a hierarchical reconciliation procedure to merge and construct an overarching dataset combining data from the two editions of BaTIS as well as UNCTAD, Eurostat and Comtrade, as shown in Figure 2. This process results in a harmonized dataset of bilateral service-sector trade flows reaching back to 1985, albeit with varying degrees of coverage.

2.2 Compilation method

Our process for data compilation is divided into four steps, which are illustrated in Figure 3. First, we perform a hierarchical reconciliation of the trade flows in each individual source dataset (A). Where available, we rely on exporter-reported trade values, but we use mirrored importer-reported data in some cases, to maximize the coverage of bilateral trade values from each source dataset (B). Second, we merge the individual datasets that follow the same BPM standard into a single dataset each: BaEuCo for BPM5; and BaUN for BPM6 (C). Third, we use a novel con-

Figure 2: Data Source



Note: The services trade data in BiTS is primarily sourced from the OECD-WTO Balanced Trade in Services database (BaTIS; OECD, 2025), and it is supplemented by data from UNCTAD-WTO, Eurostat, and UN Comtrade's historical records.

cordance table to convert the combined BPM5 dataset to the BPM6 classification (D). Finally, we merge the two resulting BPM6 datasets into the single, final BiTS dataset (C), and we perform a geographical consistency check with respect to reported multilateral trade flows (E).

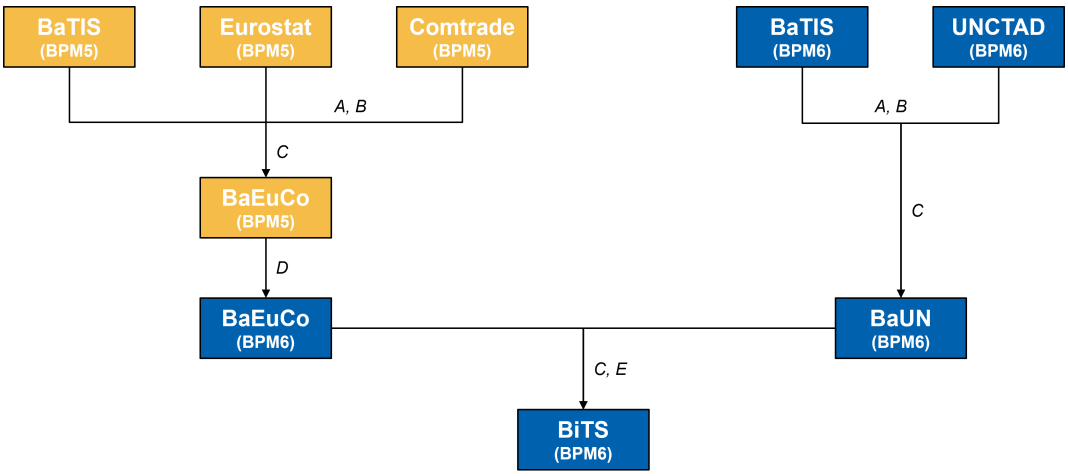
2.2.1 Hierarchical reconciliation (A)

Given that the Extended Balance of Payments Services (EBOPS) employs a hierarchical classification–as detailed in Appendix Table A.1–we perform vertical hierarchical consistency checks within each individual BPM5 and BPM6 source dataset, proceeding from the lowest (more disaggregated) to the highest (more aggregated) category levels.

Specifically, for each reporter-partner-year flow, we check whether trade values at a given category level are consistent with available data from its subcategories. Following standard practice in similar datasets, we reconcile higher-level category values by replacing them with the sum of lower-level components if one of the following conditions is met: 1) the higher-level category value is missing; or 2) both higher- and lower-level data are available and the sum of the lower-level value exceeds the reported value of the higher-level category.[6]

[6]The same rules for hierarchical reconciliation were employed in the compilation of the Trade in Services Database

Figure 3: Data Compilation Flow



Note: A (hierarchical reconciliation), B (use of mirror flows), C (dataset merging), D (concordance of BPM5 to BPM6), E (geographical reconciliation for bilateral trade flows to/from "world").

For example, consider the "travel" (SD) category—a second-level category in BPM6 that includes two third-level sub-categories: "business travel" (SDA) and "personal travel" (SDB). If the travel value is missing for a given reporter-partner-year, but values for both subcategories are available, we replace the missing value with the sum of subcategory values. If all three values are available but the subcategories sum to more than the reported travel total, we also replace the travel value with the sum of its subcategories. Otherwise, we leave the data unchanged.

This reconciliation is performed separately for each type of observed flow–reporter's exports to and imports from the partner–and is applied at each category level in the individual source datasets, starting from the most granular level of aggregation.

2.2.2 Use of mirrored flows (B)

In many cases, bilateral services trade flows are reported by both trading partners—that is, as exports by the source country and as imports by the destination. Although these values should be identical in theory, discrepancies often arise in practice due to differences in data collection methods, reporting standards, classification systems, and the complicated structure of multinational companies.[7] This poses the question which reported value to use.

For goods trade, destination-reported imports are generally considered more reliable because goods imports tend to create a tax record at customs. However, because services trade is not

(Francois and Pindyuk, 2013), the International Trade and Production Database for Estimation (ITPD-E).

[7]For example, ONS (2020) analyzes U.K. services trade data asymmetries with selected partner countries for the period 2016-18. It finds that the U.K.'s reported services exports to the U.S. were £23.5 billion higher than the U.S.-reported services imports from the U.K. Meanwhile, the U.K.'s services imports from the U.S. were £19.9 billion lower than the U.S.-reported services exports to the U.K.

subject to tariffs, such records are not typically generated. Instead, data on services exports is typically gathered more consistently, through compulsory surveys administered by national statistical agencies or central banks, and are therefore considered more consistent and reliable. For this reason, BiTS prioritizes exporter-reported flows wherever available.[8] To maximize data coverage, we incorporate "mirrored" import data, but only when source-reported data on exports is unavailable.

Special care is required to avoid inconsistencies when combining exporter-reported and mirrored data at different category levels for a given reporter-partner-year combination. To maintain internal consistency, we apply the following rules. First, If a higher-level category is populated with exporter-reported data, but all its subcategories are missing, we introduce mirrored values for the subcategories—when available—but scale them proportionally to preserve the relationship implied by the exporter-reported aggregate.[9] Second, when a category is already populated using mirrored data, we do not override or augment its subcategories with exporter-reported data. That is, in moving down the category hierarchy, only one switch in flow type is permitted, from exporter-reported to mirrored, but never the reverse. To support robustness analysis, we also provide a companion version of the BiTS that is entirely based on exporter-reported bilateral trade values without the use of mirrored flows.

2.2.3 Dataset merging (C)

Dataset merging occurs in the second step of our process (which creates a combined BPM5 and BPM6 dataset from individual sources), and in the fourth step (which merges the concorded combined BPM5 dataset with the combined BPM6 dataset). Merging datasets requires us to specify two rules: one to prioritize among multiple data soruces reporting the same flow; and another to reconcile data drawn from different sources at various levels of aggregation.

For the first rule, we establish a hierarchy of preferred sources based on data quality and consistency. BaTIS data are used wherever available, given their rigorous curation by the WTO. In the absence of BaTIS data, we turn to UNCTAD-WTO, followed by Eurostat, and finally UN Comtrade as the least preferred source. Accordingly, when reconciling the combined BPM6 dataset (BaUN), composed exclusively of BaTIS and UNCTAD-WTO, with the BPM5-based dataset (BaEUCo), we prioritize BaUN values whenever both are available for the same flow.

When a preferred source (e.g., BaTIS) provides a trade flow for a given reporter–partner–year

[8] To be more precise, countries tend to use one of two main approaches to compile data on trade in services: surveys or the International Transactions Reporting System (ITRS), which is based on transactions data reported by commercial banks. While there is a reason to prefer export over import data for countries that compile their services trade statistics from surveys, both should be of similar quality for countries using ITRS. This still leaves proritizing exporter-reported data as a reasonable "rule of thumb".

[9] For example, suppose country A reports travel service exports to country B of US$8 million but does not report values for its subcategories (e.g., business and personal travel). Country B reports US$10 million in imports from A, comprising US$2.5 million in business travel and US$7.5 million in personal travel. In this case, we use country A's reported total of travel exports to B, and we allocate US$ ($8\times2.5/10=$)2 million in business travel and US$ ($8\times7.5/10=$)6 million in personal travel.

at an aggregate category level but lacks subcategory detail, we fill in the missing subcategories from other lower-priority sources, following the hierarchy above. However, as with the use of mirrored flows, doing so risks inconsistencies across category levels. To maintain hierarchical consistency, we proportionally re-base the subcategory values from the lower-priority source to align with the aggregate value from the preferred source.[10] Again, this ensures that bilateral trade flows remain hierarchically consistent as laid out in Section 2.2.1. It also enables maximum use of high-quality sources for aggregate values, while allowing less-preferred sources to inform disaggregation only when necessary

2.2.4 Concordance from BPM5 to BPM6 (D)

A key step in assembling BiTS is the conversion of bilateral services trade data reported under the BPM5 (BaEUCo) to BPM6 categories. For this, we employ a novel concordance table supplied by the IMF's Statistics Department (Appendix Table A.2). We restrict our concordance to convert BPM5 data into just three levels of BPM6 categories: aggregate services (S), broad services subcategories (SA, SB, SC,...), and their immediate subcategories (SC1, SC2,...). However, achieving accurate concordance requires disaggregated BPM5 data to as many as five levels, as some narrow BPM5 subcategories are reclassified under different broader categories in BPM6.[11]

We are able to match almost all destination categories in BPM6 with the appropriate origin categories from BPM5. The only exceptions are "Manufacturing services" (SA), "Maintenance and repair services" (SB), and "Financial intermediation services indirectly measures" (SG2). Consequently, trade data is only available for these categories from 2005 onwards.

While our concordance allows us to perform a fairly complete mapping of BPM5 services trade flows into BPM6, it is important to note that the transition from the BPM5 standard to BPM6 was accompanied by methodological changes in the way certain services transactions are recorded. This implies that the concordance is necessarily "noisy", and users should be mindful of this when using pre-2005 trade flows as part of their analysis.

