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Reassessing the Impact of the Single Market and Its Ability to Help Build Strategic Autonomy

Abstract

European integration, which culminated in the completion of the Single Market, the single currency and successive enlargements, is now faced with the question of strategic autonomy. Against this backdrop, the present paper has three objectives. First, it assesses the benefits of EU membership based on new, disaggregated trade and production data and using established and cutting-edge empirical methods. Second, it evaluates the costs of strategic autonomy – implying not trading with "riskier" partners. Third, it asks whether further deepening of the Single Market can alleviate these costs. The paper shows that the gains from European integration are substantial, albeit heterogeneous across Member States and sectors, and that the cost of strategic autonomy can be offset by deeper, but comparatively more modest, integration efforts within the European Single Market.

JEL-Codes: F100, F140, F160.

Keywords: European integration, trade costs, trade policy, risky suppliers.

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1 Introduction

While economists systematically introduce substitution (between intermediate inputs, between capital or labor and intermediate inputs, and the more so between origins for sourcing), recent crises, e.g., the COVID-19 pandemic and the war between Russia and Ukraine, have demonstrated that substitution is not always an option, at least in the short run. To some extent, the world has proved more "Leontief" than expected in troubled times.

Previous warnings about the risks of further deepening globalization have not been taken seriously by either firms or governments: the floods in Thailand and the Fukushima disaster induced major disruptions of certain value chains (Boehm et al., 2019) which, today, sound as an early alarm. After all, a prospective exercise of the DG research (Commission, 2009) mentioned a pandemic and a war as major wild cards.

The argument put forward in this paper is that firms that make location or sourcing decisions do not internalize the macroeconomic externality of their joint choices, in terms of reduced in sourcing diversity and concentration on potentially "riskier" trading partners. Therefore, there is a need for re-evaluation of the balance between "cost reduction" vs. "risk reduction". What is at stake is an assessment of the alignment between policy objectives (e.g., economy-wide resilience without endangering growth) and firms' legitimate objectives.

Against this backdrop, this paper provides a conceptual framework to revisit the benefits of European integration, to evaluate the cost of strategic autonomy when it comes to weakening ties with riskier trading partners, and to quantify the progress needed in terms of European interdependence to offset these costs. We ask whether there are (European) substitutes for risky links. Two often overlooked arguments come into play here: the Single Market is far from fully integrated, as evidenced by the persistence of border effects; but, at the same time, it is sufficiently integrated that marginal improvements can have very significant effects. This is a promising avenue for Open Strategic Autonomy. Can the Single Market help alleviate the "Leontief nature" of economic activity?

To simulate, in terms of impact on trade and real output, a move from the "riskier" to the "more costly" (but less risky) alternatives, a New Quantitative Trade Model (NQTM) is the most widely used tool. General Equilibrium adjustments to a shock will inform us on the induced reshaping of the world matrix of trade flows. However, the need to trace very detailed products or sourcing decisions that are very granular compared to the classifications used by most Multi-Regional Input-Output (MRIO) tables, makes rather problematic the use of a NQTM featuring input-output relationships. An alternative consists of combining general equilibrium properties of structural gravity with detailed trade data that de facto encapsulate the underlying input output relations. The recent literature in structural gravity, which shares the theoretical background of NQTMs, combines sound theoretical foundations with the possibility of modelling trade at a more granular level.

Our approach comprises three distinct building blocks: The first involves the *estimation* of the effects of the EU with detailed industry-level trade data over the period 1986-2019; The second consists of *simulating* the impact of a move towards greater European autonomy and "derisking" of sourcing, by combining trade and production data for the contemporary period; The third studies whether reaping some of the untapped benefits of the Single European Market would compensate for the losses induced by such "derisking", taking as an example the two most affected Member States from the limiting of trade with 'riskier' partners and extending this reasoning to a large country –Germany– and finally to all Members states.

We follow two approaches to obtain our partial equilibrium estimates. First, we rely on established developments from the structural gravity literature, regarding estimation techniques (Yotov et al., 2016). Specifically, for each industry, and capitalizing on the properties of the Poisson Pseudo Maximum Likelihood (PPML) estimator (Santos Silva and Tenreyro, 2006), our econometric model is estimated in levels with data that includes international as well as domestic trade flows (Yotov, 2022). Motivated by theory and in order to comprehensively account for all observable and unobservable factors that may affect our estimates but may be omitted from the model, we use a rich structure of fixed effects, including exporter-industry-time, importer-industry-time, and country-pair-industry fixed effects. In addition, we also include a set of international industry-border-time fixed effects.

Second, we follow Nagengast and Yotov (2024) and Nagengast et al. (2024), who combine the established methods from the gravity literature that we just discussed with recent developments from the staggered difference-indifferences (DiD) econometrics literature (e.g., Borusyak and Jaravel, 2017; de Chaisemartin and D'Haultfœuille, 2020; Wooldridge, 2023) in order to obtain *'extended two way fixed effects' (ETWFE)* estimates that are not subject to 'negative weights' and 'forbidden comparisons'. Section 2 offers further details on our estimating specifications and econometric methods. Importantly, our estimating models are based on, and therefore, perfectly consistent with, the theoretical framework that will be employed for the counterfactual analysis.

The chosen framework requires to observe all trade flows for each industry and country, including domestic trade flows. Accordingly, usual trade data at the product-origin-destination level is not an option. A good compromise between granularity of the data and coverage of domestic flows is provided by the *International Trade and Production Database for Estimation* (ITPD-E) (Borchert et al., 2020, 2022).[1] The ITPD-E covers international and domestic trade data for a large number of countries (more than 200), a large number of industries (170) for the whole economy (e.g., including Agriculture, Mining and Energy, Manufacturing, and Services), and a long period of time (1986-2019), which varies by industry depending on the raw data used. Important for our purposes, the ITPD-E is constructed from raw data without reliance on any statistical modeling. Thus, it is appropriate for estimations. In addition to the ITPD-E, we employ other datasets in order to construct a vector of policy variables, which are employed as control covariates in our model. Section 3 offers further details on the data and the sources we use.

Several findings stand out from our disaggregated estimates of the effects of the Single European Market on trade among its members. First, the EU has been extremely successful

[1] https://www.usitc.gov/data/gravity/itpde.htm

in promoting trade among its Member States. Most of our industry-level partial equilibrium EU estimates are positive, sizable, and statistically significant. On average, our preferred estimates imply that the EU has led to about 137 percent increase in member's trade, based on all estimates, and about 175 percent, based on only the positive values. Second, we find that the effects of the EU have been very heterogeneous across the industries and the broad sectors in our sample. The strongest EU effects have been in Agriculture, which is consistent with and can be interpreted through the lens of the EU Common Agricultural Policy. The estimates for Services are mostly positive and also sizable, while the impact on Manufacturing trade has been positive but smaller, and half of our estimates for Mining and Energy not statistically significant. Third, the EU effects are quite similar depending on whether trade is among 'old' members of between 'old' and 'new' members.[2] Finally, we find that the traditional gravity estimates and the heterogeneity-robust DiD estimates are similar and highly correlated, but a smaller fraction of the ETWFE estimates are negative, and the ETWFE estimates are a bit larger in magnitude (e.g., by about 25% on average).

To translate our estimates into simulation effects on real output for each industry, we rely on three building blocks. First, we use our own partial equilibrium estimates of the impact of the Single Market. Second, we rely on a standard NQTM, which is perfectly consistent with our estimating equation.[3] Third, we utilize the first edition of the *International Trade and Production Database for Simulations* (ITPD-S), which is constructed and maintained by the US International Trade Commission (Borchert et al., 2024) and has two main advantages for our purposes: (i) It is fully balanced, thus, it is appropriate for simulations; and (ii) The ITPD-S corresponds in each dimension to the ITPD-E, thus it is perfectly consistent with our partial equilibrium analysis. As a result, by covering 170 sectors, the ITPD-S is the most

[2]To perform this analysis we split the sample in two groups of countries – 'New' members, which joined the EU after 2000 and 'Old' members including the founding members and the countries that joined prior to 2000. Operationally, we define four EU indicator variables for trade within each group (e.g., EU_NEW_OLD for trade from 'New' to 'Old' members).

[3]Input-output relationships, not documented in the existing databases at the level of detail used here, are assumed to be mirrored in the detailed trade relationships used for calibration of the model.

disaggregated existing balanced database for simulation analysis.[4]

Armed with our partial equilibrium estimates, the NQTM methods, and the ITPD-S data, we obtain simulation results from three counterfactual scenarios. First, we employ our own partial sectoral estimates of the EU effects to calculate the benefits of the Single Market, measured in terms of real output changes per industry. Overall, we obtain large gains for all Member States, but we also observe intuitive heterogeneity e.g., larger countries (e.g., Italy, UK, France, and Germany) and some newer members (e.g., Poland, Latvia, and Romania) gain relatively less, while smaller and more central Member States (e.g., Luxembourg, Belgium, and the Netherlands) gain more. Across the industries, as expected, the largest gains in real output are in Agriculture. In sum, and similar to our partial equilibrium conclusions, the main implication from our first counterfactual analysis is that the impact of the Single Market on the EU economies has been positive, remarkably strong, and very heterogeneous, both across countries and across industries.

In our second thought experiment, we increase the EU trade costs with some "riskier" partners, e.g., China and Russia, to the extent that we eliminate about 98 percent of trade with these two countries. We find that limiting trade with Russia would impact the most former Soviet republics (e.g., Estonia and Latvia) as well as countries that are geographically close and economically tied to Russia (e.g., Finland, Bulgaria, and Cyprus). Perhaps not surprisingly, the most affected industries are in "Mining and Energy". Limited trade with China has a larger negative impact on average, and it affects different EU members (e.g., Estonia, Czechia, Germany, Poland, and Denmark) and different industries (e.g., mostly in the Manufacturing sector, with many of them related to textile and apparel). The average real output losses for Russia and China from eliminating trade with the EU are about 8 percent and about 3 percent, respectively, suggesting that increased trade costs with the EU may indeed cause significant damage to Russia, while China will be affected moderately.

Finally, in the third set of counterfactuals, we explore the possibility for further trade

[4]We offer further details on the ITPD-S in Section 3.

liberalization within the EU to offset the losses from limiting trade with 'riskier' partners i) by focusing on the two countries (Estonia and Cyprus) that were affected the most from limiting trade with China and Russia; ii) by focusing on the largest Member State; and iii) by addressing the question of how to compensate for the losses of decoupling for the EU as a whole. We find that a moderate tariff-equivalent decrease of about 4 percentage points in the trade costs between Estonia and the EU will be sufficient to more than offset the losses for this country from limiting trade with Russia and China.[5] In the case of Cyprus, whose losses were concentrated in services, a tariff-equivalent decrease of about 5.8 percentage points in the trade costs between Cyprus and the EU but only in Services, will be sufficient to eliminate all losses for Cyprus for the lost trade with Russia and China. As for the losses for Germany and for the EU as a whole are concerned, the same experiment of a 4 percentage points reduction in the cost of trading within the Single Market is more than sufficient to offset the losses of decoupling. The main implications from these experiments are (i) that relatively small further integration efforts within the EU may compensate for the potential losses for the EU Member States, and (ii) that intra-EU trade liberalization in specific sectors may be particularly effective.

Related Literature. Our paper speaks to several strands of literature. Firstly, it delivers an additional piece of evidence on the impact of the European integration (Head and Mayer, 2000, 2021; Felbermayr et al., 2022; Santamaría et al., 2023; Nagengast et al., 2024), which contributes by offering evidence with a more detailed industry composition.

Secondly, our paper is related to the literature on the consequences of the energy crisis, on sanctions and on decoupling. Bachmann et al. (2022) use a Baqaae-Farhi model to study the economic effects of a potential cut-off of the German economy from Russian energy imports and find GDP losses below 1 percent thanks to substitution possibilities. Mahlstein et al. (2022) use a computable general equilibrium model to simulate an embargo of allies

[5] We classify a 4-percentage-point decrease in tariffs as moderate against the tariff decrease of 18 percentage points, which we estimate to be due to membership in the EU.

against Russian exports, and allies' exports to Russia, by means of prohibitive tariffs in all sectors. Germany would record a 1.2% drop in GDP, above the allies average loss of 0.5%. Eppinger et al. (2021) use a NQTM to simulate the economic consequences of a decoupling of GVCs, defined as increased barriers to global input trade and repatriation of the production of intermediate goods. Switching-off all intermediate imports by the US would reduce US GDP by 2.2%, while decoupling the US only from China will cost only 0.1%. Closer to our exercise, Felbermayr et al. (2021) simulate the impact of decoupling the EU from China (a doubling of trade costs in all industries) in a different NQTM framework. In case of Chinese retaliation, the loss of GDP of the EU would amount to 1.0%. Javorcik et al. (2023) quantify with a Baqaae-Farhi model the economic cost of friendshoring, constructing blocs of like-mind countries based on their UN votes. They introduce a 20% additional tariff on all goods between blocs (of the magnitude of the trade war between the US and China), and alternatively a 20% increase in trade costs. In the latter case, the cost is close to 1.5%for China, 1.0% for France or Germany; 0.5% for North America, but up to 3% for South-East Asia. We contribute to this literature in two ways: we further disaggregate industries and we assess whether further integration among the group of countries would compensate the induced economic losses of autonomic strategy.

Lastly, our paper speaks to the literature on the impact of uncertainty on macroeconomic aggregates that has been extensively studied since Bloom (2009). On the top of the channel of a pause in investment and hiring combined with a stop of reallocation among production units, one of the mechanisms recently identified is how firms re-examine the balance between low cost and safety provided by reliance on more costly producers (Kopytov et al., 2023). The link between micro-economic decisions and macroeconomic outcomes is then the endogenous formation (or reshaping) of networks by optimizing firms, in the presence of changes in their economic environment (Acemoglu and Azar, 2020; Dhyne et al., 2021; Arkolakis et al., 2023). Major natural disasters propagate through networks of suppliers and customers (Barrot and Sauvagnat, 2016). Importantly, firms do not internalize the externality associated to their optimal choices in this literature. Grossman et al. (2023) show how public intervention can help improving resiliency of the economy in such context, while Grossman et al. (2021) contrast two policies in the presence of insecure supply chains, i.e. reshoring versus diversification of sourcing.

A related and older literature addresses the choice of the optimal public policy in presence of non-cooperative policies of trading partners (Bhagwati and Srinivasan, 1976; Mayer, 1977; Arad and Hillman, 1979). The bottom line is that public intervention may alleviate the economic cost of distortions due to externalities of optimal micro-economic choices or trade restrictions in exporting or importing countries. Our contribution here is to confirm, in the European case, that there is room for manoeuvre leveraging on the further completion of the Single Market to pursue strategic autonomy. Indeed, in contrast to the *de jure* situation, *de facto* border effects among Member States are still sizeable: Santamaría et al. (2023) show, considering a shipment originating from a randomly selected European region, that the probability for it to reach another region outside the country of origin is only one-fifth.

The rest of the paper is organized as follows. Section 2 describes the econometric methods used to estimate the effects of the Single Market on intra-EU trade. Section 3 offers a brief description of the datasets that we used to perform the analysis, and their sources. Section 4 presents our partial equilibrium estimates of the effects of the EU on trade among Member States. Section 5 reviews the model that we use to perform the counterfactual analysis and we discuss our main findings. Finally, Section 6 concludes with a summary of our main results and a discussion of some caveats and possible improvements of our analysis.

