No 2023-23 – December

Working Paper

CEPII

Why Origin Matters in Trade Data*

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Highlights

- Different reporting standards are applied to determine the country of origin of trade flows in existing international trade databases, altering the geography of trade.
- We illustrate the impact of discrepancies in reporting standards using two extensively used trade databases, UN-Comtrade and IMF-DoTS. It has important implications when evaluating the impact of trade policies using a gravity framework.
- We provide evidence that IMF-DoTs applies different reporting standards for intra- and extra-EU trade from 1999 onwards. Such discrepancies generate a (significant) upward bias in the estimated impact of RTA, the EU and the euro area on trade.
- Reporting standards also differ across declaring countries in UN-Comtrade. We show that it inflates the estimated impact of Brexit on trade.

* We thank Kevin Lefebvre, Thierry Mayer and participants at CEPII seminar and ETSG for their comments.
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Abstract

Different reporting standards are applied to determine the country of origin of trade flows in existing international trade databases, altering the geography of trade. We illustrate this issue using two extensively used trade databases, UN-Comtrade and IMF-DoTS and show that it has important implications when evaluating the impact of trade policies using a gravity framework. We provide evidence that IMF-DoTs applies different reporting standards for intra- and extra-EU trade from 1999 onwards. Such discrepancies generate a (significant) upward bias in the estimated impact of RTA, the EU and the euro area on trade. Reporting standards also differ across declaring countries in UN-Comtrade. We show that it inflates the estimated impact of Brexit on trade.

Keywords

Gravity Equation, International Trade, Statistics, Regional Trade Agreements, European Union, Brexit.

JEL

F14, F13, F15, F62.

Working Paper

CEPII

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CEPII Working Paper
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Editorial Director:
Antoine Bouët

Visual design and production:
Laure Boivin

ISSN 1293-2574

December 2023

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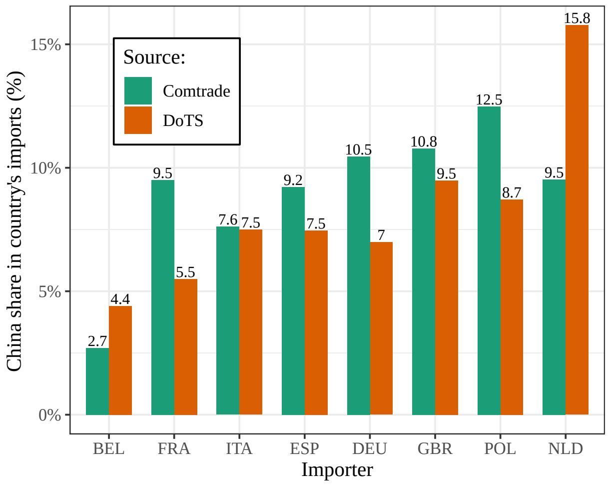
1. Introduction

What is the share of China in French imports? The answer to this straightforward question actually depends on the source of trade data: China represents 9.5% of French imports according to the UN-Comtrade database, and 5.5% according to the IMF Direction of Trade Statistics (DoTS) database. Such discrepancies are not specific to the China-France pair, but are widespread among large European countries including Germany, Spain or Poland (Figure 1), i.e. including 5 out of the top ten global importers.

Figure 1 – China's share in national imports (%)



Source: UN-Comtrade and IMF-DOTS

International merchandise trade data are generally deemed reliable, since cross-border transactions are taxed, and since recording them mainly involves monitoring ports and airports. Determining the geographic origin of imported goods is however not straightforward: products may be processed in several countries and can transit through different countries before reaching their final destination. This creates the potential for different geographical origins to be assigned to the same trade flow, depending on methodological choices of the recording authorities.

Even though this issue may sound technical, it has wider implications for applied trade economists and the estimation of gravity equations. The issue is not restricted to EU countries, but their case provides a good illustration: the European statistical agency, Eurostat, requires European countries to report their intra-EU imports by country of consignment for the Comext database[1], while the international merchandise trade statistics (IMTS) standard requires countries to report on a country of origin basis, i.e. where the last substantial transformation has taken place. Declaring on Eurostat's country of consignment basis means that a shipment from China to Austria, introduced into the Single Market and cleared through customs at its port of arrival in Germany, would be recorded as a German import from China and an Austrian import from Germany. On the contrary, with the IMTS standard, it would directly be recorded as an Austrian

[1]"Member State of consignment is the Member State from which the goods were initially exported to the Member State of import if neither a commercial transaction (e.g. sale or processing) nor a stoppage unrelated to transport has taken place in an intermediate Member State or non-member country" (Eurostat, 2022, p.160).

import from China. Using this procedure only for intra-EU trade mechanically inflates intra-EU trade relative to extra-EU trade.