2.2.5 World totals trade flows (E)

In the final consolidated BiTS dataset, we also conduct a geographical consistency check, similar to the hierarchical checks described in Section 2.2.1.

Specifically, many countries also report their bilateral exports to and imports from the world (WLD). For our check, we compute countries' total value of bilateral exports and imports in each

[10] For example, suppose preferred source 1 has country A export travel services to country B of US$8 million. However, source 1 contains no data on the subcategories of business travel and personal travel. For the same year, source 2 has country A export travel services to country B of US$10 million, US$2.5 million in business travel with no information on personal travel. In this case, our approach imposes travel exports by country A to country B of US$8 million, with US$ ($8\times2.5/10=$)2 in business travel and a missing value for personal travel.

[11] For example, "Postal and courier services", a subcategory of "Communications services" in BPM5, becomes a subcategory of "Transport services" in BPM6.

category and year. Where the total is greater than a country's reported exports to/imports from WLD, the reported WLD value is replaced with the corresponding sum total of bilateral flows.

2.2.6 Zero-valued flows and missing values

It is important to note that all zero-valued bilateral trade flows in BiTS are directly reported in the corresponding original source datasets, not inferred or imputed. Users can therefore treat these as "true zeroes". Meanwhile, missing values reflect cases where no information is available from any source, based on the procedure described above. In some cases, it may be reasonable to infer that a missing value represents a zero,[12] but we leave it to users to make their own inferences as appropriate.

2.3 Modes of services trade delivery

Trade services are highly heterogeneous, spanning a diverse set of activities delivered by different modes. The General Agreement on Trade in Services (GATS) under the WTO categorizes the different ways in which services can be traded across borders: Mode 1–cross-border supply: services are supplied across borders without the physical movement of the consumer or the provider (e.g., design services provided via the internet). Mode 2–consumption abroad: consumers or firms travel to another country to consume services there (e.g., tourism). Mode 3–commercial presence: a foreign company establishes a physical presence, such as a branch, office, or subsidiary, in another country to provide services (e.g., financial services in Canada provided by a U.S.-based bank). Mode 4–presence of natural persons: individuals travel to another country to provide services in person (e.g., a UK-based consultant working on-site in South Africa).

Balance of Payments statistics capture only transactions via modes 1, 2 and 4. Consequently, the BiTS dataset is limited to these three modes.[13]

3 Data coverage and description

3.1 Data coverage

BiTS contains bilateral services trade flows for up to 245 countries and geographic entities. The data, reported in million US dollars, spans the period 1985–2023. It covers 12 broad service categories, nine of which are further divided into 26 subcategories, resulting in a total of 29 distinct service-sector categories, as listed in Appendix Table A.1. A "Data source" indicator is also

[12] For example, suppose BiTS has country A export travel services to country B of US$8 million, with a missing value for the subcategory business travel and US$8 million for the subcategory personal travel. In this case, it may be reasonable to infer that the value for business travel is zero, but we do not override the missing value with zero.

[13] Data on Mode 3 services–those supplied through a commercial presence–are available from Foreign Affiliates Statistics (FATS) compiled by Eurostat. In principle, FATS and BiTS could be combined to offer a more comprehensive view of bilateral services trade across all four modes.

Table 1: Variables in BiTS

Variable Name	Description	Value
Origin	Origin country/geography	ISO 3-digit code; WLD = world total
Destination	Destination country/geography	ISO 3-digit code; WLD = world total
Category	Service category	BPM6 service sector category; see Appendix Table A.1
Year	Year	1985-2023
Value	Value of trade flow from origin to destination	Million US$
Source	Data source for value	BaTIS original (49%) BaTIS mirrored (27%) UNCTAD original (2%) UNCTAD mirrored (1%) Eurostat original (3%) Eurostat mirrored (2%) Eurostat mixed (0%) UN Comtrade original (8%) UN Comtrade mirrored (5%) UN Comtrade mixed (0%) Mixed (3%)

Note: Variables in BiTS. In the breakdown of data sources "mixed" indicates values based on a combination of exporter(origin)-reported and mirrored values, and/or a combination of different source datasets.

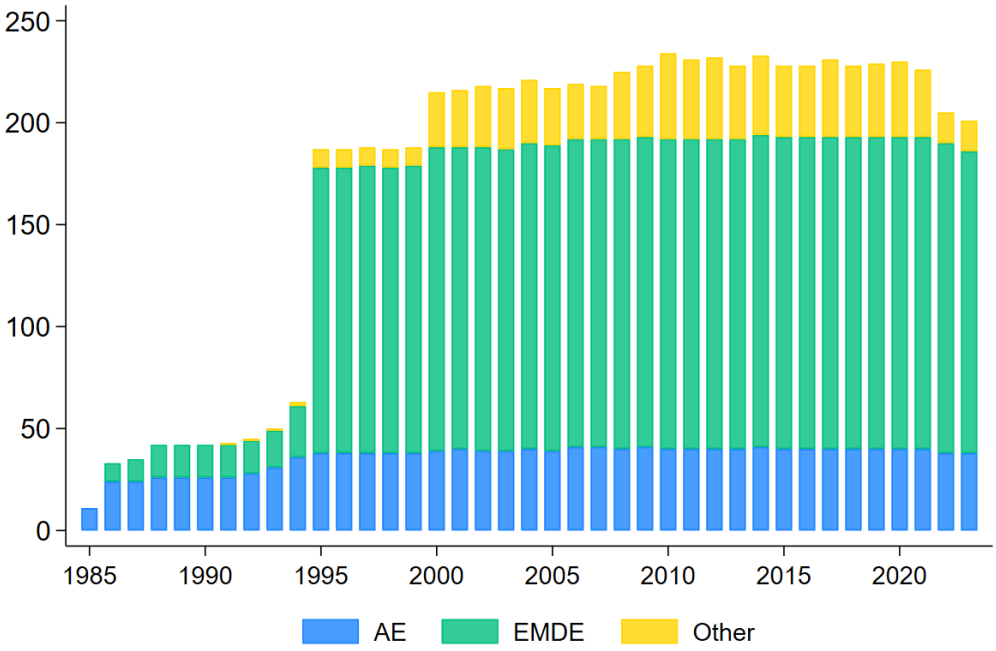
included to record the source of a particular bilateral trade-flow observation. Table 1 gives an overview of all BiTS variables.

Data coverage in BiTS improves significantly over time. Figure 4 highlights changes in geographic coverage of the dataset between 1985 and 2023. In the early years, only a handful major AEs (including the U.S., Germany and Japan) are covered. From the mid-1990s, all AEs are covered to some extent, while coverage of EMDEs begin to appear regularly. By 2010, BiTS contains at least some bilateral trade data for over 200 countries and territories. Due to typical reporting lags, coverage drops off somewhat in the final two years, 2022 and 2023.

The inclusion of a country in the data does not generally imply that its entire matrix of bilateral services-trade flows is available. Indeed, despite the attempts made to maximize coverage of bilateral services trade in BiTS, the value of bilateral trade for most country pairs in any given year is missing.[14] Among AEs, coverage of bilateral services trade is most comprehensive, with non-missing values for just under half of all possible bilateral trade flows from 2010 onwards (Figure

[14]The discussion in the remainder of this section focuses on the availability of total bilateral services values (category S), for which the share of missing values is significantly lower than for any individual services subcategory.

Figure 4: Number of countries and geographic entities in BiTS

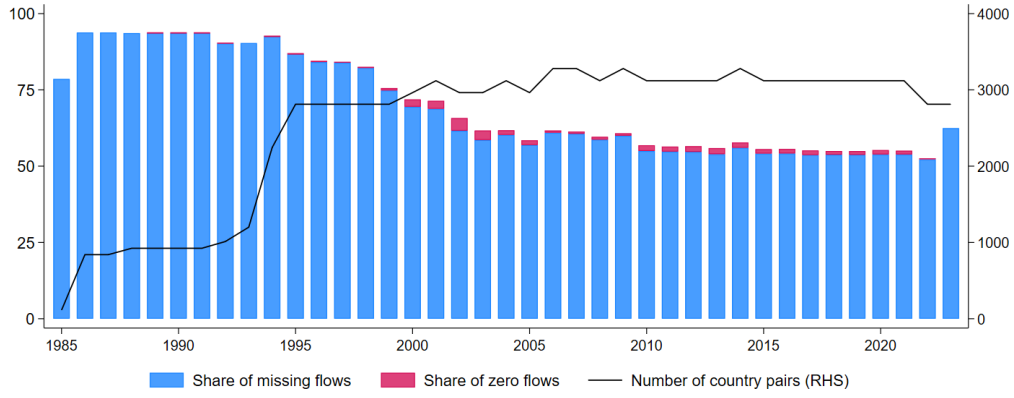


Note: Number of countries and geographic entities for which at least some bilateral trade in total services (category S) is covered by BiTS in a given year. AEs = Advanced Economies; EMDEs = Emerging and Developing Economies; Other = non-country geographic entities (for simplicity referred to as "countries" in the text).

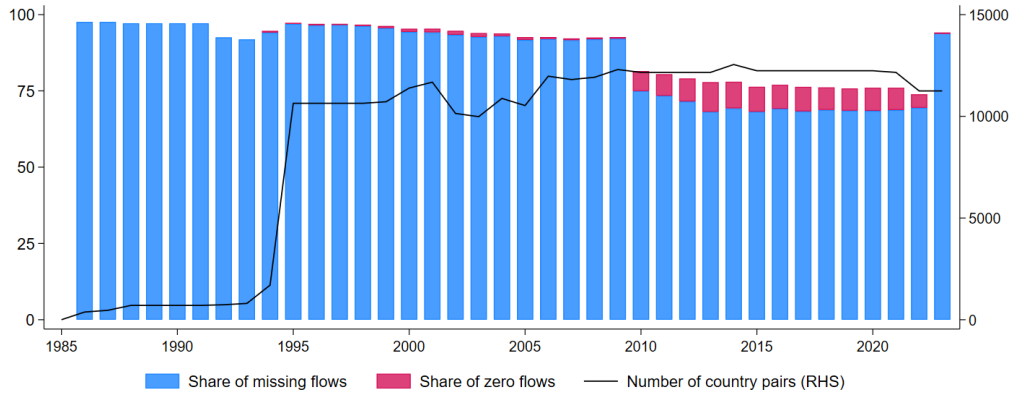
5: panel a). Between AEs and EMDEs, even post-2010 three quarters of all possible bilateral trade flows are missing (Figure 5: panel b). Bilateral services trade values among EMDEs are almost entirely missing (Figure 5: panel c) .