2 Econometric Methods

To obtain estimates of the effects of EU integration for each of the industries in our sample, we rely on the workhorse model of trade – the gravity equation. Specifically, we estimate alternative specifications of the following econometric model:

$$X^k_{ij,t} \;=\; \exp[EU_{ij,t} \times \beta^k + POLICY_{ij,t} \times \alpha^k + GLOB^k_{ij,t} + \overrightarrow{\mu}^k_{ij} + \pi^k_{i,t} + \chi^k_{j,t}] \times \epsilon^k_{ij,t}. \quad (1)$$

Before we continue to describe each of the elements in equation (1), we note that it is consistent with a wide class of theoretical foundations, which, subject to parameter interpretation, lead to isomorphic gravity equations (Arkolakis et al., 2012).[6] This is important for our purposes for at least two reasons. First, as will become clear below, theory will motivate some of the terms in equation (1) as well as our econometric methods. Second, since it is theory-consistent, equation (1) is part of, and can be nested structurally within, the new quantitative trade framework that will be used in the counterfactual analysis.

To specify and estimate equation (1), we capitalize on established developments from the related literature (Yotov et al., 2016). We start with a discussion of the characteristics of the dependent variable, $X^k_{ij,t}$, which denotes nominal (Baldwin and Taglioni, 2006) trade flows from exporter i to importer j in industry k at time t, i.e., the dependent variable includes directional trade (exports and imports) at the industry level at each point of time. Based on the recent analysis of Egger et al. (2022), we will use data for consecutive years, instead of data with intervals, as suggested by Cheng and Wall (2005). $X^k_{ij,t}$ includes both cross-border/international and domestic/internal trade flows, which is consistent with structural gravity theory (Yotov, 2022). The inclusion of domestic trade flows is potentially important for estimating the effects of the EU because, as demonstrated in Dai et al. (2014), much of the increase in bilateral trade flows between FTA members is actually due to diversion from

[6]Since Anderson (1979) firstly derived a structural gravity model of trade in goods differentiated by place of origin (Armington, 1969) (and consumer preferences homothetic, identical across countries) that can be approximated by a CES utility function, the gravity equation has been derived from many alternative micro-foundations, including: monopolistic competition (Krugman, 1979); Heckscher-Ohlin foundations (Bergstrand, 1985); the Ricardian model (Eaton and Kortum, 2002); a sectoral level with a demand-side perspective (Anderson and van Wincoop, 2004); heterogeneous firms (Chaney, 2008); a sectoral level with a supply-side perspective (Costinot et al., 2012); with country-specific dynamics via asset accumulation (Olivero and Yotov, 2012; Eaton et al., 2016; Anderson et al., 2020); with input-output linkages (Caliendo and Parro, 2015); and with bilateral dynamics (Anderson and Yotov, 2020). See Head and Mayer (2014) and Yotov et al. (2016) for a complete presentation.

domestic sales. Thus, gravity specifications that do not include domestic trade flows may under-predict the effects of FTAs.

Due to the separability of the theoretical gravity model (Anderson and van Wincoop, 2004; Costinot et al., 2012), equation (1) can be estimated at any level of aggregation, e.g., product, industry, sector, aggregate. This is important for the current purposes, as it would enable us to estimate the model separately, and consistent with theory, for each of the 170 industries that are available in our data,[7] while still having corresponding data on domestic trade flows/production, which would enable us to perform counterfactual analysis. In addition, guided by theory, we will be able to obtain aggregate estimates at desired level of aggregation by pooling (instead of aggregating) the industries in our data.[8]

Motivated by Santos Silva and Tenreyro (2006), we will use the Poisson Pseudo Maximum Likelihood (PPML) as our preferred estimator. Due to its multiplicative form, the PPML estimator would enable us to include and take advantage of the information contained in the zeros in our sample. In addition, and more important, the PPML estimator successfully handles heteroskedasticity in trade flows data, which, due to Jensen's inequality, actually renders the corresponding OLS estimates inconsistent. PPML also has the advantage of being consistent with the structural gravity model (Fally, 2015). We will estimate our model with the **ppmlhdfe** command of Correia et al. (2020), and, following the standard approach in the gravity literature (e.g., Egger and Tarlea (2015), Pfaffermayr (2019), and Pfaffermayr (2022)), we cluster the standard errors by country pair, i.e., $Cov[\varepsilon_{ijt}, \varepsilon_{ijd}] \neq 0,$ for all t, d, and zero otherwise.

Turning to the policy covariates in our model, the most important term in equation (1) is $EU_{ij,t}$. We use vector notation to denote this term because we will experiment with several EU variables. In the simplest scenario, $EU_{ij,t}$ will be defined as a single dummy variable that takes a value of one if two countries in our sample are members of the European Union at the same time. In addition, we will experiment by obtaining directional EU effects depending

[7]See the Data Section 3.

[8]Pooling industries improves estimation efficiency and offers benefits in terms of tractability of the results.

on when a country joined the EU. Specifically, in the current analysis we define two groups of countries – 'New' members, which joined the EU after 2000 and 'Old' members including the founding members and the countries that joined prior to 2000. Based on this definition, we define four EU indicator variables, including for trade from 'New' to 'Old' members (EU_NEW_OLD), from 'Old' to 'New' members (EU_OLD_NEW), from 'Old' to 'Old' members (EU_OLD_Old), and from 'New' to 'New' members (EU_NEW_NEW). Finally, we will obtain 170 estimates of the EU effects for each of the industries in our setting.

The vector $POLICY_{ij,t}$ in equation (1) includes the following time-varying bilateral policy variables: membership in Regional Trade Agreements (RTA) *other than the EU*, membership in the World Trade Organization (WTO), complete trade sanctions ($COMPL\_SANCT$), partial trade sanctions ($PARTL\_SANCT$), other sanctions ($OTHER\_SANCT$), membership in the Euro Zone (EURO),[9] and membership in other currency unions ($COMM\_CURR$). In principle, some bilateral policies (e.g., tariffs) may vary at the industry-level. However, we do not have such policies in our specification. Note, however, that even when a policy is implemented at the country/aggregate level, e.g., a complete trade sanction, the impact of such policy is heterogeneous across products and sectors. Therefore, we also allow for the estimates of the policy coefficients (α^k) to vary by product/sector and type of policy.

Equation (1) includes four sets of fixed effects. $GLOB_{ij,t}^k$ denotes a vector of time-varying border indicators, one for each year in our sample, which take a value of one for international flows and are equal to zero for domestic trade flows for each year in our sample. The estimates on these dummy variables would capture the impact of common (de-)globalization trends that have affected the international relative to the domestic trade, e.g., improvements in communication, transportation, global recessions, etc. Thus, our key EU variables would capture EU effects that are in addition to any common globalization trends among the countries in our sample. Notice that, due to perfect collinearity with the pair fixed effects in our preferred specification, we cannot obtain estimates on the full set of border/globalization

[9]Thus, the estimates of the EU effects that we obtain would be not include possible additional impact from membership in the Euro Zone.

variables, and we need to drop one of them. This is irrelevant given our focus, i.e., the choice of reference group for the globalization dummies will not affect our EU estimates.

Equation (1) includes directional/asymmetric pair fixed effects, $\overrightarrow{\mu}_{ij}^{k}$. Motivated by Baier and Bergstrand (2007), and consistent with the average treatment effects methods of Wooldridge (2010), country-pair fixed effects are standardly used in trade gravity models to mitigate potential endogeneity concerns. Also important for the current purposes, the country-pair fixed effects would absorb and control for all (symmetric and asymmetric) time-invariant bilateral trade costs.[10] Finally, following (Baier et al., 2019), in order to avoid attributing asymmetries in the underlying time-invariant trade costs to the EU, we explicitly allow for the country-pair fixed effects for vary depending on the direction of trade flows, i.e., from "i" to "j" vs. from "j" to "i". This directional nature motivates the arrow notation.

Guided by theory, equation (1) also includes source-industry-time and destination-industry-time fixed effects ($\pi_{i,t}^{k}$ and $\chi_{j,t}^{k}$, respectively) to account for structural multilateral resistances terms (Anderson and van Wincoop, 2003) and for any country-time-specific determinants of trade flows on the source and the destination side. When the model is estimated with pooled data, the corresponding fixed effects would be at the source-industry-time and the destination-industry-time dimensions, respectively. Thus, regardless of the level of aggregation, the exporter and importer fixed effects would account for and absorb all country-industry-time-specific characteristics that influence bilateral trade flows, thus allowing us to isolate and focus on the remaining bilateral components and the EU effects in particular.

Finally, following the recommendations of Nagengast and Yotov (2024), and in order to account for possible biases in the presence of treatment effect heterogeneity, e.g., due to 'negative weights' or the so-called 'forbidden comparisons' that (mis)use already-treated units in the control group (e.g., Borusyak and Jaravel, 2017; de Chaisemartin and D'Haultfœuille,

[10]Egger and Nigai (2015) and Agnosteva et al. (2019) demonstrate that the standard gravity variables (e.g., distance, etc.) do well in predicting relative bilateral trade costs, however, they fail to capture the level of bilateral trade costs (e.g., they underpredict the bilateral trade costs for the poor countries and overpredict them for the more developed countries). In the Appendix, we decompose the importance of the different bilateral variables in specification (1), and show that the set of covariates is a very good proxy for the cross-border bilateral trade costs within the EU.

2020), we also will obtain estimates of the EU effects on intra-EU trade after combining the established practices for gravity estimations that we just discussed with recent developments from the difference-in-differences econometrics literature (e.g., Borusyak and Jaravel, 2017; Hull, 2018; de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021; Wooldridge, 2021; Goldsmith-Pinkham et al., 2022; de Chaisemartin and D'Haultfœuille, 2023; Borusyak et al., forthcoming; Wooldridge, 2023). The new *'extended two way fixed effects' (ETWFE)* econometric model, which corresponds to our *'two way fixed effects' (TWFE)* gravity specification (1), becomes:

$$X_{ij,t}^k = \exp[\sum_{g=q}^{T}\sum_{s=g}^{T}\delta_{gs}^k D_{gs} + \overrightarrow{\mu}_{ij}^k + \pi_{i,t}^k + \chi_{j,t}^k] \times \epsilon_{ij,t}^k. \quad (2)$$

All but one of the terms in equation (2) were defined earlier.[11] The single, and most important for the current purposes, exception is the term $\sum_{g=q}^{T}\sum_{s=g}^{T}\delta_{gs}D_{gs}$. Following, Nagengast et al. (2024), this term is designed following the staggered difference-in-differences literature, and it would capture the EU effects. Specifically, g denotes a treatment cohort if the condition that both countries i and j were EU members was for the first time fulfilled in year g, q is the first year of the treatment of cohort g, T is the last year of the panel, D_{gs} is a time-varying treatment indicator equal to 1 for cohort g for $s = t$ in post-treatment years and 0 otherwise, and δ_{gs}^k captures the cohort-year specific treatment effects for each industry k in our sample.[12] For example, $D_{2007,2007}$ would be equal to one for the country pair France-Bulgaria in the year 2007, since Bulgaria joined the EU in 2007, and France had already been an EU member since 1957. $\delta_{2007,2007}$ would capture the EU effect on trade between all country pairs of the 2007 cohort in the first year. $\delta_{2007,2008}$ would capture the EU effect on

[11] In principle, we can include in equation (2) the additional policy and globalization covariates from specification (1). However, the inclusion of multiple or continuous treatments is not advisable in equation (2). de Chaisemartin and D'Haultfœuille (2023) propose an approach to estimate heterogeneous treatment effects in the presence of multiple treatments, while de Chaisemartin et al. (2023) and Callaway et al. (2024a,b) discuss estimations with continuous treatments. In both cases, the focus is on linear settings.

[12] To obtain our aggregate ATT estimates for each industry, we give every post-treatment observation the same weight.

trade between all country pairs of the 2007 cohort in the second year, etc.

Finally, we will estimate equation (2) with the **jwdid** command of Nagengast et al. (2024) and, following their analysis, we will assume an 'onset' of the EU effects two years before the official entry into force for each EU member. The motivation for this is that it is possible that the onset of the EU effects on trade would precede the date of the official EU accession, e.g., due to the multi-stage enlargement process, and/or due to adjustments in bilateral trade costs or firm behavior in anticipation of EU membership.

3 Data and Sources

To perform the estimation analysis, we compile an unbalanced panel estimating sample, which includes (i) trade data, (ii) production data, and (iii) data on bilateral policy variables, which come from several sources.

Trade data. The data on bilateral trade flows that we employ come from the *International Trade and Production Database for Estimation* (ITPD-E). The ITPD-E was originally developed by Borchert et al. (2020) and, for the current analysis, we use the latest edition of the data (Borchert et al., 2022).[13] The ITPD-E has several advantages for our purposes. First, it covers a large number of countries (more than 200), a large number of industries (170) that add up to the whole economy (e.g., including the broad sectors of Agriculture, Mining and Energy, Manufacturing, and Services), and a long period of time (1986-2019), which varies by industry depending on the raw data used. Second, the ITPD-E includes domestic trade flows. As discussed earlier, this may be important for identification purposes and for consistency with the counterfactual analysis that we plan to perform. Finally, and most important for our purposes, the ITPD-E is constructed from raw data without reliance on any statistical modeling, which makes it appropriate for estimations.[14]

[13] https://www.usitc.gov/data/gravity/itpde.htm

[14] ITPD-E is constructed from four main different original sources. For Agriculture the trade and production data come from the Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT). Manufacturing and Mining and Energy trade data are obtained from the UN Commodity

Production data. Counterfactual trade policy analyses require balanced production and trade data or, equivalently, balanced data on international and domestic trade. Given our purposes, existing balanced datasets (e.g., WIOD or GTAP) have two disadvantages. First, they are relatively aggregated, e.g. 56 sectors and 43 countries in WIOD, or 65 sectors and 141 countries in GTAP). Second, they are *constructed* using statistical methods and they do not have corresponding datasets based on raw data appropriate for estimations.[15]

To overcome both of these challenges, we capitalize on a new dataset, the *International Trade and Production Database for Simulations* (ITPD-S), which is constructed and maintained by the US International Trade Commission (Borchert et al., 2024) and has three advantages for our purposes. First, the ITPD-S is fully balanced. Second, by covering 170 sectors, the ITPD-S is the most disaggregated existing balanced database for simulation/counterfactual analysis. Finally, by construction, the ITPD-S corresponds in each dimension (i.e., industries, countries, and years) to the ITPD-E. In fact, the latter database is the basis for the construction of the ITPD-S. Thus, our key estimates of the effects of the EU will be obtained from a dataset that is based on raw data, and which is consistent with the dataset that will be used for the counterfactual analysis.[16]

Trade Statistics Database (COMTRADE), while the production data are from the UNIDO United Nations Industrial Statistics (INDSTAT) Database. For services trade, ITPD-E uses information from the WTO-UNCTAD-ITC Annual Trade in Services Database and the UN Trade in Services Database (UN TSD). Services gross output data are from the UN System of National Accounts (UN SNA) Database. See Borchert et al. (2020) and (Borchert et al., 2022) for further details on the construction and features of the ITPD-E.

[15] Three recent exceptions that are suitable for estimation and cover international and domestic trade flows are: (i) the WTO 'Structural Gravity Database (SGD)' of Larch et al. (2019, forthcoming at the Canadian Journal of Economics), which covers aggregate manufacturing (1986-2016); the CEPII 'Tradeprod' database of Mayer et al. (2023), which covers 9 industrial sectors (i.e., Food, Textiles, Wood-Paper, Chemicals, Minerals, Metals, Machines, Vehicles, Other) over a long time span (1966-2018); and (iii) the 'Granular Trade and Production Activities' (GRANTPA) database (Bradley et al., 2024), which is at the product level (1995-2019) but only for 35 European economies. The ITPD-S data, which will be used for our analysis, has the advantages of covering Agriculture, Mining and Energy, Manufacturing, and Services at a more disaggregated level than the SGD and the Tradeprod data, and covering many more countries than the GRANTPA data.