Such difference in reporting standards in Comext is acknowledged in their documentation and is often referred to as the 'Rotterdam effect'.[2] It is however not restricted to data directly disseminated by Eurostat (through the Comext database). The widely used IMF Direction of Trade Statistics (DoTS) database actually includes Eurostat (Comext) data for trade flows reported by EU countries since 1999 (Marini et al., 2018). The UN-Comtrade database also includes trade flows under different reporting standards depending on the reporting country.[3]

Differences in reporting standards across datasets and within datasets for different countries have important consequences when assessing the impact of trade policies. We show how it affects econometric estimations of gravity equations by providing two case studies based on the two widely used DoTS and Comtrade databases. We first focus on the estimation of the impact of regional trade agreements (RTAs). The fact that DoTS switches in 1999 to declarations from Comext, based on countries of consignment for intra-EU trade, mechanically inflates the value of trade between EU countries after this date, at a time of deepening European integration (implementation of the single market program and creation of the euro area). In the state of the art gravity equation literature, identification comes from the within dimension of the data. Therefore, such time varying measurement bias correlated to trade policy variables is likely to bias the estimated coefficient on trade agreements. This paper shows that the discrepancies in reporting definition in DoTS bias upward the estimated trade impact of regional trade agreements, the EU and euro area in gravity equations.

Second, we focus on the impact of Brexit using UN-Comtrade data. At the time of Brexit in 2021, a wedge appeared between British data and mirror flows published by some EU countries (Gasiorek and Tamberi, 2021). This discrepancy mainly stems from the reporting standards applied: after Brexit, some trade flows from the UK to the EU stopped being recorded by EU countries because, with the UK leaving the EU, the convention to record EU imports from the UK switched from country of consignment to country of origin. Those same flows were still recorded by the ONS as exports from the UK to the EU on an IMTS basis. Since Comtrade trade flows use different reporting standards depending on the reporting country and the partner country, such changes will affect the estimation of the impact of Brexit on trade. Our results show that disregarding this issue of differences in reporting standards inflates the estimated impact of Brexit in a gravity framework.

This issue is relevant beyond the specific cases presented here, in particular because DoTS and Comtrade have been prominently used in the trade literature, including seminal contributions (e.g. Baldwin and Taglioni (2006), Baier and Bergstrand (2007), Silva and Tenreyro (2010),

[2]While countries such as the Netherlands or Belgium are particularly impacted because of their international ports, we show in Figure 3 that the bias is not restricted only to a few coastal EU countries.
[3]We provide the detail of reporting standards used in the UN-Comtrade database in 2020 for EU countries in table B.1.

Glick and Rose (2016), Head and Mayer (2014)) or more recent papers (e.g. Mayer et al. (2019), Larch et al. (2019)). Applied trade economists should be aware of such discrepancies in reporting standards and their potential impact on the geography of trade and how it can bias the econometric estimation of gravity equations. Two other papers noted discrepancies between datasets but did not investigate their source or consequences. Egger and Wolfmayr (2014) compare UN, OECD, IMF and Eurostat trade date and find discrepancies between the latter and former two. Head and Mayer (2021) note discrepancies between Comtrade and DoTS data for some intra-EU flows, assuming that these relate to the treatment of re-exports. We go further by documenting the origin of these discrepancies and assessing their impact on trade policy estimates.

2. Different reporting standards for trade origin

We can distinguish two and a half main methods to define the partner country in trade statistics. For imports, the IMTS standard recommends countries to report on a country of origin basis, i.e. either the country where the good has been wholly produced or where the last substantial transformation has taken place. Such substantial transformation criterion is generally met when a good changes tariff heading, using a list of specific manufacturing or processing operations or using an ad valorem percentage rule.[4] Such standard aims at linking directly the country where the good is produced to the country where it is used.[5] The most widely used alternative is the country of consignment, i.e. the last country in which a commercial transaction (e.g. sale or processing) or a stoppage unrelated to transport has taken place.

Eurostat applies an extended country of consignment standard for intra-EU trade, and a country of origin standard for extra-EU trade.[6] The EU legislation imposes to include quasi-transit in trade statistics, i.e. operations in which the goods are imported from outside the single market but customs clearance occurs in another Member State. In this case, on a country of consignment basis, the Member State in which customs clearance takes place would be considered as a transit country, and therefore not registered as the country of consignment, since the good is not acquired by a resident and is not processed in any way locally (Eurostat, 2022). In the specific case of Eurostat data however, this flow would be recorded.[7]

European trade data collected according to Eurostat rules is made available via the Comext dataset. Comext is in turn used by the IMF to construct the DoTS dataset. It is the source for trade flows reported by European countries after 1999.[8] The link between DoTS and Comext

[4] https://unstats.un.org/unsd/trade/imts/methodology.asp.

[5] For exports, it is recommended to report the country of last known destination.

[6] Since 1993, intra-EU trade is recorded with the Intrastat survey. Economic operators are required to submit a form with basic information on transactions taking place. Extra-EU trade is recorded with customs declarations.