While the large number of missing bilateral trade values in BiTS may seem like a serious limitation on the face of it, many of the values in question are likely to be either small or zero in practice. To illustrate this, Figure 6 compares the value of countries' bilateral services exports covered in BiTS with the value of their multilateral services exports reported in the IMF's World Economic Outlook (WEO) database. This gives a sense of the economic significance of the missing bilateral flows. For the median country in BiTS, the value of multilateral services exports covered hovers around 30 percent during the 1985-2000 period. It then rises to about 90 percent by 2010, and remains at this level thereafter. The pattern is the same for total global services exports. This confirms that, for most countries in BiTS, the value of missing bilateral services exports is small towards the end of the period covered by the data. However, missing bilateral flows are a concern in the earlier years, especially prior to 2000.

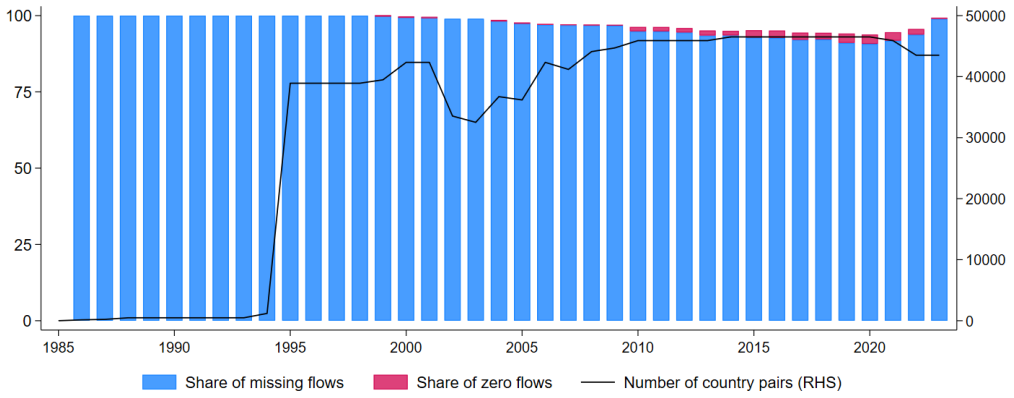
Figure 5: Share of missing and zero values in BiTS



(a) AE-AE trade flows



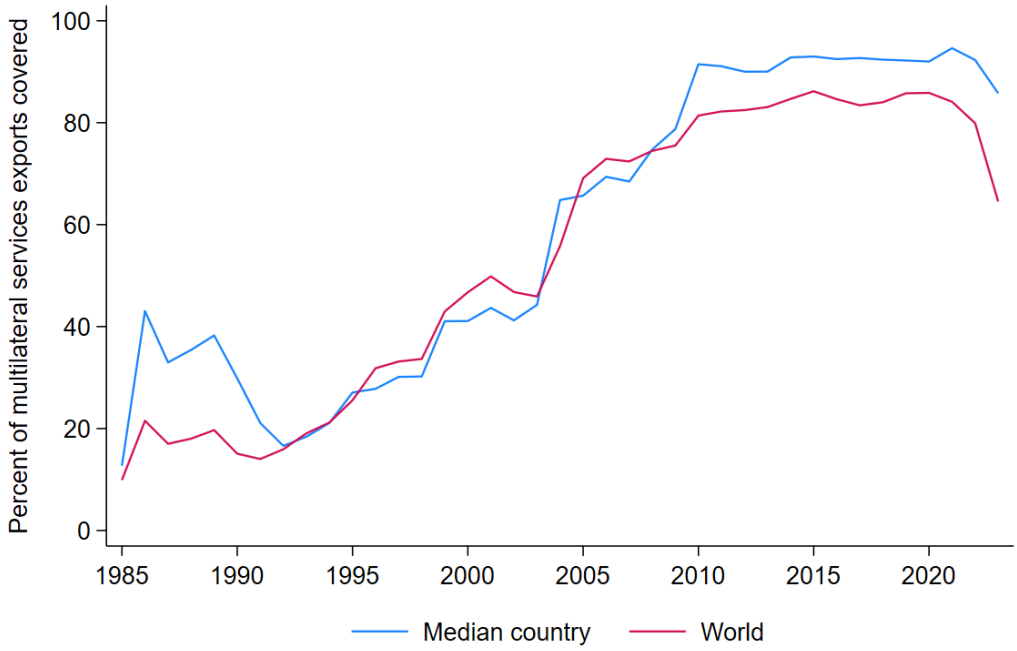
(b) AE-EMDE trade flows



(c) EMDE-EMDE trade flows

Note: The number of country pairs described the maximum number of bilateral flows that could be observed in any given year, given the BiTS country sample. The share of missing flows/zeroes captures the share of these for which bilateral flows of total services (category S) are missing/zero in BiTS. AEs = Advanced Economies; EMDEs = Emerging and Developing Economies.

Figure 6: Percent of countries' multilateral services exports covered



Note: Figure shows the percentage of multilateral services exports, taken from WEO, that is covered by the sum of total bilateral services exports (category S) in BiTS, both for the median country and for the world as a whole.

3.2 Data description

Figure 7 uses BiTS data to visualize the structure of global services trade networks in 2019 (panel b). It contrasts this with the patterns of bilateral trade in goods, drawn from the IMF's Direction of Trade Statistics (DOTS; panel a). In each panel, economies that are more central to the trade network are shown as larger nodes, and the thickness of the connecting lines reflects the intensity of bilateral trade.[15] Colors indicate modularity groupings generated by the Louvain community detection algorithm: countries in the same color cluster trade more intensively with each other than would be expected by random chance.

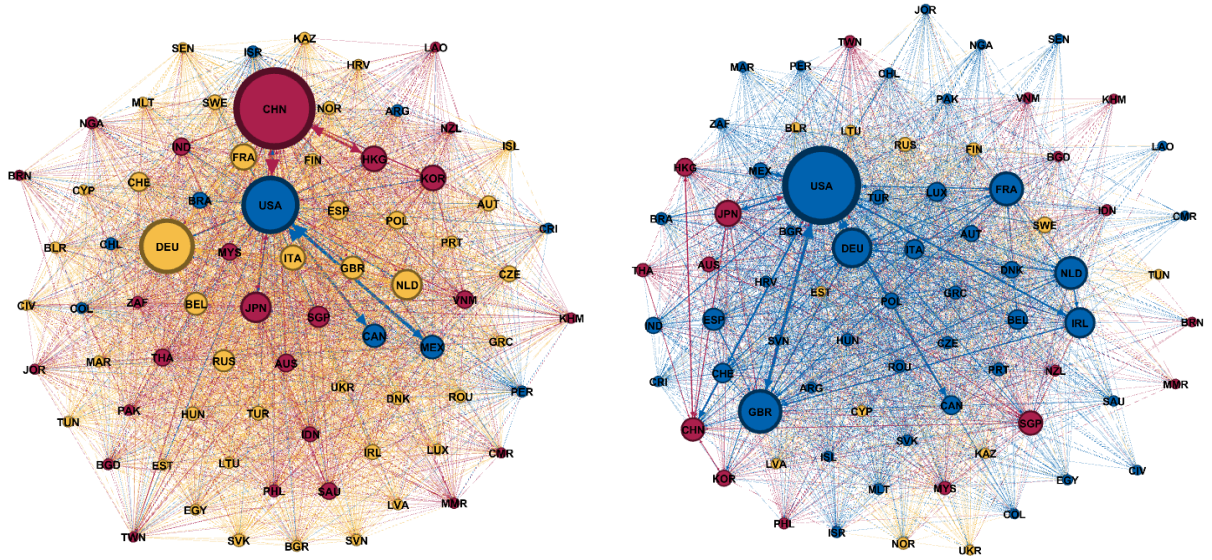
In the goods trade network of Figure 7(a) larger economies—such as the U.S., China, Germany and Japan—clearly represent the most important network nodes. Meanwhile, the modularity clusters strongly reflect geography, with North America (blue), East and Southeast Asia (red), and Europe (yellow) forming distinct trading blocks. This reflects the well-known forces of "gravity" that shape the patterns of international trade, in which goods flows continue to play a dominant role. Tinbergen (1962) first documented that the variation in bilateral trade flows across country pairs is well explained by an empirical model that uses economy size and geographic distance

[15]Note that the sizes of network nodes are comparable within each panel, but not across the two panels.

as the main explanatory variables, and this finding remains central to the modern empirical and theoretical literature on international trade (Head and Mayer, 2014; Costinot and Rodríguez-Clare, 2014).

By contrast, in the services trade network of Figure 7(b) gravity forces are less evident. While some larger economies—such as the U.S. and Germany—are still central to the services trade network, so are a number of smaller economies—such as the Netherlands and Ireland. Moreover, in contrast with its outsized footprint in the goods trade network, China is only a minor node of the services trade network. The role of geography is also less pronounced: one dominant cluster (blue) includes advanced economies from both North America and Europe, while the other two clusters contain a mix of smaller services traders from different regions.