[16] Without going into details, we note that the ITPD-S was constructed through a sequence of statistical and econometric methods (e.g., interpolation and structural gravity estimations). The ITPD-S is based on the ITPD-E dataset, which we described above, and which will be used to obtain our partial estimates of the impact of the Single Market. As a result, the ITPD-S has the same dimensions as the ITPD-E in terms of sectors (170), countries (258), and years (1986-2019), however, it it perfectly balanced in each year. The only reason why ITPD-S is not balanced in all years is due to the fact that some countries do not exist in

The disaggregated data that we will use for our analysis comes with some caveats too. For example, at such level of sectoral detail input-output data is absent. Moreover, beyond intermediate consumption, other factors of production such as embedded capital are not documented either. This constrains us to perform a comparative static analysis in an endowment setting.

We take two final steps to prepare the data for the simulation analysis. First, following (Borchert et al., 2024), we use averaged data from 2017 to 2019. This averaging increases the number of non-zero observations by 17%, which come from cases where for some international trade flows there are zero observations in some years and non-zero observations in other years. An additional benefit from the averaging is that it would diminish the possibility for our results to be subject to the influence of outliers.

Second, for computational ease and without impact on the results, we kept all EU countries and the countries that account for most of trade and expenditure in each industry, and we aggregated the rest of the countries from the full sample into a rest of the world (ROW) aggregate region. The result is that the countries that are included separately, including all EU countries China and Russia, account on average for 99.8 percent of the data, and the minimum per industry is 98.2 percent. We also note that none of the countries that are aggregated in ROW were subject to any of the initial shocks in our counterfactual experiments. Finally, in robustness analysis, we confirm that the results do not change if we drop the ROW regions completely from our counterfactual analysis.

Policy Gravity Variables. Data on membership in the European Union (EU) and data on membership in the World Trade Organization (WTO) come from the *Dynamic Gravity Dataset* (DGD) of the USITC (Gurevich and Herman, 2018).[17] We also construct our own indicator variable for countries that use the Euro based on data from the European Union.[18]

all years while new ones appear in some years.

[17]https://www.usitc.gov/data/gravity/dgd.htm

[18]https://european-union.europa.eu/institutions-law-budget/euro/countries-using-euro_en

Data on other currency unions were constructed by Jose de Sousa.[19] Data on membership in Regional Trade Agreements (RTAs) are from Egger and Larch (2008) and comprise information on enforced RTAs until year 2021.[20] Finally, data on trade and other sanctions are from the latest edition of the *Global Sanctions Database* (Felbermayr et al., 2020; Syropoulos et al., 2024).[21]

4 Estimation Results and Analysis

We present our estimates of the effects of the EU on trade between the Member States in three steps. We start with an analysis of the estimates of the industry-level EU effects that we obtain from specification (1). Then, we discuss our estimates of the directional EU effects based on the distinction between 'Old' vs. 'New' countries. Finally, we present heterogeneity-robust ETWFE estimates that are obtained from specification (2), and we compare them with the benchmark gravity estimates from equation (1). Since we obtain a large number of estimates (i.e., one for each of the 170 industries in our sample), we rely on a mixture of tables and figures to present them.

Our main estimates of the EU effects on disaggregated intra-EU trade are reported in Table 1, and we visualize the TWFE results in Figure 1.[22] The first three columns of Table 1 list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E, respectively. Columns (4) and (5) of panel A report the EU estimates, together with their corresponding standard errors, respectively, which are obtained after estimating specification (1) for each ITPD-E industry with the use of a single indicator variable for EU membership. Finally, columns (6) and (7) of panel B report our ETWFE EU estimates and their corresponding standard errors.

[19] http://jdesousa.univ.free.fr/data.htm

[20] https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html

[21] https://www.globalsanctionsdatabase.com/

[22] The top panel of Figure 1 reports the estimates for all ITPD-E industries, while the four panels in the bottom of the figure report the estimates for each of the four broad sectors in the ITPD-E. For clarity, in each panel of Figure 1, we have dropped the top and bottom 5% of the estimates.

Several findings stand out from the TWFE gravity estimates in column (4) of Table 1. First, the EU has been extremely successful in promoting trade among the Member States.[23] This is supported by the fact that the vast majority of the estimates (about 80%) in Table 1 are positive and most of them are sizable and statistically significant. Following the Cecchini report tackling "the Cost of Non-Europe" (Cecchini et al., 1988), the benefits of the Single Market have been repeatedly documented in the literature (Fontagné et al., 1998; Mayer et al., 2019; Head and Mayer, 2021). Our estimates are larger and obtained at a more disaggregated level.

Second, on average, our TWFE estimates of equation (1) imply that the partial equilibrium impact of the EU on member's trade has been an increase of about 63 percent, calculated as $(\exp(0.49) - 1) * 100$, where 0.49 is the mean of the EU estimates from Table 1. The corresponding number based on only the positive values in the Table 1 is 115%, suggesting that the EU has doubled trade among its members. Using a standard value for the trade elasticity of 5, our estimates suggest that EU membership has led to direct trade volume gains that are equivalent to tariff reductions of 9% and 14%, respectively.[24] We do obtain some negative (although mostly not statistically significant) estimates. Some of the negative estimates may be explained by directional trade cost asymmetries, others may point to anomalies in the data. These are conservative estimates, compared to ETWFE estimates of equation (2) for reasons that will be discussed below.

Finally, we find that the effects of the EU have been very heterogeneous across the industries and the broad sectors in our sample. The four bottom panels of Figure 1 visualize the estimates for each of the four broad sectors in the ITPD-E. These estimates reveal that the strongest EU effects have been in Agriculture, which is consistent with and can be interpreted through the lens of the EU Common Agricultural Policy. The estimates for

[23] We remind the reader that our EU estimates do not include the effects of the Euro zone. Thus, for the countries that have adopted the Euro, the impact of European integration on international trade should be even larger. See Berthou and Fontagné (2013) for a more refined analysis on the impact of the Euro.

[24] We employ a trade elasticity value that we employ corresponds to a value of 6 for the elasticity of substitution, in line with the average elasticity estimates computed at the product level. See Fontagné et al. (2022). The tariff-equivalent across all estimates is calculated as $(\exp(0.49/(1-\sigma)) - 1) * 100$, where $\sigma = 6$.

Services are mostly positive and sizable, but we also obtain some negative estimates, which are not precisely estimated: the ETWFE approach will bring these estimates back in the positive territory. Finally, we note that half of the estimates for Mining and Energy not statistically significant.

The large estimates for Agriculture contrast with the relatively small estimates for Manufacturing, which may have two non-exclusive explanations. One is the changing geography of the world economy, e.g., some natural trading partners (e.g., China) are outside the EU. Another possible explanation is the muted nature of the European industrial policy over the period considered here. Without attempting to unravel these explanations, what emerges is that the trade potential in this broad sector is perhaps not being fully exploited and realized. It is also true that the estimates for the manufacturing industries are quite heterogeneous and we do see from Figure 1 that some of them are quite large.

Since we cannot identify the nature of the individual industries in Figure 1, we obtain more aggregate sectoral estimates. To do so, rather than aggregating the industry data, we pool together individual industries into 18 sectors, including Agriculture, Mining and Energy, Services, and 15 Manufacturing sectors. Guided by theory, each of the fixed effects from equation (1) now also varies across the sectoral dimension. Our findings appear in Figure 2. As expected, we see that the estimate for Agriculture is among the largest, implying that the EU has led to an increase in the trade volume in this sector by about 200%. The other two sectors with particularly large estimates are related – 'Beverages and Tobacco' and 'Food'. The fourth largest estimate is for Services.[25] Consistent with the results in Figure 1, the estimate for Mining and Energy is not estimated precisely, but it is statistically significant.[26] Also consistent with Figure 1, most of the estimates for Manufacturing are positive and statistically significant, but they are relatively small. The only negative (and statistically significant) estimate that we obtain is for 'Apparel and Footwear'.

[25] We remind the reader that the Services data in the ITPD-E starts in 2000.

[26] When pooling the industries in the Mining and Energy sector, we exclude industry '35: Gas production and distribution' because we could not obtain individual estimates for it.

To highlight the remarkable success of the EU to promote trade among members, in Figures 3, we reproduce the estimates from the top panel of Figure 1 and, in addition, we use a scatter plot to overlay the corresponding results for all RTAs other than the EU, which are obtained from the same specification. Consistent with the literature (Baier et al., 2019) and with our expectations, we see that most of the estimates of the effects of the RTAs are significantly smaller than the corresponding EU estimates, and the fraction of positive and significant RTAs is much smaller too. Thus, the results in Figures 3 reinforce the perception of the EU as one of the most successful trade liberalization efforts in the world.

Next, we obtain estimates of the EU effects depending on the direction of trade flows and after splitting the EU countries into 'Old' vs. 'New' members. Our results are presented in Table 2, and they reveal the following. Similar to the single EU impact, the estimates of the directional EU effects are positive, large, and statistically significant. Importantly, our estimates reveal that the EU effects are quite similar across the four groups of countries in our sample.[27] Our directional estimates are heterogeneous across sectors but confirm that the strongest EU effects are for Agriculture.[28]

We conclude the analysis of our partial equilibrium estimates of the EU effects on intra-EU trade with a discussion of the heterogeneity-robust ETWFE estimates, which are reported in columns (6) and (7) of Table 1 and also visualized in the top panel Figure 4.[29] Similar to the corresponding gravity estimates from column (4), the ETWFE estimates from column (6) confirm that the effects of the EU on intra-EU trade are economically large, statistically significant, and very heterogeneous across the industries in our sample. The correlation between the positive estimates in column (4) and the corresponding ETWFE results in column (6) is also high (0.84).

To further highlight the similarities between the two sets of estimates, in the bottom

[27]Specifically, we obtain an average estimate of 0.563 for exports from New to New members, 0.586 for exports from New to Old members, 0.494 for exports from Old to New members, and 0.571 for exports from Old to Old members.

[28]Since the Services data in the ITPD-E starts in 2000, we cannot obtain estimates for the EU effects on trade among Old members.

[29]For clarity, we do not report the top and the bottom 5 percent of the estimates in Figure 4.

panel of Figure 4, we reproduce the ETWFE estimates and, in addition, we use a scatter plot to overlay the corresponding gravity estimates of the EU effects from column (4). We see from this figure that for most industries the two sets of estimates are not statistically different from each other. However, we also see some differences between the two sets of results. First, a smaller fraction (about 10%) of the ETWFE estimates are negative, and only 6 of them are statistically significant. A possible explanation for this is that the ETWFE estimates are not subject to the caveats of 'negative weights' and 'forbidden comparisons' (Borusyak and Jaravel, 2017; de Chaisemartin and D'Haultfœuille, 2020).

Second, the ETWFE estimates are a bit larger (e.g., by about 25% on average). This is consistent with the differences between TWFE vs. ETWFE estimates, in favor of the latter, which are documented in Nagengast and Yotov (2024) and Nagengast et al. (2024). The implied trade volume effects based on the averages across all ETWFE estimates and based only on the positive estimates are 137 percent and 175 percent, respectively. The corresponding tariff-equivalent values are 15 percent and 18 percent, respectively.

In sum, the analysis in this section leads to four main conclusions. First, the EU has had a remarkable impact on trade among its members. Second, this impact has been quite heterogeneous across sectors, with a premium for Agriculture. Third, we do not find any dramatic asymmetries in the average EU effects on trade among Old and New members. Finally, we obtain highly correlated estimates from an established gravity model vs. a heterogeneity-robust estimator, but the ETWFE estimates are a bit larger in magnitude and a smaller fraction of them are negative. Based on this, in the counterfactual analysis that we perform next, we will experiment with both sets of industry-level EU estimates.

5 Counterfactual analysis

This section presents the results from three simulation scenarios. First, we use the ETWFE partial equilibrium estimates of the EU effects that we obtained in column (6) of Table 1 to calculate the benefits of the Single Market.[30] Then, we evaluate the impact of decreasing/eliminating trade with 'riskier' partners. Specifically, we simulate a decrease in trade between the EU and China and Russia by 98 percent, which is equivalent to the imposition of a uniform tariff of about 55 percent across all industries in our data. Finally, we demonstrate that, through comparatively small trade liberalization efforts within the EU, the Single Market can fully offset the losses for the countries that suffered the most (i.e., Cyprus and Estonia) due to the forgone trade with China and Russia from the previous simulation scenario. Subsection 5.1 reviews the theoretical framework that we employ. Then, in Subsection 5.2, we summarize the findings from the three counterfactual experiments.

5.1 Summary of the structural gravity system

Our counterfactual analysis relies on the gravity model, a.k.a. the new quantitative trade model (NQTM), because it has been recognized and widely accepted as the benchmark/workhorse model for simulation analysis of the effects of trade policies. In addition to its predictive power, and theoretical foundations, which are consistent with a large class of trade models, the structural gravity system has two important and specific advantages for our purposes. First, it nests a structural gravity equation that corresponds directly to our econometric specification. Thus, our partial equilibrium estimates are consistent with the simulation framework. Second, the gravity system is 'separable' at the product/industry/sector level, which will enable us to perform the counterfactual analysis for each individual industry in our data.[31]

Given that the gravity system is isomorphic to many different foundations (e.g., Arkolakis et al. (2012)), in the following presentation, we rely on the simplest gravity theory, which is

[30] As noted earlier, we also will obtain counterfactual results based on the estimates of the EU effects from columns (4) of Table 1.

[31] The rest of the exposition in this section follows Beverelli et al. (2023), who study the impact of institutional quality on international trade and, more recently, Borchert et al. (2024), who quantify the impact of globalization on trade and welfare in the world over the period 1986-2019. Using the newly-created ITPD-S, they employ a solution of the structural gravity model in changes, following Dekle et al. (2007) and Dekle et al. (2008).

built on the assumptions of an endowment economy on the supply side and globally common CES preferences on the demand side (Anderson, 1979; Anderson and van Wincoop, 2003, 2004). The solution for expenditures on goods shipped from country i to country j of the consumer's optimization problem leads to the following expression for bilateral trade flows:

$$X_{ij} = \left(\frac{\alpha_i p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j. \tag{3}$$

Although, for expositional simplicity, equation ((3)) does not include time and sector/product subscripts or superscripts, the gravity system holds at any desired level of aggregation (Anderson and van Wincoop, 2004; Costinot et al., 2012). This is important for our the remaining discussion in this subsection and for our simulation anallysis in the next subsection, which will be conducted at the industry level.[32]

Turning to the different terms in equation ((3)), α_i is the CES share preference parameter, p_i denotes the price of the good in country i, t_{ij} denotes any determinants of trade between countries i and j, including time-varying bilateral trade barriers (e.g., EU membership) as well as time-invariant trade costs, which were accounted for with the country-pair fixed effects in our econometric model. The CES price aggregator P_j , which can be interpreted as an ideal price index that combines the prices from all countries, is given by $P_j^{1-\sigma} = \sum_l (\alpha_l p_l t_{lj})^{1-\sigma}$. E_j is the expenditure in country j, which can be calculated for each country as sum across all bilateral imports, including the domestic sales in country j: $E_j = \sum_i X_{ij}$. Due to the assumption of an endowment economy, we have $E_i = Y_i + TI_i = p_i Q_i + TI_i$, where Y_i denotes the total value of production of country i, which can be calculated as total sales at home and abroad: $Y_i = \sum_j X_{ij}$. Q_i denotes the initial endowments in each country i, and TI_i denotes the trade imbalances, which are held constant.[33] Finally, σ denotes the elasticity of

[32]Equation ((3)) can be derived from dynamic microfoundations (Olivero and Yotov, 2012; Eaton et al., 2016). However, this is not necessary for the general equilibrium counterfactual analysis that we will perform for a baseline year.