[7] Note that, although the impact of quasi-transit is larger on imports, it also affects exports, when the custom clearance occurs in the Member state of exit of the EU customs territory and not the actual member state (Eurostat, 2022).

[8] More precisely, DoTS uses the dataset "DS-057380 EU Trade Since 1999 by HS2,4,6 and CN8" (Marini et al., 2018).

was even strengthened with a major revision of DoTS that took place in 2017. On top of the 2022 version of DoTS, we therefore used an older vintage of DoTS covering the 1948-2012 period to assess the specific impact of the 2017 update.

The Comtrade database produced by the United States Statistical Department (UNSD) follows the IMTS standard but a number of countries do not apply the IMTS recommendations and declare their imports on a country of consignment basis instead. In particular, several EU countries, including Spain, Italy or the Netherlands, declare on a country of consignment basis for intra-EU trade and on a country of origin basis for extra-EU trade (see Table B.1).

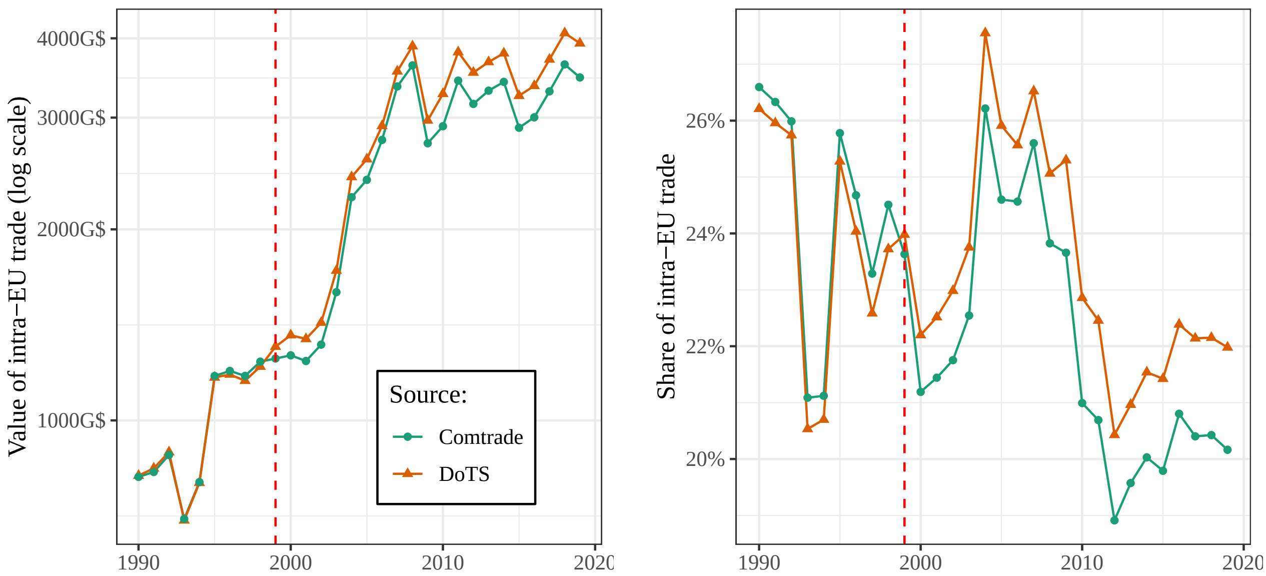
3. Illustration #1: regional trade agreements and the European union

In this section, we compare DoTS and Comtrade data to show the impact of changes over time in reporting standards for EU countries in DoTS on the estimated impact of RTA and the EU.

3.1. Intra EU trade increases in DoTS from 1999 onward

We first provide graphical evidence that the share of intra-EU trade increases specifically in the DoTS database starting around 1999 (Figure 2).

Figure 2 – Intra-EU trade over time in DoTS and Comtrade



(a) Level (b) Share

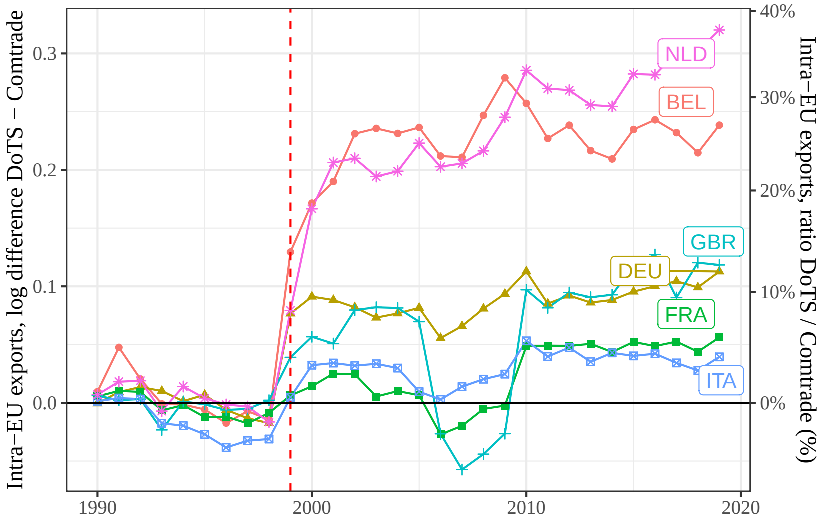
Note: Current EU (number of States varies over time). Sample restricted to observations present both in DoTS and Comtrade.