Figure 7: The network of trade in goods and services



(a) Goods flows in 2019

(b) Services flows in 2019

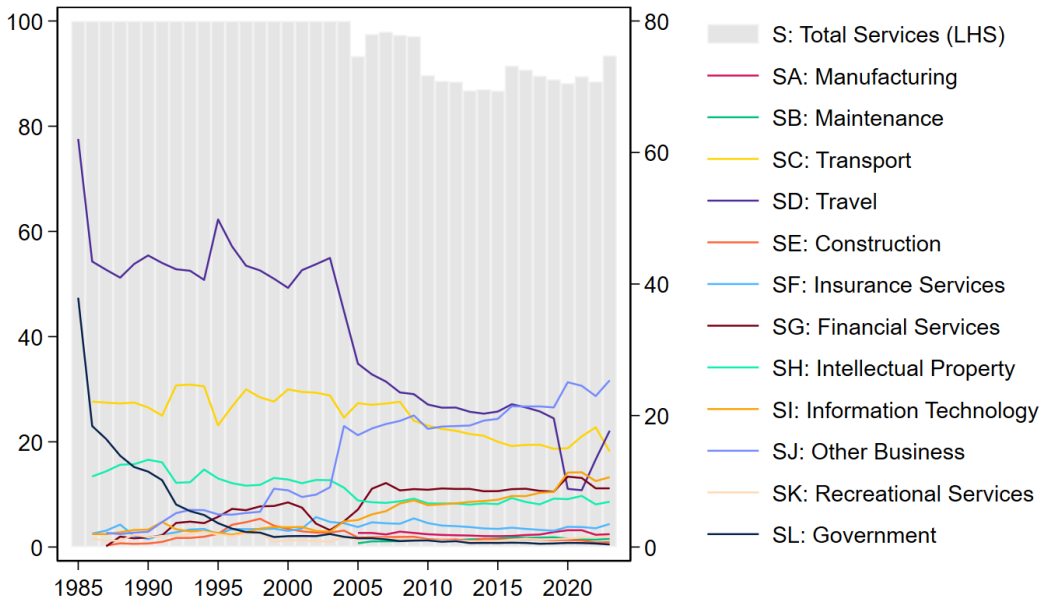
Note: Bilateral goods imports taken from the IMF Direction of Trade Statistics (DOTS). Bilateral services exports taken from BiTS. Charts drawn using the Louvain community detection algorithm. Size indicates the centrality of an economy in the trade network. Thickness of connecting lines reflects the intensity of bilateral trade. Color indicates membership of a trade cluster based on modularity, allowing for three distinct groupings.

One potential explanation is that overall services trade encompasses a variety of different economic transactions, some of which may be less gravity-bound than others. The colorful lines in Figure 8 illustrate the evolution in the share of overall services exports of major service categories, based on BiTS data. Grey bars represent the percentage of overall bilateral services exports (category S) in BiTS accounted for by the sum of bilateral exports across the major service subcategories. The figure shows that transport and travel services used to account for the bulk of services flows.

Since these services categories reflect the physical movement of goods and people between countries, it is natural to think that they would share empirical regularities with the flows of goods. However, the share of these categories in services trade has steadily declined over the last four decades.

By contrast, modern service categories have grown rapidly. Other business services—including activities such as R&D and management consulting—made up a negligible share in the late 1980s, but have gradually risen to 25 percent by 2023. Financial and information services have also seen significant increases in their shares since the early 2000s, respectively reaching 9 percent and 11 percent of global services trade by 2023. To the extent that these services are more "weightless" than goods, transportation and travel, their growing importance could be causing the empirical properties of services trade flows to deviate from the empirical properties of goods flows over time. In Section 4.1, we explore this issue more formally, and provide some evidence consistent with this explanation.

Figure 8: Share of multilateral services exports covered in BiTS



Note: For each year, the figure shows the percentage of the value of total bilateral services exports in BiTS accounted for by different subcategories (colorful lines) and the sum across these subcategories (grey bars).

4 Research applications

4.1 Gravity in services trade

In the first of two research applications of the BiTS dataset, we show that economy size and geographic distance can explain a significant share of the variation in bilateral services trade flows across country pairs. However, that share for services has declined over time and is substantially lower than for goods in recent data. We document that declining power of "gravity forces" in services trade in part reflects a declining distance elasticity of services trade. We further show that most of the fall in the distance elasticity can be attributed to a structural shift in the composition of services trade towards less distance-sensitive categories.

4.1.1 "Naïve" Gravity in goods and services

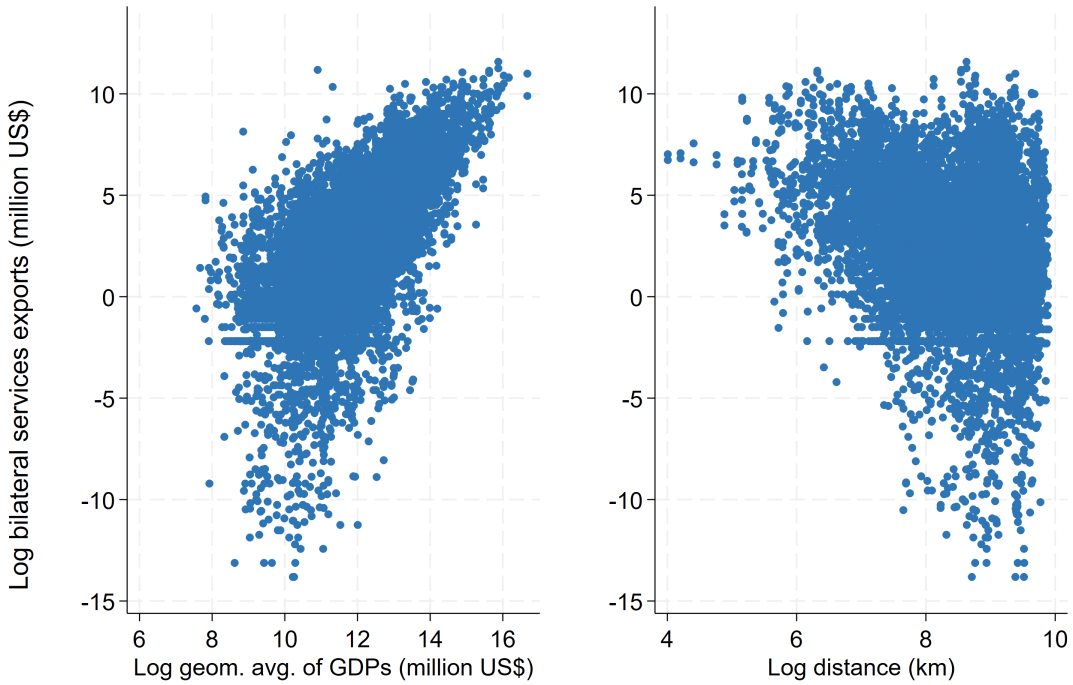
The notion of a "gravity equation in international trade" refers to a model of bilateral interactions in which size and distance enter multiplicatively, loosely analogous to Newton's law of universal gravitation (Head and Mayer, 2014). The simplest manifestation of this is an empirical model of the form:

$$X_{od} = \exp\{\alpha + \gamma_o \ln(Y_o) + \gamma_d \ln(Y_d) + \beta \ln(dist_{od})\}\epsilon_{od}, \tag{1}$$

where X_{od} is the dollar value of trade flows from origin country o to destination country d in a given year; Y_o and Y_d respectively represent measures of the market size of the origin and destination economy; $dist_{od}$ is a measure of distance between o and d; and ϵ_{od} is an error term. Empirical specifications of this type brought gravity modelling of trade flows to prominence due to their ability to explain a large share of the variation in bilateral trade flows with few variables (Leamer and Levinsohn, 1995). However, they have earned the moniker "naïve gravity" because they lack a foundation in formal theoretical models of international trade.

Figure 9 shows that a naïve gravity equation such as (1) should be expected to have significant explanatory power for services trade. Using BiTS data for 2019, it documents that the log of overall bilateral services exports is strongly positively correlated with the log geometric average of origin and destination GDP, and strongly negatively correlated with the geographic distance between them. However, we are interested in how this explanatory power compares between services and goods. To this end, we estimate (1) for the year 2019 using BiTS for services and DOTS data for goods. Throughout, unless otherwise indicated, we use importer-reported imports to measure trade in goods. GDP is used to capture market size, and the weighted average kilometer distance between the origin's and destination's most populous cities to measure distance, as provided by the CEPII gravity database (Conte *et al.*, 2022). We use Poisson Pseudo-Maximum Likelihood (PPML) estimation, which allows us to incorporate zero-valued trade flows and to obtain consistent parameter estimates in the presence of possible heteroskedasticity (Santos Silva

Figure 9: Role of market size and distance in services trade



Note: Bilateral services exports are taken from BiTS. Distance is the weighted average distance between the origin's and destination's most populous cities. Origin GDP, destination GDP and distance are taken from the CEPII gravity database (Conte *et al.*, 2022). All data is for the year 2019

and Tenreyro, 2006).

The full estimation outputs are reported in Table 2. We focus here on the R^2 of each of the two regressions. The R^2 for services is 0.49, which is high for such a simple regression with around 14,000 observations. Yet it is low relative to the R^2 for goods, which is 0.63. This suggests that a naïve gravity model explains bilateral services trade significantly less well than bilateral goods trade in 2019. This finding is consistent with the observation in Section 3.2 that the services trade network exhibits weaker "gravity" properties than the goods trade network.

Figure 10 highlights that this divergence is a relatively recent phenomenon. It reports the annual R^2 from estimating equation (1) for both goods and services over the period 1985 to 2023. Prior to 2007, the naive gravity fit was broadly comparable across two sectors. There is some downward trend in both—possibly due to increasing sample heterogeneity as data for more country pairs becomes available. However, since 2007, the goods R^2 has been steady around 0.6, while the fit for services has continued declining despite a relatively stable number of observations. By 2023, the model explains only about 2/3 as much variation in services trade as it does for goods. In the next subsection, we identify one culprit for the diminishing explanatory power of gravity

Table 2: Naïve Gravity for Goods and Services

Variables	(1) Goods	(2) Services
Log GDP Origin Country	0.8461***	0.7061***
	(0.021)	(0.040)
Log GDP Destination Coutry	0.8452***	0.7956***
	(0.022)	(0.029)
Log Distance	-0.7840***	-0.7730***
	(0.033)	(0.035)
Observations	25,319	13,914
R-squared	0.625	0.491

Note: Table shows output from estimating equation (1) for goods (column 1) and for services (column 2) using data for the year 2019. Bilateral services exports are taken from BiTS. Bilateral goods exports are taken from DOTS. Distance is the weighted average distance between the origin's and destination's most populous cities. Origin GDP, destination GDP and distance are taken from the CEPII gravity database (Conte *et al.*, 2022). Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

for services: the declining distance elasticity of services trade.