[33]There are various ways to deal with trade imbalances. Holding them constant between the baseline and counterfactual, as we do, ensures that world trade imbalances are zero in the baseline and counterfactual. See for a nice discussion Costinot and Rodriguez-Clare (2014).

substitution.

Based on the gravity model and following Arkolakis et al. (2012) we can define:

$$\hat{W}_i = (\hat{\pi}_{ii})^{1/(1-\sigma)}, \tag{4}$$

where $\hat{\pi}_{ii}$ denote the changes in the share of expenditure on goods from country i. With aggregate data, $\hat{W}_j$ can be interpreted as the change in expenditure, real income, or welfare in response to a trade shock. However, since our counterfactual analysis will be performed separately for each industry, we can no longer interpret the corresponding sectoral indexes as welfare or real GDP effects. Strictly defined, for each industry, they will be constructed as the ratio of nominal income (e.g., wage) changes in the industry over the changes in consumer prices for the goods paid in this same industry. Thus, our 'welfare-like' ACR measures are closer to terms-of-trade (ToT) indexes or real output per industry. It may be possible obtain complementary sectoral and aggregate welfare measures by aggregating the consumer prices across all industries, e.g., through nesting the CES preferences across varieties within a given industry into Cobb-Douglas preferences across the different industries. However, we do not do this in the current analysis because our primary objective is to obtain industry-specific effects from our counterfactual analysis.

The shocks in the counterfactual experiments that we will perform will be triggered by changes in trade costs ($\hat{t}_{ij}$), e.g., lower trade costs due to the formation of the Single Market or higher trade costs with 'riskier' partners. These changes in trade costs will translate into 'ToT/real output' changes by affecting the share of expenditure on goods from country i. Following Dekle et al. (2007, 2008), country i's share in country j's spending is defined as $\pi_{ij} = X_{ij}/E_j$, and, using (3), we calculate the change of π_{ij} between the baseline (denoted with superscript b) and the counterfactual (denoted with superscript c) as follows:

$$\hat{\pi}_{ij} = \frac{\pi^c_{ij}}{\pi^b_{ij}} = \frac{\left(\hat{p}_i \hat{t}_{ij}\right)^{1-\sigma}}{\sum_l \pi_{lj} \left(\hat{p}_l \hat{t}_{lj}\right)^{1-\sigma}}. \tag{5}$$

Due to the assumption of an endowment economy, we can express $\hat{Y}_j = \hat{p}_j$ and $\hat{E}_i = E_i^c/E_i = (\hat{Y}_i Y_i + TI_i)/E_i$, and $\hat{Y}_i$ can be calculated from:

$$Y_i\hat{Y}_i = \sum_j \frac{\pi_{ij}(\hat{Y}_i\hat{t}_{ij})^{1-\sigma}}{\sum_l \pi_{lj}(\hat{Y}_l\hat{t}_{lj})^{1-\sigma}}(\hat{Y}_jY_j + TI_j). \tag{6}$$

One important advantage of solving the gravity system in changes is that it has minimum data requirements. Specifically, in addition to the changes in the trade cost vector, we only need data on trade flows (including domestic and international trade flows) and value(s) for σ. We make two decisions with respect to the trade data. First, we limit the simulation samples for each industry to include all EU members, Russia, China, and the US, plus the thirty largest additional exporters in the corresponding industry. We made this decision to ensure convergence due to cases for small countries that do not trade certain products. On average, the resulting sample covers 98.8 percent of trade across all industries, which vary between 90.6% and 100% for individual industries.[34] Thus, despite limiting the number of countries, we sill cover almost all trade in the world for each industry. Second, even after limiting the number of countries, we still have a few cases when a country does not produce and trade at all in a given industry. Those cases were dropped from the simulations, but their number is really small, i.e., a few small countries in some of the Services industries.

To obtain our counterfactual results, we chose a single/common value of 6 for the elasticity of substitution σ, which is standard in the gravity literature. The trade elasticity can vary by industry, both theoretically and empirically. In fact, we are well aware that there exist very detailed disaggregated estimates of the trade elasticity, e.g., the product-level estimates of (Fontagné et al., 2022) that are obtained at the 6-digit HS level from a gravity setting such as ours, and which are very heterogeneous across products. In principle, we can apply the methods from (Fontagné et al., 2022) to obtain our own trade elasticity estimates from our main econometric model and at the industry level of aggregation that we employ in this

[34] We also experimented by increasing the number of largest exporters to the top 50 and the top 70 and, as expected and whenever convergence was achieved, the results were very similar.

paper. However, our simulation results will be obtained with a constant value across the industries in our sample for two reasons. First, we do not have consistently aggregated tariff data and concordances from the HS level to the industry level of our analysis.[35] Second, using a common trade elasticity will enable us to better decompose the drivers of the heterogeneous response to the trade shocks that we introduce across the EU countries, with sectoral impacts driven by the structure of the matrices of trade flows and trade costs, and not by differences in sectoral trade elasticities.[36]

Using the trade data, we can obtain/define $Y_i = \sum_j X_{ij}$, $E_j = \sum_i X_{ij}$, $TI_i = E_i - Y_i$, and $\pi_{ij} = X_{ij}/E_j$. Then, with $\hat{Y}_i$, we can calculate the remaining changes: $\hat{E}_j = (\hat{Y}_j Y_j + TI_j)/E_j$, $\hat{p}_j = \hat{Y}_j$, $\hat{P}_j = (\sum_l \pi_{lj}(\hat{p}_l \hat{t}_{lj})^{1-\sigma})^{1/(1-\sigma)}$, and $\hat{\pi}_{ij} = (\hat{p}_i \hat{t}_{ij})^{1-\sigma}/(\sum_l \pi_{lj}(\hat{p}_l \hat{t}_{lj})^{1-\sigma})$. Finally, as with all NQTMs, solving our model requires the choice of a numéraire. Given the focus on the EU, we use the factory-gate prices, p_i, in Canada as our numéraire. The main reasons are that Canada has reliable data and that it is relatively "remote" from the counterfactuals that we will perform. It should also be noted that the choice of numéraire is inconsequential for our "welfare-like" real output indexes, and it would only be relevant if we reported and discussed any nominal indexes, e.g., prices, trade, etc.

5.2 Counterfactuals, Results, and Discussion

We use the structural gravity model that we presented in the previous section to perform three counterfactual experiments. In what follows, we describe the design for each of the simulations and we discuss our findings. In each case, we obtain real output effects for each country-industry combination in our data. Due to the large number of indexes, we only focus on the EU countries and we report summary/average indexes across the industries in our sample, which are obtained from the underlying country-industry indexes with output

[35] We are aware of an ongoing effort by the US International Trade Commission (USITC) to create such data and concordances and we plan to capitalize on them when available.

[36] Of course, the relationship between changes in the trade elasticity and the direction of the corresponding welfare changes is well understood, i.e., we know that larger values for the trade elasticity would be associated with smaller real output effects.

shares used as weights. The motivation for this choice is to attach larger weight to the more important industries in each country. We use a combination of tables and figures.

Counterfactual 1: The impact of the Single Market. Our first counterfactual analysis evaluates the impact of the EU completion. To this end, we start with our real-world data as the baseline, and we use our own ETWFE estimates of the partial effects for each industry to simulate a scenario *without* the EU (e.g., like Brexit but for all members). In the few cases/industries when we got negative EU partial estimates (see Table 1), we set them to zero. Thus, real output in these industries is not affected by the EU and they do not contribute to the country-specific indexes that we report and analyze below. By construction, eliminating the EU results in losses for all members. However, to ease interpretation, we instead report the indexes in absolute value, i.e., as gains.

The top panel of Figure 5 plots the average, across all industries, of the real output gains from the Single Market for each Member State. Although we obtain large and heterogeneous gains for all Member States larger countries (e.g., Italy, UK, France, and Germany) and some newer members (e.g., Poland, Latvia, and Romania) gain relatively less. By sake of country size and market potential, in contrast, smaller, and more central, and 'older' Member States (e.g., Luxembourg, Belgium, and the Netherlands) gain more. We also see relatively large gains for some of the recent and more centrally located EU members (e.g., Hungary, Slovenia, and Slovakia).

For brevity, we do not present results of the EU effects across industries. However, the industry real output results are pre-determined by the size and heterogeneity of the of the corresponding partial equilibrium EU estimates. Thus, as expected, the largest gains in real output are in Agriculture. Finally, in the bottom panel of Figure 5, we compare the real output effects that are obtained based on the preferred ETWFE estimates (in blue color) vs. those from the TWFE gravity estimates (in red color). The correlation between the two sets of results is very high (0.95) and, as demonstrated in Figure 5, they are quite similar in levels too.

The overall policy implication from this analysis is that the impact of the Single Market on the EU economies has been positive, remarkably strong, and very heterogeneous, both across countries and across industries. Geography, country size, sectoral specialization, and strength of the bilateral trade ties of the economies within the EU therefore explain the observed differences.

Counterfactual 2: Eliminating trade with "riskier" partners. In a second thought experiment, the counterfactual starts with the actual data for the baseline year, i.e., with the EU in place, and we increase the trade costs with some "riskier" partners. Specifically, we increase trade costs to eliminate about 98 percent of the EU trade with China and Russia, *and the two countries retaliate*, i.e., we limit both the exports to and the imports from Russia and China for each of the EU Member States. By construction, such a decrease in trade is equivalent to the imposition of a uniform (across sectors and countries) reciprocal tariff of about 55 percent between the EU Member States vs. China and Russia across all industries in our data. To decompose the effects of limited trade with Russia vs. China, we proceed in three steps.

First, we increase the trade costs between the EU Member States and Russia only. The results from this experiment are reported in the top-right panel of Figure 6, and we find them intuitive. Specifically, some of the countries that suffer the most are former Soviet republics, e.g., Estonia, Latvia, and Lithuania. The other countries that are affected the most are countries that are geographically close and economically tied to Russia, e.g., Finland and Bulgaria. We also note that Greece and especially Cyprus also lose a lot. The case of Cyprus is particularly interesting because of the historically strong trade ties to Russia, "particularly in services trade, notably tourism and professional business services, which contribute over 25% to Cyprus' total exports of services – highest among EU countries" (Sakkas and Mavrigiannakis, 2024). On the other end of the spectrum, i.e., with very small losses, we see Spain, Portugal, France, and Luxembourg. Denmark is the only Member State that registers very small gains in this experiment, and the explanation for this effect is that it is due to the GE trade diversion effects in our model.

We also find intuitive the results when we turn to the effects of limiting trade between the EU and Russia across industries. Panel A of Table 3 lists the fifteen industries, where the losses from cutting trade ties with Russia are the largest. Before we discuss our findings, we remind the reader that the shock to the trade costs with Russia was identical for all industries in our sample. Thus, the widely heterogeneous counterfactual results that we obtain are driven by heterogeneous bilateral dependence, size, and sectoral specialization, and not by heterogeneous shocks. As expected, we see from Table 3 that the most affected industries belong to the broad category of "Mining and Energy". In addition, most of the industries that fall within the broader manufacturing sector are also resource-driven.

In the top-left panel of Figure 6, we report the results from an experiment where we only increase the trade costs between the EU Member States and China. Comparison between the results with the top-right panel reveal that, on average, the losses from limiting trade China are larger than those from limiting trade with Russia. The composition of affected countries is also very different, as expected. The five most negatively affected countries in this scenario are Estonia, Czechia, Germany, Poland, and Denmark. Large initial trade volumes with China are the natural explanation for these results. The five Member States that are affected the least in this scenario are Luxembourg, Latvia, Croatia, Belgium, and Lithuania. Notably, Luxembourg and Croatia are were also among the countries that were affected less from the decrease in trade with Russia, while Latvia and Lithuania were among the most affected ones.

The industry-level results in response to limiting trade with China are also intuitive. Panel B of Table 3 lists the fifteen industries, where the losses from cutting trade ties with China are the largest. These industries are exclusively in the broad Manufacturing sector, with many of them related to textile and apparel, as expected.

The estimates in the bottom-left panel of Figure 6 are obtained in an experiment where we simultaneously increase trade costs between the EU members with Russia and China. Due to the GE forces and non-linear relationships in our model, these results are not a simple sum of the individual effects from the previous experiments. Nevertheless, there is a clear additive component in the relationship between the three graphs, and it is informative to keep in mind the decomposed estimates when interpreting the aggregate results in the bottom panel.

We see from Figure 6 that the two most negatively affected countries are Estonia and Cyprus. Based on the top two panels of Figure 6, we see that in the case of Estonia, the large losses are due to cumulative effects from limiting trade with both Russia and China, while in the case of Cyprus, the losses are mostly driven by limiting trade with Russia. Overall, and as indicated before, the heterogeneity in the results is indeed driven by geography, country size, initial sectoral specialization, and economic ties between the EU members and China and Russia.

For comparison, the corresponding average losses that we obtain for Russia and for China are about 8 percent and about 3 percent, respectively. Thus, Russia would be the country with the largest losses. The policy implication of these results is that increased trade costs with the EU may indeed cause significant damage to Russia, while China will be affected moderately. Finally, for comparison purposes, in the bottom-right panel of Figure 6, we combine the estimates of the EU effects (in blue color) and the effects of the counterfactuals for China and Russia (in red color). The figure clearly demonstrates that, despite being large, the losses from limiting trade with China and Russia are relatively small as compared to the gains from the Single Market.

Counterfactual 3: Compensating trade liberalization. In the third set of counterfactuals, we explore the possibility for further trade liberalization within the EU to offset the losses from limiting trade with China and Russia. To this end, we first focus on the two countries (Estonia and Cyprus) that were affected the most from limiting trade with China and Russia. In each case, we start in a benchmark with the EU effects in place and also with the higher costs with China and Russia that we implemented in the previous counterfactual. Then, we decrease further the trade costs between Estonia and the other EU Member States and then between Cyprus and the other EU Member States.

The results in the top panel of Figure 7 are obtained from a scenario where we uniformly decrease the trade costs for all industries between Estonia and the EU by a symmetric shock to the bilateral trade cost vector between Estonia and the EU that is equivalent to a partial equilibrium gravity estimate of 0.2, which is equivalent to a hypothetical tariff decrease of less than 4 percent. For comparison, we remind the reader that the corresponding tariff-equivalent effect of the Single Market on intra-EU trade that has already taken place is about 18 percent (calculated as the average of our positive ETWFE EU estimates). Thus, in combination with the widely heterogeneous EU effects across industries and the fact that Estonia is a relatively new member, we believe that the 4 percent tariff-equivalent decrease that we implement in this scenario is plausible and feasible in the longer run.

Two main results stand out from the top panel of Figure 7. First, the proposed 4 percent tariff-equivalent decrease in the trade costs between Estonia and the EU will be sufficient to more than offset the losses for this country from limiting trade with Russia and China. The fact that such a moderate decrease in intra-EU trade costs is more than enough to offset the losses from no trade with two of the EU's largest trade partners is not surprising because the EU market is large and close. Thus, even a small success in further integration within the EU would have large effects.

The second notable finding from Figure 7 is that, in addition to Estonia, some other EU countries will gain as well. Perhaps not surprisingly, due to their close geographical location and strong economic ties to Estonia, these are Latvia, Lithuania, and Finland. This experiment, and the corresponding results, have broader implications because the same logic applies in the opposite direction, i.e., in the case of trade protection. Specifically, if Estonia suffered from increased trade costs, then it would have diverted trade to its closest trading partners, e.g., Latvia, Lithuania, and Finland.