While the value and share of intra-EU trade is similar in Comtrade and DoTS before 1999, a wedge appears between the two datasets after this date. This timing coincides with the inclusion of Comext data into DoTS as a source of trade data for EU countries. After 1999, DoTS systematically records higher values than Comtrade (panel (a) of Figure 2). This inflates the share of world trade taking place within the EU: for instance in 2010, according to DoTS, 22.9% of global trade correspond to intra-EU trade, whereas Comtrade provides a figure almost 2 percentage points below, around 21% (panel (b) of Figure 2).

The distortions induced by Eurostat conventions are even more striking when focusing on exports from EU countries towards other EU countries. Figure 3 reports the log difference between values recorded by DoTS and Comtrade for intra-EU trade flows for different EU countries. Data from Comtrade and DOTS are very close until 1999, at which point DoTS values jump above their Comtrade counterparts. The gap widens again in the late 2000s and never disappears.[9]

Figure 3 also underlines that the bias towards intra-EU trade flows is not driven by a single country: it is visible for all the major countries in Europe, although with a different magnitude. As expected, it is especially large for the Netherlands and Belgium, whose ports serve as entry points into the European market, and are consequently often recorded as countries of consignment in Comext. But it is also sizeable for the UK and for Germany and still visible for France or Italy.

Figure 3 – DoTS gives higher intra-EU exports after 1999



Notes: For each exporting country, we compute the total value of exports going to the 6 founding EU members. We then compare the log of this total value in DoTS and in UNSD: Ln(DoTS) - Ln(UNSD). Current EU (number of member States varies over time). Values reported by the importing countries.

3.2. Gravity estimates

We estimate a standard plain vanilla 3-way fixed effects gravity equation as follows:

$$\log T_{ijt} = \beta_1 RTA_{ijt} + \beta_2 EU_{ijt} + \beta_3 EURO_{ijt} + \theta_{it} + \theta_{jt} + \theta_{ij} + \epsilon_{ijt}. \quad (1)$$

T_{ijkt} stands for imports from country i to country j in year t. RTA_{ijt}, EU_{ijt} and $EURO_{ijt}$ are dummy variables for common membership in a regional trade agreement, in the European Union

[9]Figure A.1 in Appendix shows that the spread is slightly smaller with the 2014 version of DoTS than with the 2022 version, the later being more reliant on Comext data (Marini et al., 2018).

(EEC prior to 1994), and in the euro area. θ_{it} and θ_{jt} are fixed effects by importer-and-year and exporter-and-year that account for multilateral resistance terms and any country specific variable affecting trade (including in particular production and expenditures but also land area or landlessness). Finally, θ_{ij} are country-pair fixed effects and control for all time invariant pairwise variables as distance, common language, similarity of institutions or colonial history. β_1, β_2 and β_3 measure the partial trade impact of belonging to a RTA, the EU, or the euro area respectively.

We estimate Equation 2 using OLS in log-linear form. As suggested by Head and Mayer (2014), we also present, in Appendix A, results using a PPML estimator on trade in level (Table B.2) and share (Table B.3) to assess the robustness of our results. Standard errors are clustered at the country pair level.

Trade data are from the IMF-DoTS, downloaded in July 2022, which provides data over the 1948-2021 period,[10] and from UN-Comtrade, downloaded in February 2022, covering the period 1962-2020. RTA data are taken from the CEPII Gravity dataset version 202211 (Conte et al., 2022). Eurozone membership is hand-coded. The estimation sample does not include any zero trade flow. We use trade flows as reported by the importer.

Table 1 reports the results of estimating equation 2 on Comtrade data (odd columns) or DoTS data (even columns). Comparing columns (1) and (2) confirms that using DoTS overestimates the trade creating effect of RTAs compared to results using Comtrade. Controlling separately for the European Union and the euro area in columns (3) and (4) shows that the overestimation falls mainly on the EU coefficient, in line with discrepancies emphasized in section 2. The bias is substantial: the estimated coefficient for EU common membership is more than half larger when estimated on DoTS data.[11]

The estimated impact of the euro area on trade is also biased but to a lesser extent: the coefficient estimated on the euro is negative on Comtrade data but positive and significant on DoTS data. Note that the estimated coefficient on the euro area is positive on both Comtrade and DoTS when using PPML on trade shares, yet slightly overestimated on the DoTS data (see columns (3) and (4) in Tables B.3).