4.1.2 The diminishing distance elasticity of services trade

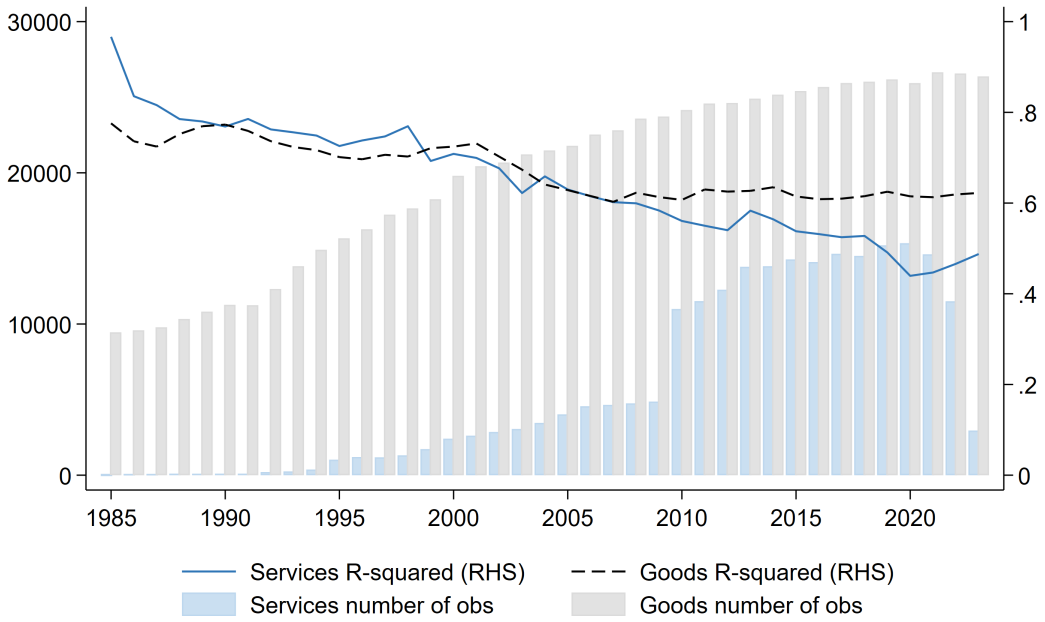
We now turn our attention to β, the elasticity of trade flows with respect to distance. As an important element of the gravity relationship, β has been the subject of extensive empirical studies–generally using data on bilateral goods trade. These studies have obtained values in the general vicinity of -1 (Head and Mayer, 2014), and a notable finding is its "puzzlingly" persistent over time *for goods*, despite major improvements in international transportation technologies (Anne-Célia and Head, 2008).

To obtain estimates of β, we employ a less naïve variant of equation (1):

$$X_{od} = \exp\{\Omega_o + \Pi_d + \beta \ln(dist_{od}) + \delta \mathbf{X_{od}}\}\eta_{od}, \tag{2}$$

where Ω_o and Π_d are exporter and importer fixed effects; $\mathbf{X_{od}}$ is a vector of country-pair-varying control variables; and η_{od} is the error term. Equation (2) controls more extensively for country-specific and bilateral trade drivers than equation (1). Specifically, the inclusion of exporter and importer fixed effects controls for the so-called "multilateral resistance terms", identified in theoretically microfounded gavity models (Anderson, 1979; Anderson and Van Wincoop, 2004). In

Figure 10: Naive gravity fit over time



Note: Lines show the R^2 from estimating equation (1) for goods (black dashed) and for services (blue solid) in each of the years shown. Bars show the observations for the goods regressions (grey bars) and the services regressions (light blue bars). Bilateral services exports are taken from BiTS. Bilateral goods imports are taken from DOTS. Distance is the weighted average distance between the origin's and destination's most populous cities. Origin GDP, destination GDP and distance are taken from the CEPII gravity database (Conte *et al.*, 2022).

this sense, equation (2) approaches a structural gravity model.[16]

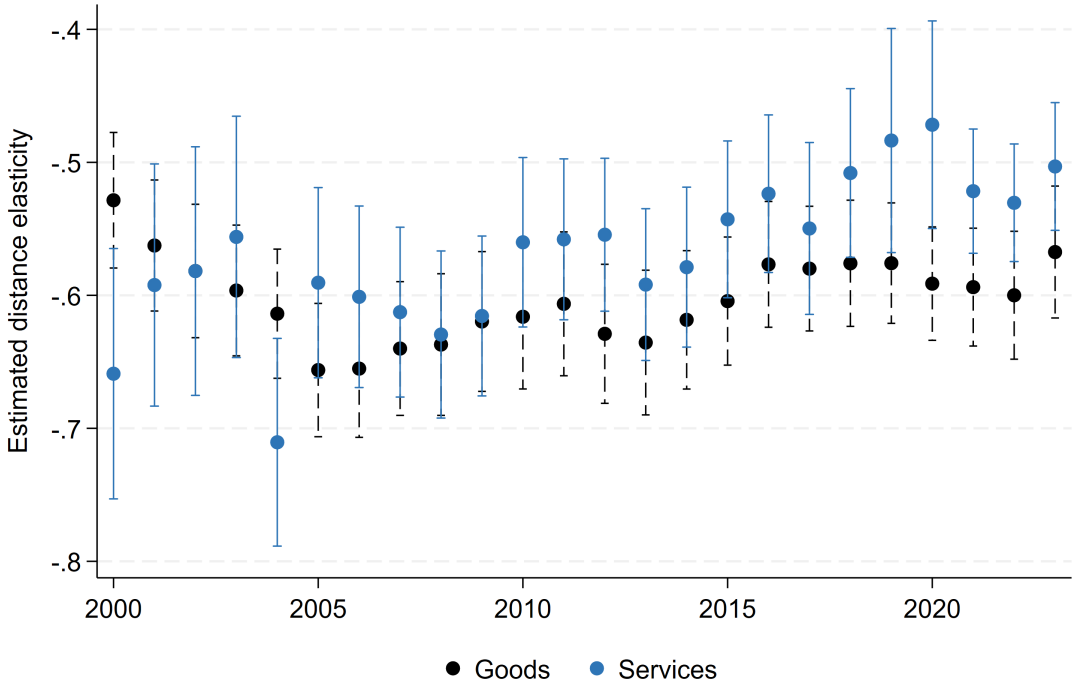
We estimate equation (2) year by year with PPML, both for goods and services. In addition to the fixed effects, our control variables include standard controls from the CEPII gravity database: dummy variables for common border, common official language, common legal origin, participation a regional trade agreement (RTA), and joint EU membership.

Figure 11 plots the estimated distance elasticities for goods and services trade from 2000 onward—a period when BiTS provides its broadest country coverage (see Section 3.1) and when the fits of the naïve gravity equations for goods and services appear to diverge. The distance elasticity we obtain for goods is generally around -0.6, implying that a one percent increase in distance between major cities of the origin and destination reduces the value of their goods flows by about 0.6 percent. This is within the ballpark of typical estimates.[17] In line with the "distance

[16]Recent work has shown that a structural estimation of gravity models should include the full matrix of bilateral expenditure flows—including domestic (origin-to-origin) trade flows (Fally, 2015; Yotov, 2022). Here, we do not include domestic trade flows. Doing so would require us to compile data on services gross output compatible with BPM6 services categories for all countries and years in our sample. This exceeds the scope of our project.

[17]Head and Mayer (2014) document that the average estimated distance elasticity from across 159 papers using

Figure 11: Estimated distance elasticities over time



Note: Markers show $\hat{\beta}$ from estimating equation (2) for goods (black) and for services (blue) for each of the years shown. Vertical bars represent 90 percent confidence intervals. Bilateral services exports are taken from BiTS. Bilateral goods imports are taken from DOTS. Distance is the weighted average distance between the origin's and destination's most populous cities. Regressions control for importer and exporter fixed effects, as well as contiguity, common language, common legal origin, RTAs and EU membership, all taken from the CEPII gravity database (Conte *et al.*, 2022).

puzzle", there is no statistically significant time trend evident from these estimates. By contrast, the distance elasticity for services appears to be shrinking over time. The average estimate for the 2000-04 period was -0.62, suggesting that services trade responded somewhat more strongly to distance during that period than goods trade. By the 2020-23 period, the average estimate had declined to -0.50, a considerably smaller effect than in the early 2000s—and smaller in magnitude than the corresponding average estimate for goods. The decline in the services distance elasticity also aligns with the divergence of the goods and services gravity fit in Figure 10.

There are broadly two reasons why the distance elasticity for services could have declined over time. One is that technological changes—such as the rise of digital platforms, cloud computing, and remote delivery—may have made it easier to supply services between remote locations.[18] The second is that the composition of services trade flows has changed, as discussed in Section 3.2. If the rising services trade categories are less distance-sensitive than the traditionally traded

structural gravity is –1.1 with a standard deviation of 0.41. Therefore, our estimates are on the low side of the typical range, but within on standard deviation of the average.

[18]For details on the rise in digitally deliverable services trade, and appropriate measurement, see OECD-WTO-IMF-UN (2025)

categories, this may have reduced the overall distance elasticity of services.

Appendix Table B.1 supports this compositional explanation by reporting category-specific distance elasticities for selected years, estimated using equation (2). The table shows sizable and persistent differences across service categories. Specifically, transport and travel services (SC and SD), whose shares of services trade have been declining, are characterized by relatively strong distance elasticities (-0.54 and -0.73 on average, respectively). Financial, information and other business services (SG, SI and SJ), whose shares have been rising, are characterized by relatively weak distance elasticities, averaging -0.50, -0.37 and -0.35, respectively.

Our estimation approach allows us to explore the link between the aggregate and category-level estimates of the services distance elasticity more formally. Breinlich *et al.* (2024) show that when (i) gravity models are estimated with PPML, and (ii) regressors do not vary across different levels of aggregation, the parameter estimates obtained from aggregate trade data should be approximately equal to the weighted average of the estimates obtained with more disaggregated data, with the weights equal to the share of disaggregated categories in the aggregate value of trade.