In our next experiment, we focus on Cyprus, which is the country that has lost the most from limited trade with Russia and China (see the bottom-left panel of Figure 6). Previously, we have speculated that most of Cyprus' losses are probably due to lost services trade with Russia. We now test this hypothesis in the middle panel of Figure 7, where we report two sets of estimates. In blue color, we reproduce the losses for all countries due to limited trade with Russia and China in all sectors. Then, the estimates in red color are obtained from the same scenario but without increasing the trade costs in Services between the EU and Russia. In other words, we have increased all trade costs between the EU and China and all the trade trade costs between Russia and the EU, except for services trade. Consistent with our expectations, most of the losses for Cyprus are eliminated, we also see significantly smaller losses for some other countries, e.g., Lithuania, Estonia, and Latvia.

Next, we perform a compensating trade liberalization experiment for Cyprus. In the bottom panel of Figure 6 we reproduce the losses for all countries due to limited trade with Russia and China in all sectors (in blue color). Then, in addition, we report in red color the results from a simulation scenario, where we decrease the trade costs between Cyprus and the EU but only in Services. To this end, we implement a change in the services trade costs between Cyprus and the EU that is equivalent to a partial equilibrium gravity estimate of 0.3 (i.e., a tariff-equivalent decrease of about 5.8 percentage points). The main result from the bottom panel of Figure 7 is that the moderate decrease in the bilateral trade costs in Services between Cyprus and the other EU members was more than enough to offset the losses for Cyprus from limiting its trade with Russia and China in all sectors. The policy implication of this experiment is that intra-EU trade liberalization in specific sectors may be particularly effective in benefiting existing EU Member States.

Given that Estonia and Cyprus are relatively small EU members, one may be wondering what would it take to compensate Germany, the largest EU member in terms of GDP and population, for the losses from limited trade with Russia and China. We answer this question with the results in the top panel of Figure 8, which are obtained from a scenario where we uniformly decrease the trade costs for all industries between Germany and the EU by a symmetric shock to the bilateral trade cost vector between Germany and the EU that is equivalent to a partial equilibrium gravity estimate of 0.2, which is equivalent to a hypothetical tariff decrease of less than 4 percent, i.e., the same scenario that we implemented for Estonia in the top panel of Figure 7.

Two main results stand out from the top panel of Figure 8. First, the proposed 4 percent tariff-equivalent decrease in the trade costs between Germany and the EU will be sufficient to not only offset the losses but to generate significant gains for Germany. While, because of Germany's relative size, this result may seem counterintuitive at first, the explanation for it is that Germany is a very important trading partner for many/most EU countries. Thus, when trade is liberalized uniformly with all EU partners the gains for Germany will be large. The same intuition explains the second main finding from Figure 8, which is that trade liberalization with Germany only will be sufficient to offset the losses for some other countries. Perhaps not surprisingly, due to their tight connections with Germany, the two countries that will end up with net gains in this scenario are Luxembourg and Austria.

Stimulated by our findings for Germany, we next ask what would happen if we liberalized trade among all EU members, i.e., as if there was a coordinated round of additional trade liberalization within the EU. Once again, starting with the limited trade with Russia and China, we liberalize trade by a symmetric shock that is equivalent to a partial equilibrium gravity estimate of 0.2 (i.e., a tariff decrease of less than 4 percent), but this time for the trade costs among all EU members. Our findings are reported in the bottom panel of Figure 8, and we find them encouraging and intuitive. Specifically, the main result is that almost all EU members will end up with net gains, and these gains will be larger for the smaller EU members. The only three countries that still experience net losses are Cyprus, Estonia, and Finland. The explanation is that (i) these were the countries with some of the largest losses from limiting trade with Russia and China, and (ii) unlike our first counterfactual, where we only liberalized trade between Estonia and the EU, the 4 percent tariff-equivalent decrease is no longer enough to compensate the losses for Estonia due to trade creation and trade diversion to and from other EU members that also enjoy trade liberalization within the EU in the new counterfactual, i.e., Estonia would gain more if it traded at lower costs with all EU members while they were not trading more with each other.

6 Conclusion

We used established methods and new disaggregated data to quantify the economic impact of the Single Market and conduct stylized thought experiments on strategic autonomy and offsetting deepening of EU integration. In sum, we found that the impact of the EU on its Member States has been positive and remarkably strong, but also heterogeneous, both at the partial and at the GE level.

We also obtained significant negative effects from eliminating trade with Russia and China, but we showed that these effects are relatively small in comparison to the gains already obtained from the completion of the Single Market. Consistent with this, a simulation analysis revealed that even the largest losses from decreased trade with Russia and China can be offset by relatively small further/deeper integration within the EU. As a natural consequence of usual gravity forces governing trade in goods and services, this result has been established for small countries that benefit greatly from an additional reduction in trade costs vis-a-vis a large European market, whether for goods or services, namely Estonia and Cyprus. Interestingly, this possible compensation also exists for the largest Member State, which benefits from being a major trading partner for other EU Member States. The same conclusion applies for the EU as a whole, although complex trade diversion and creation effects within the Single Market are conducive to heterogeneous offsetting effects across Member States.

While we believe that our main conclusions are robust, we see several possibilities for improvements of our analysis and we acknowledge some caveats. First, on the estimation front, we believe that the analysis can be improved and refined in several directions. We could identify a number of other EU effects depending on interest and needs. For example, due to the use of domestic trade flows, we can obtain EU estimates per country and decompose those on trade with members vs. non-members. We can also obtain estimates per pair within the EU, e.g., EU effects on trade between France and Bulgaria. We can also go a step further and obtain directional pair EU effects, e.g., exports from France to Bulgaria, and vice versa.

Second, on the counterfactuals front, the accuracy of our predictions could improve by using heterogeneous trade elasticity estimates. In addition, we are aware that some of the counterfactual predictions may not be reached due to constraints on the extensive margin (e.g., due to capacity and/or lack of natural resources). Moreover, our simple endowment analysis does not include global value chains and does not allow for dynamic forces that act through asset accumulation. Based on findings from the existing literature, we expect that allowing for IO links and dynamics would actually reinforce most of our conclusions.

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Table 1: Industry-Level EU Estimates

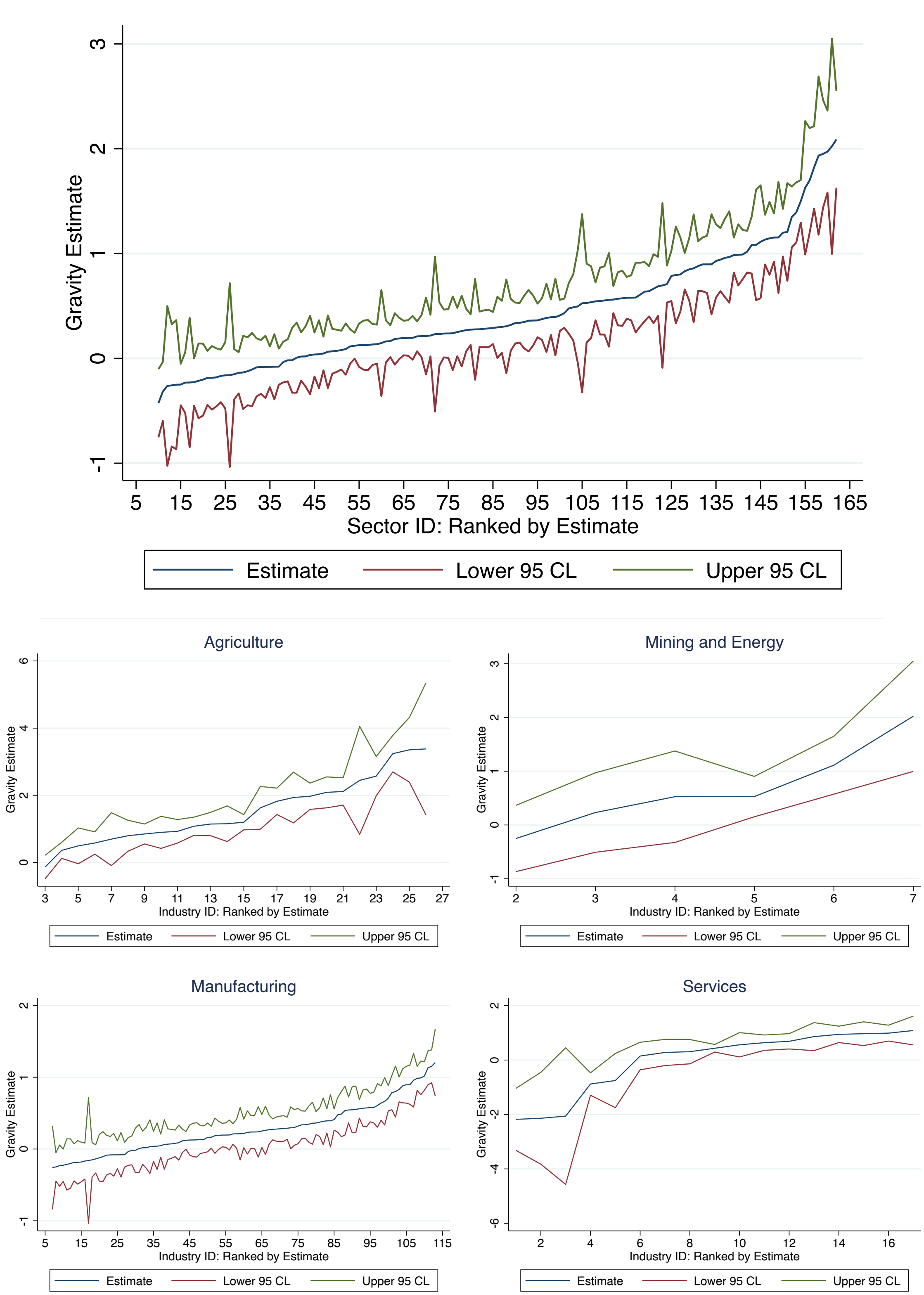
Industry ID	Industry Description	Broad Sector	A. TWFE Estimates %ΔReal Output	A. TWFE Estimates Std.Err.	B. ETWFE Estimates %ΔReal Output	B. ETWFE Estimates Std.Err.
1	Wheat	Agriculture	2.115	(.208)	2.312	(.2)
2	Rice (raw)	Agriculture	3.241	(.277)	3.004	(.242)
3	Corn	Agriculture	2.088	(.235)	1.833	(.224)
4	Other cereals	Agriculture	1.822	(.2)	1.740	(.158)
5	Cereal products	Agriculture	3.354	(.49)	4.057	(.651)
6	Soybeans	Agriculture	1.935	(.385)	2.358	(.372)
7	Other oilseeds (excluding peanuts)	Agriculture	0.849	(.151)	1.151	(.158)
8	Animal feed ingredients and pet foods	Agriculture	0.580	(.17)	1.236	(.209)
9	Raw and refined sugar and sugar crops	Agriculture	3.382	(1.001)	4.309	(.609)
10	Other sweeteners	Agriculture	1.154	(.271)	1.605	(.197)
11	Pulses and legumes, dried, preserved	Agriculture	0.496	(.272)	1.028	(.151)
12	Fresh fruit	Agriculture	1.081	(.138)	1.184	(.103)
13	Fresh vegetables	Agriculture	1.199	(.116)	1.203	(.086)
14	Prepared fruits and fruit juices	Agriculture	0.897	(.243)	0.448	(.205)
15	Prepared vegetables	Agriculture	5.667	(2.035)	3.813	(.948)
16	Nuts	Agriculture	1.145	(.178)	1.267	(.151)
17	Live Cattle	Agriculture	0.696	(.401)	1.360	(.522)
18	Live Swine	Agriculture	4.543	(.423)	2.357	(.607)
19	Eggs	Agriculture	1.972	(.2)	2.123	(.135)
20	Other meats, livestock products, and live animals	Agriculture	-0.134	(.178)	0.062	(.165)
21	Cocoa and cocoa products	Agriculture	2.445	(.819)	4.949	(.55)
22	Beverages, nec	Agriculture	2.572	(.298)	2.858	(.232)
23	Cotton	Agriculture	1.627	(.325)	2.045	(.396)
24	Tobacco leaves and cigarettes	Agriculture	0.796	(.235)	1.080	(.213)
25	Spices	Agriculture	0.929	(.178)	0.953	(.16)
26	Other agricultural products, nec	Agriculture	0.361	(.122)	0.513	(.1)
27	Forestry	Agriculture	-0.161	(.162)	0.093	(.158)
28	Fishing	Agriculture	-0.230	(.315)	0.256	(.277)
29	Mining of hard coal	Mining and Energy	0.526	(.434)	0.125	(.292)
30	Mining of lignite	Mining and Energy	2.024	(.524)	2.897	(.59)
31	Extraction crude petroleum and natural gas	Mining and Energy	-0.251	(.314)	-0.035	(.305)
32	Mining of iron ores	Mining and Energy	0.232	(.377)	-0.167	(.363)
33	Other mining and quarring	Mining and Energy	0.528	(.192)	0.226	(.106)
34	Electricity production, collection, and distribution	Mining and Energy	1.112	(.275)	1.631	(.)
35	Gas production and distribution	Mining and Energy	-1.887	(1.304)	.	(.)
36	Processing/preserving of meat	Manufacturing	1.153	(.117)	1.324	(.084)
37	Processing/preserving of fish	Manufacturing	0.991	(.119)	1.090	(.112)
38	Processing/preserving of fruit and vegetables	Manufacturing	0.709	(.09)	0.743	(.063)
39	Vegetable and animal oils and fats	Manufacturing	0.959	(.191)	1.012	(.177)
40	Dairy products	Manufacturing	1.498	(.104)	1.539	(.075)
41	Grain mill products	Manufacturing	1.393	(.146)	1.598	(.112)
42	Starches and starch products	Manufacturing	1.133	(.121)	1.129	(.125)
43	Prepared animal feeds	Manufacturing	0.881	(.121)	0.795	(.083)
44	Bakery products	Manufacturing	0.897	(.131)	1.306	(.123)
45	Sugar	Manufacturing	1.206	(.238)	2.009	(.182)
46	Cocoa chocolate and sugar confectionery	Manufacturing	1.018	(.101)	1.355	(.071)
47	Macaroni noodles and similar products	Manufacturing	1.698	(.255)	1.842	(.149)
48	Other food products n.e.c.	Manufacturing	0.986	(.085)	1.075	(.075)
49	Distilling rectifying and blending of spirits	Manufacturing	1.350	(.148)	1.271	(.128)
50	Wines	Manufacturing	0.800	(.181)	0.357	(.162)
51	Malt liquors and malt	Manufacturing	0.487	(.16)	0.699	(.117)
52	Soft drinks; mineral waters	Manufacturing	0.573	(.134)	0.978	(.093)
53	Tobacco products	Manufacturing	1.951	(.263)	2.301	(.223)
54	Textile fibre preparation; textile weaving	Manufacturing	0.578	(.11)	0.605	(.109)
55	Made-up textile articles except apparel	Manufacturing	0.037	(.107)	0.322	(.089)
56	Carpets and rugs	Manufacturing	0.897	(.139)	0.558	(.104)
57	Cordage rope twine and netting	Manufacturing	0.237	(.116)	0.327	(.078)
58	Other textiles n.e.c.	Manufacturing	0.190	(.1)	0.346	(.081)
59	Knitted and crocheted fabrics and articles	Manufacturing	-0.167	(.128)	0.098	(.118)
60	Wearing apparel except fur apparel	Manufacturing	-0.503	(.146)	-0.019	(.09)
61	Dressing and dyeing of fur; processing of fur	Manufacturing	0.007	(.171)	-0.135	(.143)
62	Tanning and dressing of leather	Manufacturing	-0.202	(.175)	0.010	(.154)
63	Luggage handbags etc.; saddlery and harness	Manufacturing	-0.434	(.174)	0.191	(.143)
64	Footwear	Manufacturing	-0.186	(.155)	0.138	(.103)
65	Sawmilling and planing of wood	Manufacturing	-0.122	(.165)	-0.070	(.091)
66	Veneer sheets plywood particle board etc.	Manufacturing	0.196	(.106)	0.297	(.054)
67	Builders' carpentry and joinery	Manufacturing	0.127	(.119)	0.119	(.078)
68	Wooden containers	Manufacturing	-0.226	(.115)	0.197	(.057)
69	Other wood products; articles of cork/straw	Manufacturing	0.301	(.127)	0.011	(.067)
70	Pulp paper and paperboard	Manufacturing	0.218	(.101)	0.762	(.062)
71	Corrugated paper and paperboard	Manufacturing	0.286	(.091)	0.517	(.064)
72	Other articles of paper and paperboard	Manufacturing	-0.0180	(.102)	0.191	(.086)
73	Publishing of books and other publications	Manufacturing	0.194	(.084)	0.532	(.085)
74	Publishing of newspapers journals etc.	Manufacturing	-0.086	(.141)	0.483	(.149)
75	Publishing of recorded media	Manufacturing	-0.215	(.182)	0.214	(.139)
76	Other publishing	Manufacturing	-0.081	(.152)	-0.004	(.137)
77	Printing	Manufacturing	0.212	(.103)	0.361	(.063)
78	Service activities related to printing	Manufacturing	0.033	(.191)	0.249	(.114)
79	Coke oven products	Manufacturing	-0.263	(.389)	-0.192	(.252)
80	Refined petroleum products	Manufacturing	0.238	(.119)	0.667	(.099)
81	Processing of nuclear fuel	Manufacturing	-0.159	(.447)	-0.361	(.246)
82	Basic chemicals except fertilizers	Manufacturing	0.115	(.084)	0.210	(.111)
83	Fertilizers and nitrogen compounds	Manufacturing	0.641	(.122)	0.501	(.098)
84	Plastics in primary forms; synthetic rubber	Manufacturing	0.410	(.076)	0.312	(.073)
85	Pesticides and other agro-chemical products	Manufacturing	0.787	(.122)	0.789	(.114)
86	Paints varnishes printing ink and mastics	Manufacturing	0.195	(.087)	0.734	(.05)
87	Pharmaceuticals medicinal chemicals etc.	Manufacturing	0.375	(.102)	0.816	(.099)