Note that data are available for different country pairs and years in DoTS and Comtrade. We therefore re-estimate equation (2) restricting our sample to observations common to the two datasets, to confirm that diverging results are driven by differences in the definition of the partner country, rather than by differences in the sample composition in terms of countries and years. Columns (5) and (6) of Table 1 present the results. Again, we find that estimations on DoTS overestimate the impact of the EU and the euro on trade, although the estimated bias is slightly lower. Such results confirm that using DoTS overestimates the trade impact of the EU

[10] We additionally use an older version of DoTS with data up to 2012 and find similar bias.
[11] It is 60% larger using PPML in level and 40% larger using PPML in shares (columns (3) and (4) in Tables B.2 and B.3).

Table 1 – EU effect: OLS estimates

Sample	Full sample				Common observations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Source	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS
RTA	0.22[a]	0.34[a]	0.19[a]	0.28[a]	0.21[a]	0.21[a]	0.20[a]	0.21[a]
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EU			0.59[a]	0.93[a]	0.61[a]	0.89[a]		
			(0.04)	(0.04)	(0.04)	(0.04)		
Euro			-0.14[a]	0.09[c]	-0.11[a]	0.09[c]		
			(0.05)	(0.05)	(0.04)	(0.05)		
EU x consignment							0.74[a]	0.77[a]
							(0.05)	(0.05)
EU x origin							0.43[a]	1.07[a]
							(0.05)	(0.05)
Euro x consignment							-0.11[b]	-0.06
							(0.06)	(0.06)
Euro x origin							-0.09	0.26[a]
							(0.06)	(0.07)
Observations	984,041	1,043,336	984,041	1,043,336	809,721	809,721	809,721	809,721
Pseudo R^2	0.346	0.354	0.346	0.354	0.373	0.370	0.373	0.370
i-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
j-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
i-j fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$. RTA includes EU.

because of the specific definition of countries of origin for trade flows within the EU. Turning to the trade effect of RTAs in general (excluding the EU), the estimated effect is quasi-identical in DoTS and Comtrade data, corroborating the fact that the upward bias is specific to intra-EU trade flows.[12] [13]

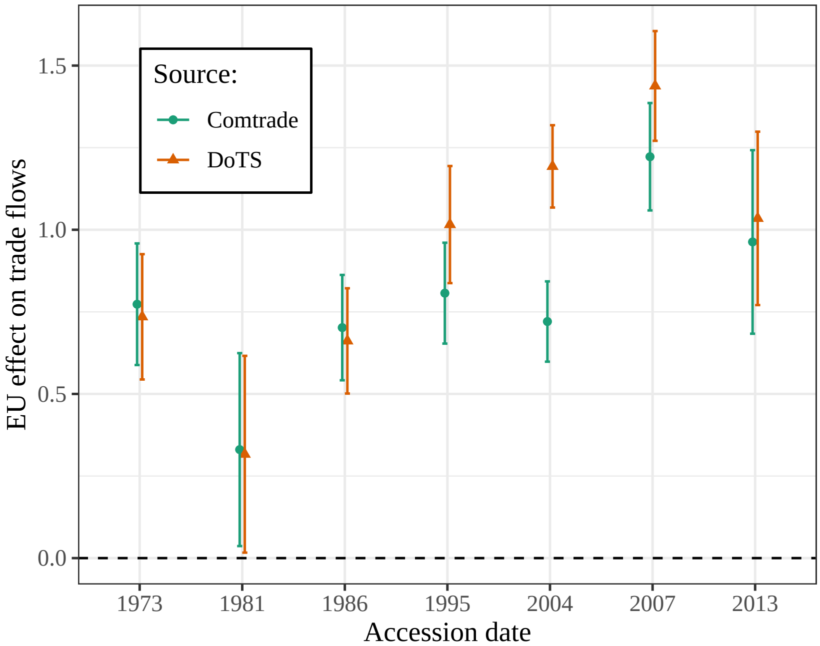
In Figure 4, we additionally shows that the bias is, as expected, particularly important for EU enlargements close to the 1999 switch to Eurostat data (the regression results are presented in columns (1) and (2) of Appendix Table B.4). The difference between coefficients estimated on DoTS and Comtrade is larger for the 2004 enlargement, and to a lesser extent in 1995 and 2007, and tends not to be significantly different for the 1973, 1981, 1986 and 2013 enlargements.

Finally, in columns (7) and (8) of Table 1, we exploit the differences in reporting convention in the Comtrade data. As emphasized in Section 2, some countries do report their trade on a

[12] The upward bias on the EU and eurozone effects persists when using an older vintage of DoTS (a version from 2014), even though it is attenuated in this case. This suggests that all versions of DoTS are concerned by the shortcoming we identified, although the more recent ones (obtained after the 2017 IMF methodological revision) are more affected.