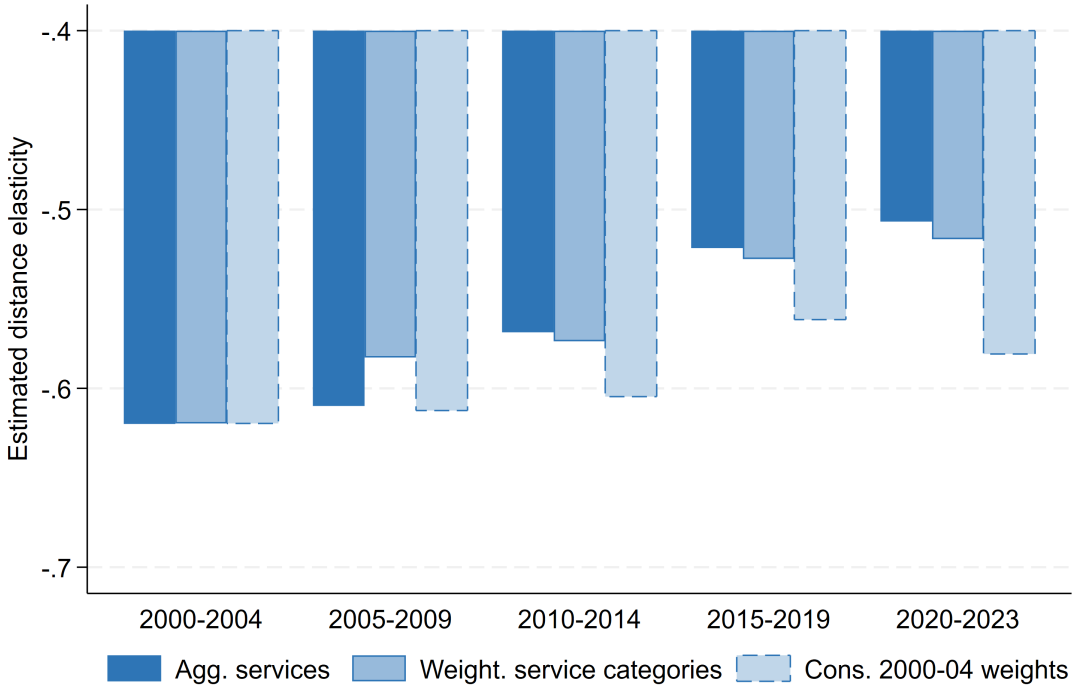
Figure 12 verifies that this is the case in our setting. All bars show the distance elasticity of aggregate services trade, averaged by period. The dark blue bars obtain this elasticity from estimating equation (2) using aggregate bilateral services flows. The light blue bars with solid border obtain it from estimating equation (2) at the two-letter category level, then aggregating using categories' shares in aggregate bilateral services flows. As the figure shows, the two bars are of approximately equal magnitude in each period–and both capture the declining trend in services' sensitivity to distance.

To assess the role of composition, the figure also include a third set of bars (light blue with dashed border), which are computed like the second set but holding the category weights fixed at their 2000-04 levels. This counterfactual exercise shows that if the composition of services trade had remained unchanged, the decline in the aggregate distance elasticity would have been modest. It suggests that the observed declining services distance elasticity, and by extension the weakening of gravity forces in services trade, is primarily the result of the increasing prominence in global trade of less distance-sensitive service categories.

4.2 Geoeconomic fragmentation in services?

The IMF has coined the term "geoeconomic fragmentation" to describe a geostrategically driven reversal of cross-border economic integration (Aiyar *et al.*, 2023). There is mounting evidence that such geoeconomic fragmentation is underway. Historical evidence has long suggested that the patterns of trade in goods are sensitive to bilateral geopolitical relationships (Pollins 1989a,b; Keshk *et al.* 2004; Martin *et al.* 2008). Correspondingly, recent studies have found that countries' goods imports and exports have begun to shift towards more aligned trading partners amid resurgent geopolitical tensions (Bosone and Stamato 2024; Gopinath *et al.* 2024). A similar trend is evi-

Figure 12: Services trade composition and the distance elasticity



Note: Bars show the distance elasticity of aggregate services trade, averaged by period. The estimates represented by the first set of bars (dark blue) are obtained from estimating equation (2) for aggregate bilateral services flows. The estimates represented by the second set of bars (light blue bar with solid border) are obtained from estimating equation (2) at the two-letter category level, than aggregating using categories' shares in aggregate services trade. The estimates represented by the third set of bars (lighter blue with dashed border) are obtained the same way, but using 2000-04 shares as aggregation weights.

dent in the cross-border flows of capital (Aiyar *et al.* 2024; Catalán *et al.* 2024). However, so far little is known about the influence geopolitics exerts on the patterns of trade in services. Our second research application addresses this knowledge gap with a first set of stylized facts.

4.2.1 Fragmentation in goods versus fragmentation in services

As a first step, we once again take data on total bilateral goods trade from DOTS and data on total bilateral services trade from BiTS. For each, we use PPML to estimate a panel regression of the form:

$$X_{odt} = \exp\{\Omega_{ot} + \Pi_{dt} + \Delta_{od} + \gamma_t \ln(geo_{odt}) + \boldsymbol{\delta}\mathbf{X_{odt}}\}\xi_{odt}, \tag{3}$$

where Ω_{ot}, Π_{dt} and Δ_{od} respectively represent the full set of exporter-time, importer-time and exporter-importer fixed effects; geo_{odt} is a time-varying measure of geopolitical distance between exporter and importer; $\mathbf{X_{odt}}$ is a vector of control variables; and ξ_{odt} is the error term.

Equation (3) represents the many-period analogue of equation (2), and it has been used widely to study over-time changes in bilateral trade patterns. In addition to controlling for multilateral resistances by means of the exporter-time and importer-time fixed effects, it controls for any time-invariant trade drivers (such as distance) by means of the importer-exporter fixed effects. Hence, we only include country-pair-time-varying controls in $\mathbf{X_{odt}}$—specifically, dummy variables that capture whether o and d are party to the same trade agreement or both EU member countries in period t. We restrict our sample to 76 major economies, both because these economies have a more complete matrix of available bilateral trade flows and because they account for the bulk of global trade.[19] We also average bilateral trade-flow data within three-year intervals in the 2004-2023 period (so t represents one such three-year interval).[20]

We measure geopolitical distance geo_{odt} using the ideal point distance between countries based on their votes in the United Nations General Assembly–a measure of foreign policy disagreement originating in the international relations literature (Bailey *et al.*, 2017). Foreign policy disagreement is expected to have a negative effect on bilateral trade flows, and we allow for this effect to vary between three-year periods. Given the use of importer-exporter fixed effects, γ_t is identified from within-country-pair, over-time changes in ideal point distance. If γ_t is roughly constant across t, and γ_t<0, it tells us that *increases* in geopolitical distance are associated with *declines* in bilateral trade. If γ_t is decreasing with t, it tells us that *increases* in geopolitical distance are associated with *stronger declines over time*.[21]

Figure 13 displays the main object of interest derived from our estimations–the time varying coefficient on geopolitical distance, both from the goods-trade regression (left-hand panel) and the services-trade regression (right-hand panel). The round markers represent the estimated coefficients, normalized by the standard deviation of ideal-point distances in the 2019-21 period, with the vertical lines depicting the 95 percent confidence intervals. The full regressions results can be found in Appendix Table C.1.

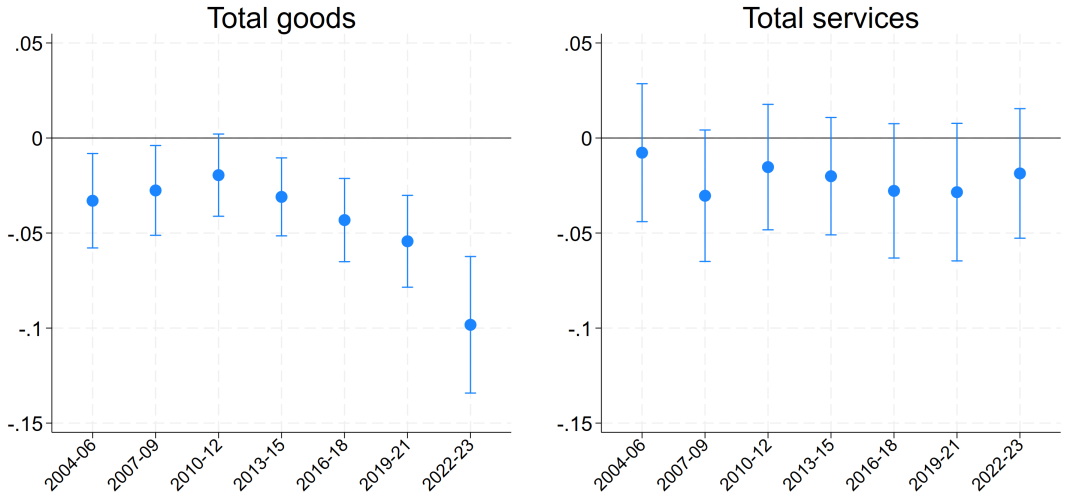
The left-hand panel of Figure 13 replicates a finding previously documented in Bosone and Stamato (2024). Prior to 2016, there was weak evidence that foreign policy disagreement acted as a barrier to goods trade. During this period, a one standard deviation increase in ideal point distance was associated with about a 2.5 percent decline in bilateral goods trade. Moreover, this association was at most borderline statistically significant. However, since 2016, the effect has quadrupled in strength and become unambiguously statistically significant. It is consistent with other recent research highlighting that the influence of geopolitics on the patterns of goods trade has intensified.

[19] The 76 economies are the same as those covered by the OECD Inter-Country Input Output Database (OECD, 2023).

[20] We average trade-flow data within three-year intervals to maximize the number of observations and to ensure our estimates do not reflect fluctuations in trade flows at business-cycle frequencies. The last two years in our analysis–2022 and 2023–are averaged as the only two-year interval. None of our results would be materially different if we used annual flows instead.

[21] Our estimation approach replicates the one pursued in Bosone and Stamato (2024) for goods only and, as we show below, we obtain broadly similar findings for goods.