Continued on next page

88	Soap cleaning and cosmetic preparations	Manufacturing	0.831	(.089)	1.394	(.102)
89	Other chemical products n.e.c.	Manufacturing	0.393	(.086)	0.503	(.113)
90	Man-made fibres	Manufacturing	0.665	(.168)	0.383	(.123)
91	Rubber tyres and tubes	Manufacturing	0.578	(.101)	0.633	(.106)
92	Other rubber products	Manufacturing	0.165	(.078)	0.248	(.08)
93	Plastic products	Manufacturing	0.275	(.075)	0.456	(.038)
94	Glass and glass products	Manufacturing	0.290	(.078)	0.484	(.06)
95	Pottery china and earthenware	Manufacturing	0.128	(.122)	0.365	(.097)
96	Refractory ceramic products	Manufacturing	0.186	(.125)	0.434	(.134)
97	Struct.non-refractory clay; ceramic products	Manufacturing	0.126	(.106)	0.327	(.081)
98	Cement lime and plaster	Manufacturing	-0.106	(.178)	0.013	(.165)
99	Articles of concrete cement and plaster	Manufacturing	0.068	(.109)	0.226	(.078)
100	Cutting shaping and finishing of stone	Manufacturing	-0.080	(.159)	-0.271	(.105)
101	Other non-metallic mineral products n.e.c.	Manufacturing	0.363	(.082)	0.253	(.055)
102	Basic iron and steel	Manufacturing	0.561	(.066)	0.806	(.055)
103	Basic precious and non-ferrous metals	Manufacturing	0.547	(.163)	0.493	(.116)
104	Structural metal products	Manufacturing	0.047	(.082)	0.037	(.038)
105	Tanks reservoirs and containers of metal	Manufacturing	-0.081	(.099)	0.574	(.052)
106	Steam generators	Manufacturing	0.063	(.176)	0.176	(.135)
107	Cutlery hand tools and general hardware	Manufacturing	0.270	(.103)	0.808	(.084)
108	Other fabricated metal products n.e.c.	Manufacturing	0.337	(.099)	0.539	(.064)
109	Engines and turbines (not for transport equipment)	Manufacturing	-0.017	(.158)	-0.574	(.137)
110	Pumps compressors taps and valves	Manufacturing	-0.079	(.088)	0.009	(.127)
111	Bearings gears gearing and driving elements	Manufacturing	0.162	(.102)	0.182	(.086)
112	Ovens furnaces and furnace burners	Manufacturing	0.018	(.118)	-0.192	(.078)
113	Lifting and handling equipment	Manufacturing	0.136	(.095)	0.485	(.095)
114	Other general purpose machinery	Manufacturing	0.121	(.063)	0.425	(.067)
115	Agricultural and forestry machinery	Manufacturing	0.545	(.092)	0.880	(.061)
116	Machine tools	Manufacturing	0.347	(.128)	0.235	(.096)
117	Machinery for metallurgy	Manufacturing	0.536	(.175)	0.094	(.094)
118	Machinery for mining and construction	Manufacturing	0.340	(.096)	0.566	(.087)
119	Food/beverage/tobacco processing machinery	Manufacturing	0.278	(.086)	0.264	(.069)
120	Machinery for textile apparel and leather	Manufacturing	0.019	(.146)	0.138	(.103)
121	Weapons and ammunition	Manufacturing	0.261	(.172)	0.144	(.141)
122	Other special purpose machinery	Manufacturing	-0.035	(.099)	0.034	(.08)
123	Domestic appliances n.e.c.	Manufacturing	0.251	(.118)	0.562	(.114)
124	Office accounting and computing machinery	Manufacturing	0.296	(.149)	0.425	(.119)
125	Electric motors generators and transformers	Manufacturing	-0.137	(.1)	-0.616	(.085)
126	Electricity distribution and control apparatus	Manufacturing	0.133	(.099)	0.175	(.088)
127	Insulated wire and cable	Manufacturing	0.320	(.126)	0.523	(.138)
128	Accumulators primary cells and batteries	Manufacturing	0.553	(.166)	0.583	(.134)
129	Lighting equipment and electric lamps	Manufacturing	-0.181	(.141)	-0.167	(.124)
130	Other electrical equipment n.e.c.	Manufacturing	-0.249	(.101)	0.091	(.099)
131	Electronic valves tubes etc.	Manufacturing	0.360	(.149)	0.407	(.143)
132	TV/radio transmitters; line comm. apparatus	Manufacturing	-0.231	(.147)	0.064	(.137)
133	TV and radio receivers and associated goods	Manufacturing	-0.081	(.131)	0.076	(.196)
134	Medical surgical and orthopaedic equipment	Manufacturing	0.079	(.094)	0.343	(.096)
135	Measuring/testing/navigating appliances etc.	Manufacturing	0.211	(.073)	0.401	(.094)
136	Optical instruments and photographic equipment	Manufacturing	0.040	(.165)	0.131	(.136)
137	Watches and clocks	Manufacturing	0.232	(.154)	0.427	(.141)
138	Motor vehicles	Manufacturing	0.477	(.123)	0.632	(.134)
139	Automobile bodies trailers and semi-trailers	Manufacturing	0.214	(.187)	0.455	(.191)
140	Parts/accessories for automobiles	Manufacturing	0.569	(.129)	0.441	(.104)
141	Building and repairing of ships	Manufacturing	-0.481	(.163)	0.028	(.182)
142	Building/repairing of pleasure/sport. boats	Manufacturing	-0.428	(.166)	-0.239	(.133)
143	Railway/tramway locomotives and rolling stock	Manufacturing	0.387	(.166)	0.419	(.103)
144	Aircraft and spacecraft	Manufacturing	0.240	(.179)	0.433	(.185)
145	Motorcycles	Manufacturing	0.608	(.155)	0.724	(.124)
146	Bicycles and invalid carriages	Manufacturing	-0.316	(.144)	0.067	(.16)
147	Other transport equipment n.e.c.	Manufacturing	-0.151	(.122)	0.062	(.136)
148	Furniture	Manufacturing	0.282	(.09)	0.556	(.093)
149	Jewellery and related articles	Manufacturing	0.394	(.186)	0.435	(.141)
150	Musical instruments	Manufacturing	-0.186	(.131)	0.096	(.116)
151	Sports goods	Manufacturing	0.089	(.125)	0.252	(.112)
152	Games and toys	Manufacturing	-0.257	(.297)	0.567	(.144)
153	Other manufacturing n.e.c.	Manufacturing	0.073	(.103)	0.328	(.064)
154	Manufacturing services on physical inputs	Services	-2.061	(1.281)	0.071	(.846)
155	Maintenance and repair services n.i.e.	Services	-0.754	(.508)	-0.485	(.369)
156	Transport	Services	0.431	(.071)	0.684	(.059)
157	Travel	Services	0.988	(.149)	2.506	(.25)
158	Construction	Services	0.277	(.245)	0.380	(.151)
159	Insurance and pension services	Services	0.859	(.262)	1.161	(.185)
160	Financial services	Services	0.942	(.153)	2.427	(.154)
161	Charges for use of intellectual property	Services	0.146	(.258)	-0.637	(.296)
162	Telecom, computer, information services	Services	0.637	(.144)	1.835	(.177)
163	Other business services	Services	0.687	(.144)	1.574	(.165)
164	Heritage and recreational services	Services	-2.140	(.861)	11.13	(3.785)
165	Health services	Services	0.306	(.228)	2.394	(.228)
166	Education services	Services	0.967	(.223)	1.784	(.288)
167	Government goods and services n.i.e.	Services	0.558	(.228)	0.905	(.257)
168	Services not allocated	Services	-0.882	(.21)	-3.732	(.789)
169	Trade-related services	Services	1.083	(.269)	1.377	(.177)
170	Other personal services	Services	-2.180	(.582)	14.19	(7.781)

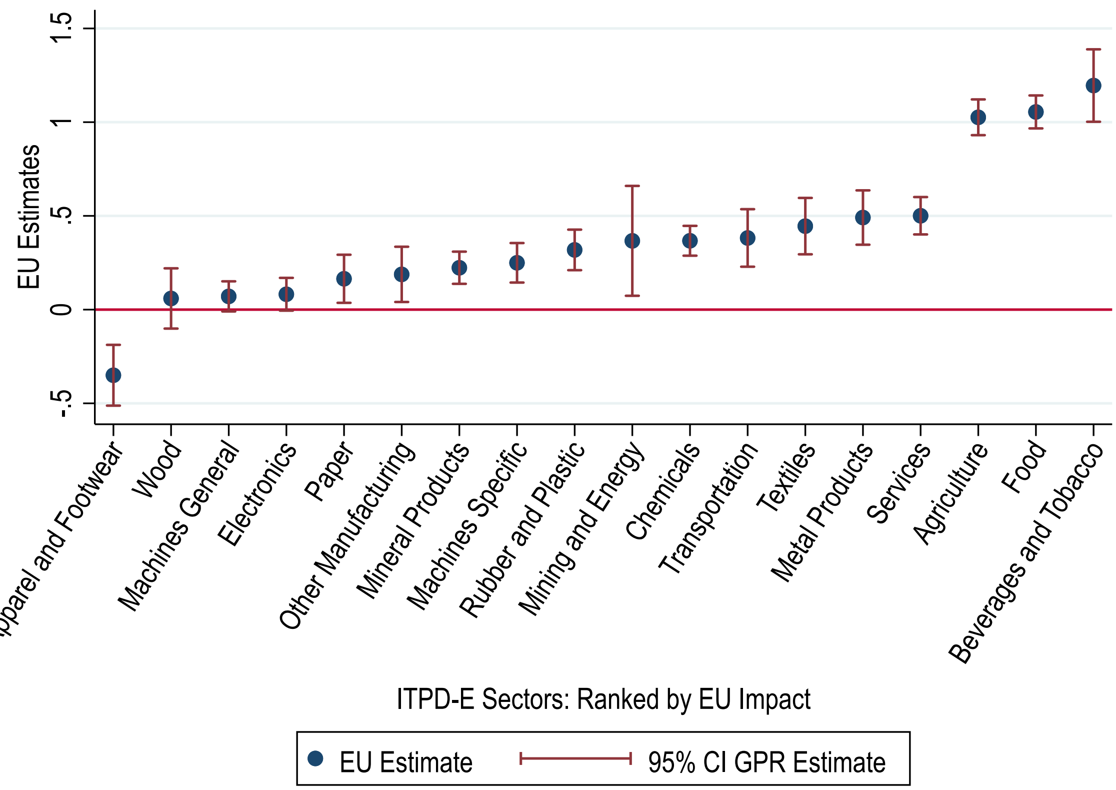
Notes: This table reports industry-level estimates of the impact of the EU on international trade. Columns (1)-(3) list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E. Columns (4) and (5) report the EU estimates together with their corresponding standard errors, respectively, which are obtained from specification (1). The dependent variable is trade in levels and the PPML estimates for each industry are obtained with exporter-time fixed effects, importer-time fixed effects, directional pair fixed effects, time-varying border indicators, and a series of policy controls, whose estimates are omitted for brevity. Finally, columns (5) and (6) report EU estimates their standard errors, respectively, which are obtained from specification (2). The standard errors in both specifications are clustered by country pair. See text for further details.

Figure 1: The EU Effects on Trade



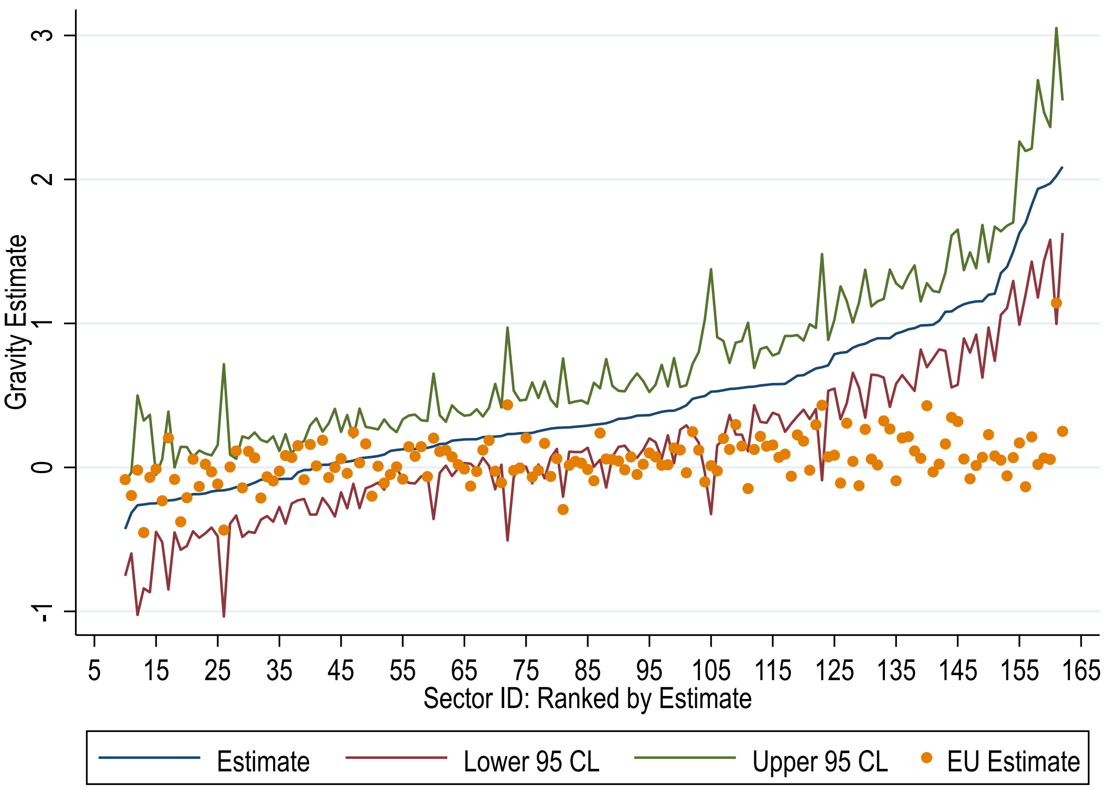
Note: This figure visualizes the results from columns (4) and (5) of Table 1. The top panel of the figure shows all industry-level estimates and their corresponding confidence intervals, while the bottom four panels report estimates and confidence intervals for the broad sectors of Agriculture, Mining and Energy, Manufacturing, and Services. See text for further details.