[13] These results still hold when removing the Netherlands and Belgium from the sample, confirming that while these two countries are the most affected by the "Rotterdam effect", they are not the single drivers of our results.

Figure 4 – EU effect, by accession year



Notes: 95% confidence intervals, standard errors clustered at the i-j level. Results are reported in columns (1) and (2) of Appendix Table B.4. We control for RTA and euro area membership.

country of consignment basis in Comtrade. The differences between DoTS and Comtrade for the estimated impact of the EU should be reduced for those countries applying a close reporting standard in both datasets, compared to countries applying the recommended country of origin standard in Comtrade.[14] We indeed find that the upward bias on the EU coefficient estimated on DoTS is driven by countries that report on a country of origin basis in Comtrade. It is worth noting that the estimated coefficient on $EU \times consignment$ is larger than on $EU \times origin$ when using Comtrade data, suggesting that the estimation of the overall EU effect in Comtrade data (column (5)) may also be biased by different reporting standards by EU countries in the Comtrade database, although to a lower extend than its IMF DoTS counterpart.

4. Illustration #2: Brexit

In this section, we focus on differences in reporting standards between reporters within Comtrade and show how it affects the estimation of the impact of Brexit on trade. Prior to Brexit, extra EU imports entering the Single market through the UK but whose final destination was another member state were recorded as an import from the UK by countries declaring their trade flows on a country of consignment basis for intra-EU trade. With Brexit, such flows are no longer recorded as imports from the UK, but as imports from the country of origin, therefore mechanically inflating the negative impact of Brexit on trade (Gasiorek and Tamberi, 2021). Since some EU countries declare on a country of consignment basis for intra-EU trade alone in Comtrade (Table B.1), this should affect the estimation of the trade impact of Brexit.

[14] Trade data reported to Comtrade on a country of consignement basis may still differ from those recorded in Comext due to the inclusion of quasi-transit flows.

We use bilateral trade data from Comtrade for all countries in the world over the 2014-2021 period and estimate the following equation:

$$\log T_{ijt} = \beta_1 Brexit_{ijt} \times EU_j^{Cons} + \beta_2 Brexit_{ijt} \times EU_j^{Orig} + \beta_3 Brexit_{ijt} \times UK_j + \theta_{it} + \theta_{jt} + \theta_{ij} + \epsilon_{ijt}. \quad (2)$$

T_{ijkt} stands for imports from country i to country j in year t. $Brexit_{ijt}$ is a dummy variable equal to one for pairs of country including an EU member and the UK, post 2020. The $Brexit_{ijt}$ variable is interacted with EU_j^{Cons} and EU_j^{Orig}, which are indicator variables equal to one when country j is an EU country and declares on a country of consignment basis (respectively country of origin) in Comtrade. For completeness, we isolate the impact of Brexit on imports by the UK from EU countries by interacting the $Brexit_{ijt}$ with an indicator for the UK.

θ_{it} and θ_{jt} are fixed effects by importer-and-year and exporter-and-year, and θ_{ij} are country-pair fixed effects (controlling for all time invariant pairwise variables as distance, common language, similarity of institutions or colonial history, as well as EU membership in our time period). β_1, β_2 and β_3 measure the partial trade impact of Brexit for different importing countries, depending on their reporting standards in Comtrade.

Results are reported in Table 2. We first present the estimated impact of Brexit averaged over all importers (column (1)) and find a negative impact of Brexit on trade between the EU and the UK, corresponding to a 13% reduction in bilateral trade. Column (2) introduces our interactions variables and shows that this average effect is however biased by differences in reporting standards. EU importers declaring on a country of origin basis show no impact of Brexit on their imports from the UK, while only EU importers declaring on a country of consignment basis display a negative and significant impact. The latter countries are those affected by a reporting bias since imports from the UK are no longer reported on a country of consignment basis starting with Brexit in 2020, therefore mechanically inflating the negative impact of the exit of the UK from EU on bilateral trade. Finally, our results point to a negative impact on UK imports from EU members. This asymmetric impact of Brexit is consistent with evidence by Freeman et al. (2022) and Gasiorek and Tamberi (2023). The inflated Brexit effect for EU countries reporting on a country of consignment basis is also found when using PPML estimators (see table B.5).