Figure 13: Trade effect of standard deviation increase in geopolitical distance, goods vs. services



Note: Markers show $\hat{\gamma}_t$ from estimating equation (3) for goods (left-hand panel) and for services (right-hand panel) for each of the time periods shown. Vertical bars represent 95 percent confidence intervals. Bilateral goods imports are taken from DOTS. Bilateral services exports are taken from BiTS. Geopolitical distance is measured as the ideal point distance between countries estimated from UN General Assembly votes (Bailey *et al.*, 2017). Regressions include importer-time, exporter-time and exporter-importer fixed effects, and control for RTAs/FTAs and EU membership. RTA/FTA dummies are taken from the CEPII gravity database (Conte *et al.*, 2022). Full regressions results can be found in Appendix Table C.1.

By contrast, the right-hand panel in Figure 1 does not display a similar trend for services trade. Instead it suggests that the influence of foreign policy disagreement on services trade remains much as it was for goods trade before 2016: a quantitatively weak negative association with limited statistical significance. This provides some cause for optimism. At least so far, there is no clear evidence that international services trade is fragmenting along geopolitical fissures.[22]

4.2.2 The role of geopolitical distance in traditional versus modern services

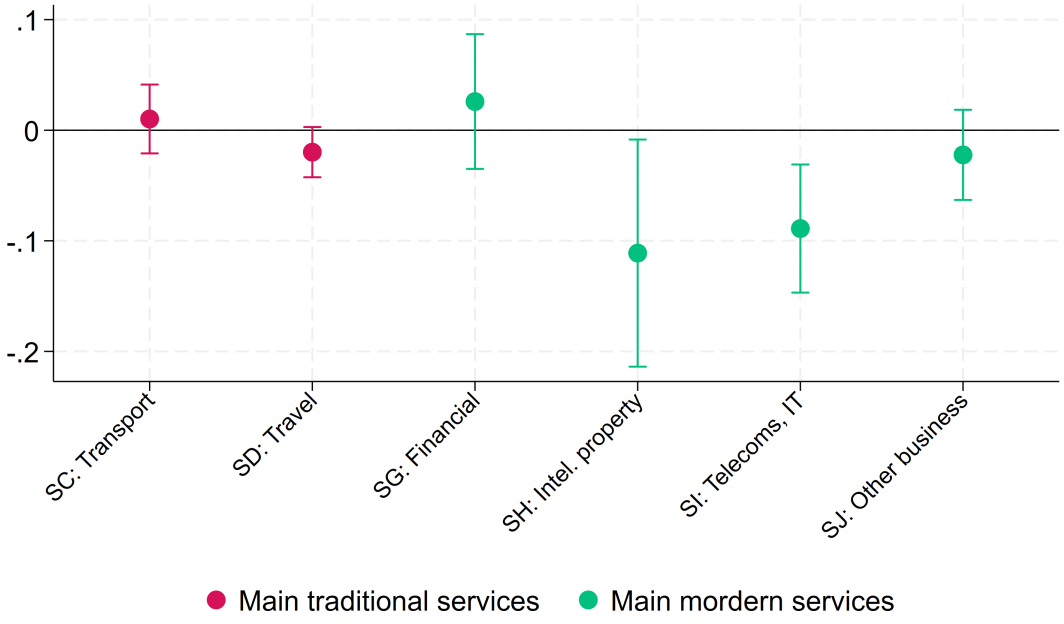
Next we estimate (3) by service category. We focus on the main traded service categories, and impose $\gamma_t = \gamma$ for all t. As discussed in Section 3.2, services span a broad range of economic activities. Our purpose here is to investigate whether cross-border exchange in some of these activities is more sensitive to geopolitics than in others.

Figure 14 displays the coefficient of interest for the six most important service categories that have dependably accounted for 90 percent of the value of international services trade since 1995. The full regressions results can be found in Appendix Table C.2. The figure distinguishes between two main types of services: "traditional services" encompassing transportation and travel;

[22] Jakubik and Ruta (2023) study the interaction between global trade policy uncertainty and geopolitical distance in both goods and services trade using a gravity model. They find that heightened uncertainty raises goods trade between more geopolitically aligned trade partners but, similar to our findings, they do not detect the same effect for services.

and "modern services" including all other service categories.[23] It documents that the effect of foreign policy disagreement on trade is markedly different across service categories. There is little evidence that ideal point distance reduces bilateral exports of traditional transport and travel services. However, foreign policy disagreement appears to be a more powerful barrier to trade in modern services.

Figure 14: Trade effect of standard deviation increase in geopolitical distance, services categories



Note: Markers show $\hat{\gamma}_t = \hat{\gamma}$ from estimating equation (3) for the service categories shown during 2004-2023, creating three-year periods as described in Section 4.2.1. Bilateral services exports are taken from BiTS. Geopolitical distance is measured as the ideal point distance between countries estimated from UN General Assembly votes (Bailey *et al.*, 2017). Regressions include importer-time, exporter-time and exporter-importer fixed effects, and control for RTAs/FTAs and EU membership. RTA/FTA dummies are taken from the CEPII gravity database (Conte *et al.*, 2022). Full regressions results can be found in Appendix Table C.2.

Intellectual property and telecommunications services stand out with strong and statistically significant negative effects of foreign policy disagreement on bilateral trade. This is not surprising. The category "(charges for) intellectual property" (SH) covers the return countries earn from permitting the reproduction, redistribution and use of their intellectual property–including industrial processes and designs, and software. The category "telecommunications" (SI) covers the supply of telecommunications, computer and information services. Both therefore comprise some sharing of knowledge and technologies that are either business sensitive or security critical. Their supply to geopolitically distant trade partners may be directly limited by governments, or may be

[23] We borrow this nomenclature from Baldwin *et al.* (2024), who use "modern services" to refer to all commercial services other than maintenance/repair, transport and travel services (equivalent to the grouping of "Other commercial services" in WTO services trade statistics.)

deemed too risky by private firms. Overall, the finding that modern services trade appears to be more sensitive to foreign policy alignments mirrors similar evidence from goods trade, showing that foreign policy disagreement primarily acts as a barrier to trade in high-tech manufacturing (Hakobyan *et al.*, 2023).

As shown in Figure 8, modern services have been the most dynamic component of global services trade for some time. The four modern services categories for which provide estimates here made up just over 20 percent of the value of cross-border services flows in 1995. By 2023, that share had risen to 58 percent. Our findings inject a note of pessimism about the prospects for modern services trade growth going forward. While technology may be removing old brakes on such growth, growing geopolitical divisions could slam on a new set of brakes.

5 Summary and conclusions

This paper introduces the Bilateral Trade in Services (BiTS) research dataset. BiTS compiles officially reported bilateral trade values for overall services trade and different service subcategories from a range of available data sources. It reconciles these and harmonizes them under a single BPM6 standard. The resulting dataset covers bilateral services trade across 12 broad categories, 9 of which are further disaggregated into 26 distinct subcategories, for up to 245 countries and geographic entities. For a subset of economies and service categories, trade coverage extends back to 1985. It is designed to facilitate empirical research on bilateral services trade that requires broad country coverage, broad time coverage or both.

We provide two illustrative research applications that make use of BiTS coverage. The first documents that the explanatory power of gravity for services trade used to be comparable to that for goods, but has fallen over time and is now materially lower. We show that this primarily reflects a shift in the composition of traded services towards service categories–such as financial and information services–that are less distance-sensitive. The second research application finds that overall services trade does not (yet) reflect a growing role of geopolitics in international trade. However, some modern services appear to be especially sensitive to trading partners geopolitical alignments. Both these applications highlight that we should not expect services trade to exhibit the same empirical regularities that have been established by an extensive literature studying bilateral trade in goods.

Given recent improvements in information and communications technologies, and the remaining scope for the expansion of cross-border services trade, services trade liberalization presents a clear opportunity to promote economic growth and development. However, formulating policies that realize the remaining gains from services trade requires a fuller understanding of the nature of the frictions that currently inhibit it. BiTS provides a new resource for this type of analysis.

Appendix

A BPM6 services categories and BPM5-BPM6 concordance

Table A.1: BPM6 services categories in BiTS

Services Category	BPM6 Code
Total services	S
Manufacturing services on physical inputs owned by others	SA
Maintenance and repair services n.i.e.	SB
Transport	SC
Sea transport	SC1
Air transport	SC2
Other modes of transport	SC3
Postal and courier services	SC4
Travel	SD
Business	SDA
Personal	SDB
Construction	SE
Construction abroad	SE1
Construction in the reporting economy	SE2
Insurance and pension services	SF
Direct insurance	SF1
Re-insurance	SF2
Auxiliary insurance services	SF3
Pension and standardized guaranteed services	SF4
Financial services	SG
Explicitly charged and other financial services	SG1
Financial intermediation services indirectly measured (FISIM)	SG2
Charges for the use of intellectual property n.i.e.	SH
Franchise fees and trademark licensing fees	SH1
Licenses for the use of outcomes of research and development	SH2
Licenses to reproduce and/or distribute computer software	SH3
Licenses to reproduce and/or distribute audio-visual materials	SH4
Telecommunications, computer, and information services	SI
Telecommunications services	SI1
Computer services	SI2
Information services	SI3
Other business services	SJ
Research and development services	SJ1
Professional and management consulting services	SJ2
Technical, trade-related and other business services	SJ3
Personal, cultural, and recreational services	SK
Audio-visual and related services	SK1
Other personal, cultural, and recreational services	SK2
Government goods and services n.i.e.	SL