Figure 2: Sectoral EU Estimates



Note: This figure visualizes the sectoral estimates of the EU effects on intra-EU trade, which are obtained after estimating a pooled version of equation (1) across groups of industries that comprise each of the sectors in this figure, e.g., the estimate for Agriculture is obtained by pooling together the 28 industries in this sector. The dependent variable is trade in levels and the PPML estimates for each sector are obtained with exporter-industry-time fixed effects, importer-industry-time fixed effects, directional pair-industry fixed effects, time-industry-varying border indicators, and a series of policy controls, whose estimates are omitted for brevity. Standard errors are clustered by pair-industry. See text for further details.

Figure 3: EU vs. RTA Estimates



Note: This figure visualizes the industry-level EU estimates (in blue), and their corresponding confidence intervals (in red and green), which correspond to columns (4) and (5) of Table 1. In addition, the figure reports (in orange, as a scatter plot) the estimates of the effects of RTAs, which are obtained from the same industry-level regressions based on specification (1). See text for further details.

Table 2: Directional Industry-Level EU Estimates

	EU_NEW_NEW		EU_OLD_NEW		EU_NEW_OLD		EU_OLD_OLD	
ID	%ΔReal Output	Std.Err.	%ΔReal Output	Std.Err.	%ΔReal Output	Std.Err.	%ΔReal Output	Std.Err.
1	2.710	(.29)	1.891	(.338)	1.513	(.284)	4.335	(.672)
2	4.428	(.553)	3.356	(.3)	3.396	(.732)	2.838	(.549)
3	2.051	(.34)	2.888	(.372)	1.483	(.359)	2.699	(.624)
4	1.964	(.255)	1.800	(.274)	1.169	(.308)	2.786	(.426)
5	2.344	(.621)	2.701	(.703)	3.117	(.601)	3.565	(.821)
6	2.218	(.824)	2.132	(.527)	2.055	(.672)	1.156	(.533)
7	0.998	(.281)	0.709	(.329)	0.768	(.242)	1.683	(.303)
8	0.915	(.325)	0.342	(.264)	0.828	(.266)	0.963	(.28)
9	2.829	(1.315)	9.168	(2.635)	1.882	(1.983)	4.067	(1.381)
10	1.003	(.358)	1.093	(.484)	0.931	(.373)	2.777	(.473)
11	0.471	(.323)	-0.451	(.296)	0.907	(.479)	0.838	(.405)
12	1.501	(.192)	1.433	(.167)	-0.183	(.221)	1.255	(.289)
13	1.426	(.176)	1.161	(.245)	1.251	(.274)	0.728	(.274)
14	1.595	(.459)	0.220	(.298)	1.660	(.355)	1.299	(.255)
15	11.98	(7.387)	7.176	(2.989)	13.22	(6.063)	2.711	(.826)
16	1.364	(.354)	0.784	(.217)	1.312	(.288)	1.594	(.291)
17	2.379	(.732)	2.469	(.713)	1.131	(.482)	-0.694	(.675)
18	3.903	(.637)	3.810	(.609)	4.535	(.478)	1.908	(.568)
19	2.000	(.251)	1.711	(.413)	2.346	(.35)	1.831	(.353)
20	0.755	(.231)	0.310	(.281)	-0.578	(.256)	0.044	(.211)
21	-0.109	(.942)	1.344	(.862)	2.068	(1.057)	7.122	(.552)
22	2.746	(.398)	2.919	(.376)	2.391	(.525)	2.029	(.451)
23	5.541	(.509)	1.035	(.406)	3.141	(.548)	1.684	(.41)
24	1.097	(.441)	0.524	(.274)	1.325	(.492)	0.551	(.251)
25	1.338	(.232)	1.385	(.225)	-0.276	(.19)	1.589	(.388)
26	0.450	(.196)	0.508	(.156)	-0.055	(.186)	0.428	(.196)
27	0.126	(.268)	-0.349	(.208)	-0.016	(.227)	-0.090	(.221)
28	-0.089	(.614)	0.245	(.483)	-0.775	(.629)	-0.686	(.435)
29	1.072	(.616)	0.492	(.543)	0.416	(.518)	-0.689	(.732)
30	2.083	(.66)	1.460	(.683)	1.774	(.871)	0.944	(.871)
31	0.103	(.978)	-0.331	(.415)	-0.872	(.866)	-0.228	(.454)
32	2.147	(1.187)	0.847	(.572)	0.708	(1.184)	-0.022	(.458)
33	0.392	(.229)	1.437	(.452)	-0.358	(.204)	0.118	(.226)
34	1.427	(.326)	0.915	(.446)	0.521	(.503)	-0.312	(.487)
35	-4.734	(2.846)	-2.732	(1.672)	-2.415	(2.09)	-0.897	(1.796)
36	1.560	(.194)	1.530	(.213)	0.584	(.27)	1.584	(.157)
37	1.309	(.174)	0.713	(.154)	1.242	(.224)	0.934	(.259)
38	0.832	(.129)	0.497	(.121)	0.683	(.162)	1.053	(.199)
39	1.418	(.258)	0.535	(.384)	2.066	(.407)	0.984	(.265)
40	1.354	(.14)	1.164	(.132)	1.598	(.214)	1.865	(.188)
41	1.375	(.175)	1.611	(.195)	1.694	(.344)	0.863	(.288)
42	0.779	(.225)	0.509	(.221)	2.152	(.242)	0.905	(.197)
43	1.071	(.137)	0.601	(.174)	1.214	(.232)	0.906	(.243)
44	0.438	(.132)	1.055	(.169)	1.869	(.166)	0.322	(.117)
45	1.658	(.323)	1.348	(.347)	0.450	(.376)	2.404	(.407)
46	0.980	(.143)	1.182	(.132)	1.324	(.15)	0.508	(.177)
47	1.096	(.325)	0.478	(.285)	1.938	(.466)	2.469	(.391)
48	0.654	(.097)	0.723	(.114)	1.670	(.193)	1.063	(.188)
49	1.637	(.253)	0.575	(.189)	2.526	(.406)	1.614	(.204)
50	0.778	(.25)	0.314	(.215)	0.863	(.324)	1.262	(.371)
51	0.546	(.19)	0.240	(.219)	0.573	(.32)	0.440	(.275)
52	0.860	(.159)	0.132	(.195)	0.880	(.281)	0.564	(.325)
53	1.406	(.341)	1.434	(.329)	2.828	(.449)	2.968	(.754)
54	1.071	(.178)	0.240	(.144)	1.256	(.176)	0.608	(.133)
55	0.528	(.229)	-0.406	(.164)	0.054	(.128)	0.383	(.158)
56	1.200	(.284)	0.477	(.179)	1.252	(.227)	1.068	(.211)
57	-0.009	(.251)	-0.080	(.162)	0.144	(.16)	0.770	(.209)
58	0.118	(.22)	-0.0180	(.136)	0.522	(.167)	0.143	(.128)
59	-0.134	(.246)	-0.193	(.175)	-0.400	(.161)	0.071	(.184)
60	-0.077	(.304)	-0.053	(.23)	-0.973	(.165)	-0.040	(.177)
61	-0.076	(.287)	-0.275	(.246)	0.041	(.271)	0.078	(.239)
62	0.075	(.363)	-0.015	(.237)	-0.226	(.324)	-0.496	(.255)
63	-0.249	(.337)	-0.082	(.233)	-0.872	(.221)	0.041	(.207)

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64	0.886	(.268)	-0.089	(.211)	-0.216	(.195)	-0.047	(.22)
65	0.052	(.175)	0.705	(.188)	-0.222	(.189)	-0.478	(.285)
66	0.231	(.139)	0.216	(.139)	0.316	(.152)	-0.026	(.163)
67	0.251	(.151)	0.486	(.227)	-0.114	(.239)	0.114	(.187)
68	-0.007	(.156)	-0.033	(.176)	-0.531	(.16)	0.137	(.2)
69	0.380	(.197)	0.312	(.173)	-0.029	(.152)	0.854	(.226)
70	0.208	(.134)	0.265	(.123)	0.569	(.137)	0.066	(.137)
71	0.063	(.132)	0.061	(.146)	0.975	(.173)	0.069	(.135)
72	-0.109	(.133)	0.054	(.124)	0.245	(.181)	-0.486	(.172)
73	-0.440	(.219)	0.294	(.137)	0.269	(.155)	-0.125	(.127)
74	-0.686	(.208)	-0.155	(.249)	0.586	(.227)	-0.578	(.223)
75	-0.488	(.439)	-0.359	(.226)	0.303	(.359)	-0.269	(.224)
76	-0.774	(.293)	0.032	(.224)	-0.225	(.273)	-0.043	(.224)
77	0.290	(.159)	0.284	(.16)	0.407	(.243)	0.030	(.112)
78	-0.098	(.274)	-0.635	(.286)	0.790	(.301)	0.385	(.264)
79	0.528	(.514)	1.204	(.603)	-0.949	(.563)	-0.177	(.421)
80	0.290	(.16)	0.226	(.19)	0.099	(.205)	0.368	(.224)
81	-1.922	(.503)	-1.331	(.378)	-1.290	(.561)	0.100	(.498)
82	0.238	(.167)	0.220	(.107)	0.076	(.183)	0.0160	(.123)
83	1.304	(.194)	1.165	(.224)	0.278	(.174)	0.978	(.283)
84	0.358	(.148)	0.322	(.1)	0.543	(.128)	0.391	(.123)
85	1.310	(.225)	0.755	(.161)	1.352	(.203)	0.246	(.251)
86	0.334	(.134)	0.113	(.103)	0.842	(.241)	-0.047	(.119)
87	0.775	(.181)	0.324	(.126)	1.490	(.17)	-0.562	(.163)
88	0.339	(.142)	0.625	(.12)	1.564	(.154)	0.336	(.106)
89	0.761	(.189)	0.178	(.121)	0.943	(.149)	0.426	(.146)
90	0.406	(.278)	0.487	(.197)	1.286	(.255)	-0.025	(.256)
91	0.146	(.215)	0.428	(.155)	0.642	(.161)	0.364	(.156)
92	0.206	(.198)	0.243	(.103)	0.197	(.14)	0.020	(.125)
93	0.201	(.139)	0.156	(.09)	0.626	(.134)	-0.046	(.106)
94	0.371	(.123)	-0.010	(.108)	0.593	(.12)	0.035	(.14)
95	0.149	(.184)	0.256	(.161)	-0.009	(.208)	0.120	(.154)
96	-0.015	(.316)	0.338	(.216)	-0.077	(.206)	0.285	(.197)
97	0.379	(.153)	-0.336	(.141)	0.524	(.197)	0.772	(.197)
98	0.287	(.257)	-0.270	(.319)	-0.665	(.256)	0.879	(.303)
99	-0.026	(.162)	0.203	(.175)	-0.142	(.199)	0.173	(.153)
100	0.677	(.227)	-0.660	(.179)	-0.190	(.292)	0.574	(.288)
101	0.135	(.135)	0.153	(.12)	0.265	(.159)	0.750	(.133)
102	0.952	(.121)	0.422	(.106)	0.846	(.12)	0.264	(.091)
103	0.870	(.212)	0.637	(.217)	0.669	(.227)	0.415	(.227)
104	0.089	(.135)	0.008	(.108)	-0.112	(.127)	0.408	(.123)
105	-0.510	(.189)	-0.129	(.166)	-0.074	(.157)	-0.043	(.164)
106	-0.159	(.265)	0.335	(.217)	-0.040	(.264)	-0.187	(.284)
107	0.429	(.209)	0.181	(.157)	0.435	(.205)	0.129	(.149)
108	0.259	(.176)	0.266	(.119)	0.597	(.143)	0.102	(.1)
109	-0.906	(.338)	-0.444	(.254)	-0.091	(.276)	0.564	(.204)
110	-0.315	(.218)	-0.230	(.121)	0.131	(.147)	-0.204	(.146)
111	-0.658	(.237)	0.062	(.117)	0.280	(.15)	-0.170	(.15)
112	-0.255	(.232)	-0.596	(.154)	0.438	(.202)	0.246	(.178)
113	-0.616	(.216)	0.230	(.143)	0.130	(.151)	0.097	(.117)
114	0.224	(.149)	0.038	(.088)	0.399	(.143)	-0.017	(.084)
115	0.867	(.153)	0.591	(.112)	0.610	(.156)	0.356	(.165)
116	0.337	(.176)	-0.050	(.13)	0.448	(.134)	0.630	(.24)
117	0.492	(.255)	0.609	(.221)	0.769	(.27)	0.246	(.201)
118	0.466	(.215)	0.385	(.13)	0.756	(.172)	-0.036	(.128)
119	0.343	(.161)	0.312	(.098)	0.585	(.211)	-0.151	(.165)
120	-0.217	(.272)	0.100	(.169)	-0.157	(.214)	0.080	(.175)
121	0.900	(.335)	0.528	(.269)	-0.048	(.24)	-0.041	(.247)
122	-0.090	(.174)	0.025	(.131)	0.025	(.13)	-0.123	(.145)
123	0.192	(.17)	0.258	(.145)	0.383	(.144)	-0.125	(.145)
124	0.188	(.259)	0.382	(.181)	0.019	(.208)	0.443	(.28)
125	-0.058	(.165)	-0.265	(.149)	-0.131	(.158)	0.013	(.126)
126	0.265	(.236)	0.326	(.131)	-0.067	(.16)	0.060	(.126)
127	0.681	(.231)	0.467	(.16)	0.325	(.185)	-0.0450	(.113)
128	0.403	(.247)	-0.004	(.237)	0.809	(.233)	0.993	(.226)
129	-0.322	(.282)	-0.480	(.226)	-0.006	(.189)	-0.006	(.155)
130	-0.118	(.211)	-0.192	(.147)	-0.438	(.156)	-0.032	(.129)