5. Conclusion

This paper documents differences in the reporting of trade flows across widely used trade datasets and within them across declaring countries and years. We illustrate the bias related to diverging reporting standards in the estimation of the impact of two trade policies (the European union and Brexit) using a gravity framework on two trade datasets, the IMF-DoTS and UN-Comtrade. We find that the trade effect of the EU is overestimated by 43% to 57% depending on the estimator when using DoTS data instead of Comtrade data. Similarly, using DoTS data overestimate the impact of the euro. While the bias we identify is quantitatively relevant, it is

Table 2 – Estimated impact of Brexit: OLS estimates

	(1)	(2)
Brexit	-0.14[a]	
	(0.05)	
Brexit x origin		0.02
		(0.09)
Brexit x consignment		-0.16[b]
		(0.08)
Brexit x UK		-0.20[a]
		(0.08)
Observations	211,982	211,982
Pseudo R^2	0.441	0.441
i-t fixed effects	✓	✓
j-t fixed effects	✓	✓
i-j fixed effects	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$. RTA includes EU.

worth noting that it does not change the qualitative results that i/ the EU has a (much) larger impact on trade than the average RTA, and ii/ European trade integration has increased over time with the implementation of the Single Market.

Differences in reporting standards across declaring countries are however not restricted to IMF-DoTS and are also found in UN-Comtrade. We also show that differences in reporting standards between reporters in UN-Comtrade inflate the estimated effect of Brexit.

While the differences in reporting standards are acknowledged in the documentation of the DoTS, Comtrade and Comext databases, it is important to keep in mind their consequences for some empirical exercises, as shown here. Similarly, caution is warranted for any analysis of the geography of trade, such as e.g. estimating the dependence of EU members on imports from specific partners.

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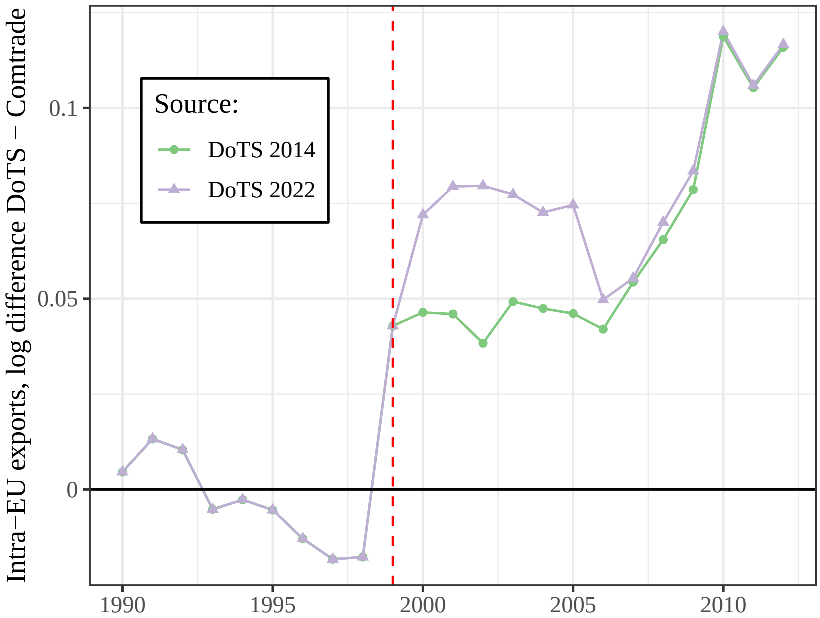
Appendix

A. Additional Figures

Figure A.1 – Total exports from EU countries going to EU countries, difference between DoTS and Comtrade



Notes: Pooling all EU exporters together, we compute the total value of exports going to EU members. We then compare the log of this total value in DoTS and Comtrade: Ln(DoTS) - Ln(Comtrade). Comtrade is taken as reference, and therefore a positive spread means that DoTS records a higher value than Comtrade. This is done both for a recent version of DoTS (DoTS 2022) and an older version (DoTS 2014). Current EU (number of member States varies over time). Sample restricted to observations present in Comtrade, DoTS 2022 and DoTS 2014.

B. Additional Tables

Table B.1 – Import partner attribution for EU countries in Comtrade (2020)

Country	Convention
AUT	origin
BEL	origin/consignment for intra-eu
BGR	consignment
CYP	origin/consignment for intra-eu
CZE	origin
DEU	origin
DNK	origin/consignment for intra-eu
ESP	origin/consignment for intra-eu
EST	consignment
FIN	origin
FRA	origin
GRC	origin/consignment for intra-eu
HRV	origin
HUN	consignment
IRL	origin
ITA	origin/consignment for intra-eu
LTU	origin/consignment for intra-eu
LUX	origin/consignment for intra-eu
LVA	origin/consignment for intra-eu
MLT	origin
NLD	origin/consignment for intra-eu
POL	origin
PRT	origin/consignment for intra-eu
ROU	origin/consignment for intra-eu
SVK	origin
SVN	origin
SWE	origin/consignment for intra-eu

Table B.2 – EU effect: PPML estimates on trade level

Sample	Full sample				Common observations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Source	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS
RTA	0.03	0.05	0.01	0.03	0.01	0.02	0.01	0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
EU			0.26[a]	0.41[a]	0.25[a]	0.36[a]		
			(0.03)	(0.03)	(0.03)	(0.03)		
Euro			-0.07[c]	0.04	-0.08[c]	0.05		
			(0.04)	(0.05)	(0.04)	(0.04)		
EU x consignment							0.30[a]	0.38[a]
							(0.04)	(0.04)
EU x origin							0.19[a]	0.32[a]
							(0.03)	(0.04)
Euro x consignment							-0.07	-0.09
							(0.05)	(0.06)
Euro x origin							-0.08[c]	0.17[a]
							(0.05)	(0.05)
Observations	984,041	1,043,336	984,041	1,043,336	809,721	809,721	809,721	809,721
Pseudo R^2	0.990	0.988	0.990	0.989	0.990	0.989	0.990	0.989
i-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
j-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
i-j fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$. RTA includes EU.