Table A.2: BPM5-BPM6 concordance

Category	BPM6	BPM5
Sea transport	SC1	206
Air transport	SC2	210
Passenger (Other)	SC31	215
Freight (Other)	SC32	216
Other (Other)	SC33	217
Space transport	SC3A	218
Rail transport	SC3B	219
Passenger (Rail)	SC3B1	220
Freight (Rail)	SC3B2	221
Other (Rail)	SC3B3	222
Road transport	SC3C	223
Passenger (Road)	SC3C1	224
Freight (Road)	SC3C2	225
Other (Road)	SC3C3	226
Inland waterway transport	SC3D	227
Passenger (Inland waterway)	SC3D1	228
Freight (Inland waterway)	SC3D2	229
Other (Inland waterway)	SC3D3	230
Pipeline transport and electricity transmission	SC3E+SC3F	231
Other supporting and auxiliary transport services	SC3G	232
Travel	SD	236
Business	SDA	237
Personal	SDB	240
Postal and courier services	SC4	246
Telecommunications services	SI1	247
Construction	SE	249
Construction abroad	SE1	250
Construction in the reporting economy	SE2	251
Insurance and pension services	SF	253
Explicitly charged and other financial services	SG1	260
Computer services	SI2	263
Information services	SI3	264
Charges for the use of intellectual property n.i.e.	SH	266
Technical, trade-related and other business services	SJ3	271
Technical, trade-related and other business services	SJ3	272
Professional and management consulting services	SJ2	274
Professional and management consulting services	SJ2	278
Research and development services	SJ1	279
Technical, trade-related and other business services	SJ3	280
Technical, trade-related and other business services	SJ3	281
Technical, trade-related and other business services	SJ3	284
Technical, trade-related and other business services	SJ3	285
Personal, cultural, and recreational services	SK	287
Audio-visual and related services	SK1	288
Other personal, cultural, and recreational services	SK2	289
Government goods and services n.i.e.	SL	291

B Distance elasticity of services trade

Table B.1 shows estimates of the distance elasticity obtained from the regression model in equation (2) using bilateral services exports from BiTS for different service categories and years. As can be seen from the table, there are sizable and persistent differences across service categories. Specifically, transport and travel services (SC and SD) are characterized by relatively strong distance elasticities (-0.54 and -0.73 on average, respectively). Financial, information and other business services (SG, SI and SJ) are characterized by relatively weak distance elasticities, averaging -0.50, -0.37 and -0.35, respectively.

Table B.1: Estimated Distance Elasticities over Service Categories

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	1995	2000	2005	2010	2015	2020
SA: Manufacturing			-0.7817***	-0.9291***	-1.0801***	-0.8365***
			(0.206)	(0.193)	(0.103)	(0.152)
SB: Maintenance			-0.3350**	-0.6878***	-0.4073***	-0.5412***
			(0.134)	(0.090)	(0.077)	(0.071)
SC: Transport	-0.1061	-0.5151***	-0.5040***	-0.5911***	-0.5516***	-0.5231***
	(0.214)	(0.056)	(0.045)	(0.048)	(0.042)	(0.038)
SD: Travel	-0.6990***	-0.7661***	-0.7628***	-0.7098***	-0.6535***	-0.7497***
	(0.147)	(0.073)	(0.053)	(0.047)	(0.047)	(0.059)
SE: Construction	-2.0027***	-0.9464***	-0.9419***	-0.5779***	-0.5864***	-0.5552***
	(0.242)	(0.146)	(0.123)	(0.104)	(0.101)	(0.112)
SF: Insurance services	-1.0811***	-1.0286***	-0.4793***	-0.4569***	-0.4341***	-0.6558***
	(0.223)	(0.127)	(0.124)	(0.109)	(0.097)	(0.086)
SG: Financial services	-0.8194***	-0.5297***	-0.6000***	-0.5277***	-0.4434***	-0.4263***
	(0.213)	(0.182)	(0.114)	(0.071)	(0.065)	(0.072)
SH: Intellectual property	-0.4811***	-0.6377***	-0.4701***	-0.5329***	-0.3170***	-0.3363***
	(0.177)	(0.126)	(0.094)	(0.080)	(0.067)	(0.065)
SI: Information services	1.1097**	0.4565	-0.5573***	-0.5867***	-0.5714***	-0.5745***
	(0.501)	(0.301)	(0.092)	(0.081)	(0.058)	(0.049)
SJ: Other business	0.9920	-0.0519	-0.4042***	-0.4147***	-0.4376***	-0.4596***
	(0.943)	(0.278)	(0.070)	(0.054)	(0.042)	(0.032)
SK: Recreational services	-0.7251***	-0.7676***	-0.5404***	-0.7735***	-0.7753***	-0.5006***
	(0.232)	(0.118)	(0.131)	(0.090)	(0.071)	(0.119)
SL: Government	-0.6049**	-0.4817***	-0.0216	-0.1245	-0.2837***	-0.4723***
	(0.255)	(0.174)	(0.130)	(0.115)	(0.108)	(0.092)

Note: Table shows $\hat{\beta}$ from estimating equation (2) by category and year using bilateral services exports from BiTS. Distance is the weighted average distance between the origin's and destination's most populous cities. Regressions control for importer and exporter fixed effects, as well as contiguity, common language, common legal origin, RTAs and EU membership, all taken from the CEPII gravity database (Conte *et al.*, 2022). Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

C Geoeconomic fragmentation in services

Table C.1: Trade effect of standard deviation increase in geopolitical distance, goods vs. services

Variables	(1) Goods	(2) Services
Log ideal point distance 2004-06	-0.0296***	-0.0068
	(0.011)	(0.016)
Log ideal point distance 2007-09	-0.0247**	-0.0269*
	(0.011)	(0.016)
Log ideal point distance 2010-12	-0.0175*	-0.0135
	(0.010)	(0.015)
Log ideal point distance 2013-15	-0.0278***	-0.0178
	(0.009)	(0.014)
Log ideal point distance 2016-18	-0.0387***	-0.0246
	(0.010)	(0.016)
Log ideal point distance 2019-21	-0.0487***	-0.0252
	(0.011)	(0.016)
Log ideal point distance 2022-23	-0.0882***	-0.0165
	(0.016)	(0.015)
Trade agreement =1	0.0902***	0.0328
	(0.028)	(0.053)
EU members =1	0.0717	0.2374***
	(0.051)	(0.060)
Observations	37,065	27,376
Fixed effects:		
-Exporter-time	Yes	Yes
-Importer-time	Yes	Yes
-Exporter-importer	Yes	Yes

Note: Table shows output from estimating equation (3) for goods (column 1) and for services (column 2) during 2004-2023, creating three-year periods as described in Section 4.2.1. Bilateral goods imports are taken from DOTS. Bilateral services exports are taken from BiTS. Geopolitical distance is measured as the ideal point distance between countries estimated from UN General Assembly votes (Bailey *et al.*, 2017). RTA/FTA dummies are taken from the CEPII gravity database (Conte *et al.*, 2022). Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Column 1 of Table C.1 provides strong evidence that foreign policy disagreement acts as a barrier to goods trade. The period-specific coefficients on ideal point distance are jointly and individually different from zero at conventional significance levels. Moreover, the estimates suggest that the effect of ideal point distance on goods trade has been increasing, with a statistically significant

increase in the magnitude of the coefficient estimate for the final period relative to earlier periods. Meanwhile, there is limited evidence in column 2 of Table C.1 that foreign policy disagreement inhibits bilateral services trade. While the period-specific point estimates of the geopolitics elasticity are all negative, we cannot reject that they are different from zero at conventional significance levels. They also do not exhibit an economically or statistically meaningful time trend.

Aside from the impact of geopolitics on trade, the table suggests that trade agreements promote goods trade, but that the average trade agreement during this period has not had an economically or statistically significant impact on bilateral services trade. By contrast, the table suggests that EU membership boosted services trade without materially impacting goods trade. The first finding is not surprising: most trade agreements focus on removing barriers to trade in goods, with few explicit provisions to foster services trade.

The second finding requires some clarification. Given the inclusion of exporter-importer fixed effects in our regressions, the EU effect is identified from *changes* in EU memberships. Our sample period covers only three EU accessions (Bulgaria and Romania in 2007, and Croatia in 2013) and one EU exit (UK in 2020). In all these cases, far-reaching good trade agreements between the EU and the country in question were in place during the non-EU sample years. This explains why EU entry/exit in these instances is not associated with a significant change in goods trade patterns. However, it is associated with a significant change in the access to the Single Market for services.

Table C.2 documents that the effect of foreign policy disagreement on trade is different across the main traded service categories. The point estimates of the of the geopolitics elasticity are generally negative, but they are only strongly statistically significant for "(charges for) intellectual property" (SH) and "telecommunications services" (SI). These categories also exhibit the largest magnitude of point estimates: a standard-deviation increase in geopolitical distance reduced intellectual property trade by about 10 percent, and information services trade by about 8 percent.

In addition to these findings, the table confirms that trade agreements have done little to foster services trade across all categories. However, EU membership has had large positive and statistically significant effects on trade in "transport" (SC), "travel" (SD) and "financial services" (SG), and to a lesser extent on trade in "other business services" (SJ).

Table C.2: Trade effect of standard deviation increase in geopolitical distance, services categories

Variables	(1) SC: Transport	(2) SD: Travel	(3) SG: Financial services	(4) SH: Intellectual property	(5) SI: Information services	(6) SJ: Other business
Log ideal point distance	0.0088	-0.0169*	0.0220	-0.0927**	-0.0761***	-0.0193
	(0.014)	(0.010)	(0.026)	(0.044)	(0.025)	(0.018)
Trade agreement =1	-0.0322	0.0246	0.0278	-0.0112	0.0648	0.0338
	(0.048)	(0.041)	(0.080)	(0.165)	(0.100)	(0.063)
EU members =1	0.2041**	0.2255***	0.3044***	-0.1545	-0.0181	0.1483*
	(0.094)	(0.069)	(0.102)	(0.231)	(0.130)	(0.076)
Observations	22,967	25,115	19,189	17,967	19,235	20,792
Fixed effects:						
-Exporter-time	Yes	Yes	Yes	Yes	Yes	Yes
-Importer-time	Yes	Yes	Yes	Yes	Yes	Yes
-Exporter-importer	Yes	Yes	Yes	Yes	Yes	Yes

Note: Table shows output from estimating equation (3) for the service categories shown during 2004-2023, creating three-year periods as described in Section 4.2.1. Bilateral services exports are taken from BiTS. Geopolitical distance is measured as the ideal point distance between countries estimated from UN General Assembly votes (Bailey *et al.*, 2017). RTA/FTA dummies are taken from the CEPII gravity database (Conte *et al.*, 2022). Robust standard errors in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

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