Table B.3 – EU effect: PPML estimates on trade shares

Sample	Full sample				Common observations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Source	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS
RTA	0.13[a]	0.19[a]	0.08[a]	0.09[a]	0.10[a]	0.08[a]	0.09[a]	0.08[a]
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
EU			0.54[a]	0.77[a]	0.53[a]	0.62[a]		
			(0.04)	(0.05)	(0.04)	(0.04)		
Euro			0.14[a]	0.15[a]	0.13[a]	0.18[a]		
			(0.04)	(0.05)	(0.04)	(0.04)		
EU x consignment							0.64[a]	0.68[a]
							(0.05)	(0.05)
EU x origin							0.35[a]	0.53[a]
							(0.05)	(0.06)
Euro x consignment							0.17[a]	0.18[a]
							(0.06)	(0.06)
Euro x origin							0.08	0.18[a]
							(0.06)	(0.06)
Observations	984,041	1,043,336	984,041	1,043,336	809,721	809,721	809,721	809,721
Pseudo R^2	0.379	0.359	0.380	0.359	0.363	0.365	0.363	0.365
i-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
j-t fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
i-j fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$. RTA includes EU.

Table B.4 – EU effect by accession cohort, sample restricted to common observations

Sample	OLS		PPML		PPML sh.	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	Poisson	Poisson	Poisson	Poisson
Source	Comtrade	DoTS	Comtrade	DoTS	Comtrade	DoTS
EU 1973	0.77[a]	0.73[a]	0.75[a]	0.36[a]	0.75[a]	0.75[a]
	(0.09)	(0.10)	(0.10)	(0.05)	(0.10)	(0.10)
EU 1981	0.33[b]	0.32[b]	0.44[a]	0.08	0.44[a]	0.46[a]
	(0.15)	(0.15)	(0.15)	(0.19)	(0.15)	(0.14)
EU 1986	0.70[a]	0.66[a]	0.96[a]	0.63[a]	0.96[a]	0.98[a]
	(0.08)	(0.08)	(0.11)	(0.10)	(0.11)	(0.11)
EU 1995	0.81[a]	1.0[a]	0.36[a]	0.27[a]	0.36[a]	0.44[a]
	(0.08)	(0.09)	(0.06)	(0.06)	(0.06)	(0.06)
EU 2004	0.72[a]	1.2[a]	0.50[a]	0.34[a]	0.50[a]	0.68[a]
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
EU 2007	1.2[a]	1.4[a]	0.95[a]	0.66[a]	0.95[a]	1.0[a]
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)
EU 2013	0.96[a]	1.0[a]	0.85[a]	0.52[a]	0.85[a]	0.82[a]
	(0.14)	(0.13)	(0.14)	(0.13)	(0.14)	(0.13)
Observations	809,721	809,721	809,721	809,721	809,721	809,721
Pseudo R^2	0.373	0.370	0.363	0.988	0.363	0.365
i-t fixed effects	✓	✓	✓	✓	✓	✓
j-t fixed effects	✓	✓	✓	✓	✓	✓
i-j fixed effects	✓	✓	✓	✓	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$. NB: since Comtrade starts in 1962, not possible to estimate the 1958 EU accession effect. Regressions also include RTA and Euro as explanatory variables.

Table B.5 – Brexit effect, PPML estimates

Estimator	PPML		PPML shares	
	(1)	(2)	(3)	(4)
Brexit	-0.16^a		-0.16^a	
	(0.04)		(0.04)	
Brexit x origin		-0.05		-0.13^b
		(0.04)		(0.06)
Brexit x consignment		-0.16^a		-0.19^a
		(0.05)		(0.07)
Brexit x UK		-0.20^a		-0.16^a
		(0.06)		(0.05)
Observations	211,982	211,982	211,982	211,982
Pseudo R^2	0.996	0.996	0.399	0.399
i-t fixed effects	✓	✓	✓	✓
j-t fixed effects	✓	✓	✓	✓
i-j fixed effects	✓	✓	✓	✓

Note: Standard errors clustered at the i-j level. Significance levels : ^{a} : $p < 0.01$, ^{b} : $p < 0.05$, ^{c} : $p < 0.1$.