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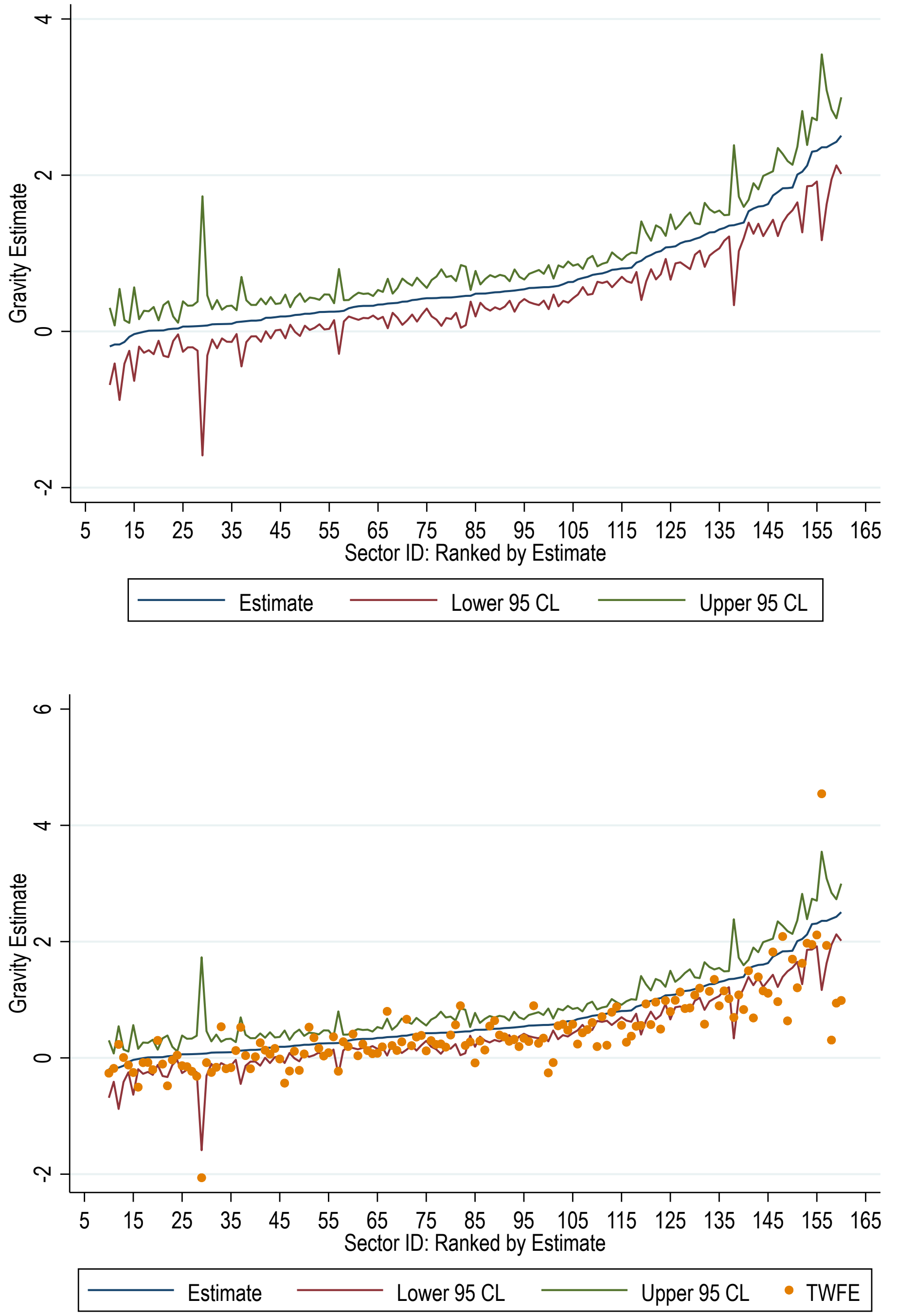
131	0.290	(.263)	0.561	(.243)	-0.093	(.217)	0.304	(.189)
132	0.375	(.317)	-0.004	(.188)	-0.263	(.236)	-0.415	(.165)
133	0.185	(.284)	-0.475	(.177)	0.098	(.221)	0.246	(.171)
134	0.118	(.21)	0.121	(.128)	0.315	(.21)	-0.154	(.156)
135	0.028	(.199)	0.241	(.114)	0.450	(.145)	-0.037	(.119)
136	0.160	(.365)	0.084	(.325)	0.368	(.302)	-0.057	(.185)
137	1.105	(.344)	0.500	(.185)	-0.143	(.281)	0.268	(.207)
138	0.888	(.271)	0.735	(.159)	0.371	(.213)	0.253	(.236)
139	-0.352	(.506)	0.283	(.43)	-0.313	(.297)	0.692	(.286)
140	0.349	(.24)	0.428	(.203)	0.835	(.205)	0.402	(.151)
141	-1.136	(.273)	-0.586	(.263)	-0.648	(.228)	0.635	(.425)
142	0.172	(.288)	-0.096	(.221)	-0.474	(.267)	-0.545	(.252)
143	0.575	(.188)	0.530	(.228)	0.283	(.242)	0.303	(.28)
144	-0.817	(.441)	0.304	(.257)	0.437	(.365)	0.232	(.283)
145	-0.624	(.393)	0.058	(.146)	1.342	(.274)	0.738	(.255)
146	-0.813	(.321)	-0.307	(.225)	-0.608	(.24)	-0.238	(.206)
147	-0.551	(.218)	-0.489	(.175)	-0.482	(.173)	0.337	(.167)
148	0.729	(.141)	0.492	(.143)	0.242	(.123)	-0.129	(.128)
149	0.516	(.351)	-0.142	(.253)	1.617	(.486)	-0.037	(.263)
150	0.241	(.278)	0.058	(.248)	-0.422	(.218)	-0.256	(.186)
151	0.174	(.262)	0.328	(.162)	-0.329	(.213)	0.191	(.173)
152	0.259	(.381)	-0.267	(.348)	-0.453	(.346)	0.110	(.381)
153	0.424	(.173)	-0.112	(.126)	0.462	(.144)	-0.202	(.154)
154	-3.086	(1.339)	-2.417	(1.556)	-1.976	(1.303)	.	(.)
155	-0.903	(.548)	-0.853	(.648)	-0.563	(.553)	.	(.)
156	0.576	(.146)	0.357	(.139)	0.461	(.135)	.	(.)
157	0.846	(.16)	1.141	(.251)	0.942	(.162)	.	(.)
158	0.616	(.269)	0.388	(.378)	0.034	(.357)	.	(.)
159	1.244	(.305)	0.787	(.359)	0.823	(.387)	.	(.)
160	0.595	(.19)	0.725	(.265)	1.405	(.321)	.	(.)
161	0.642	(.422)	-0.022	(.275)	0.670	(.476)	.	(.)
162	0.298	(.159)	0.872	(.421)	0.507	(.42)	.	(.)
163	0.483	(.147)	0.965	(.289)	0.474	(.259)	.	(.)
164	-2.538	(.884)	-0.211	(1.355)	0.210	(6.88)	.	(.)
165	0.306	(.224)	-0.149	(.453)	0.637	(.321)	.	(.)
166	1.049	(.341)	1.442	(.306)	0.354	(.372)	.	(.)
167	-0.165	(.357)	0.976	(.319)	0.069	(.343)	.	(.)
168	-0.893	(.217)	-0.974	(.215)	-0.818	(.249)	.	(.)
169	1.224	(.34)	1.209	(.424)	0.966	(.343)	.	(.)
170	-2.184	(1.094)	-1.166	(.826)	-3.115	(.991)	.	(.)

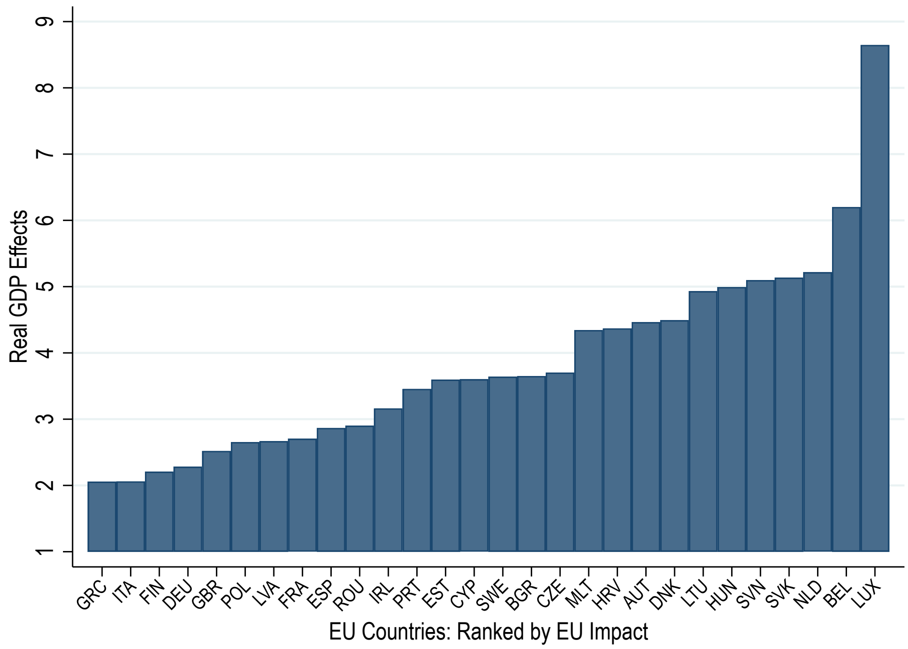
Notes: This table reports estimates of the impact of the EU on international trade depending on time of joining and depending on the direction of trade flows. The estimates are obtained from the same specification – equation (1), but after using interactions for each of the four groups, corresponding to the four panels in the table. The dependent variable is trade in levels and the PPML estimates for each industry are obtained with exporter-time fixed effects, importer-time fixed effects, directional pair fixed effects, time-varying border indicators, and a series of policy controls, whose estimates are omitted for brevity. The standard errors are clustered by country pair. See text for further details.

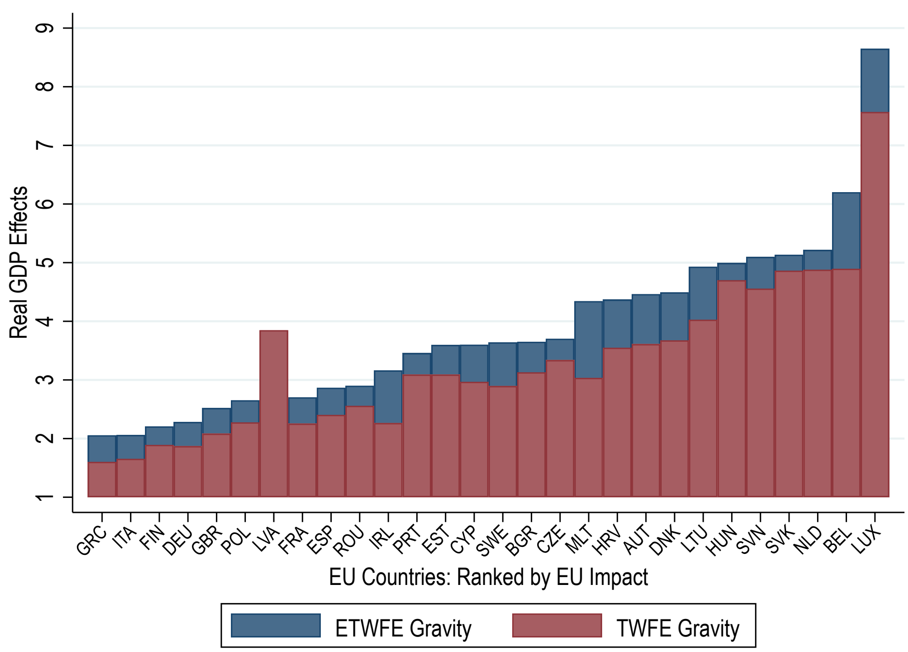
Figure 4: TWFE vs. ETWFE EU Estimates



Note: The top panel of this figure visualizes the industry-level EU estimates (in blue), and their corresponding confidence intervals (in red and green), which correspond to columns (6) and (7) of Table 1. These estimates are obtained from the ETWFE specification (2). The dependent variable is trade in levels and the PPML estimates for each industry are obtained with exporter-time fixed effects, importer-time fixed effects, and directional pair fixed effects whose estimates are omitted for brevity. The standard errors are clustered by country pair. The bottom panel of the figure reproduces the results from the top panel and, in addition, it reports (in orange, and as a scatter plot) the estimates of the EU effects from column (4) of Table (1), which are obtained from specification (1). See text for further details.

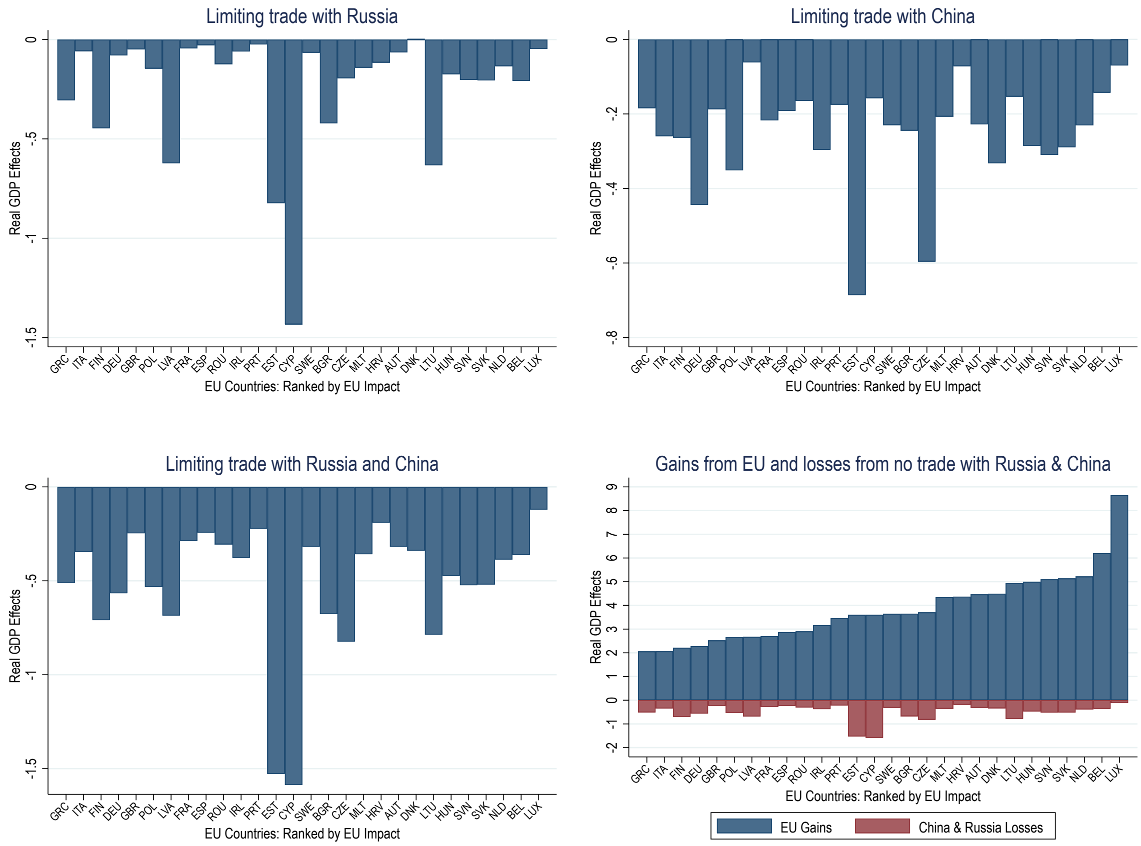
Figure 5: EU membership and real output





Note: The top panel of this figure visualizes the effects of EU membership on real output for each of the EU Member States. The indexes are obtained as weighted averages from the country-industry counterfactual results that are based on our ETWFE partial equilibrium estimates of the effects of the EU on intra-EU trade. The bottom panel of the figure reproduces the results from the top panel but also reports the corresponding indexes that are based on the TWFE partial gravity estimates. See text for further details.

Figure 6: Limiting trade with China and Russia



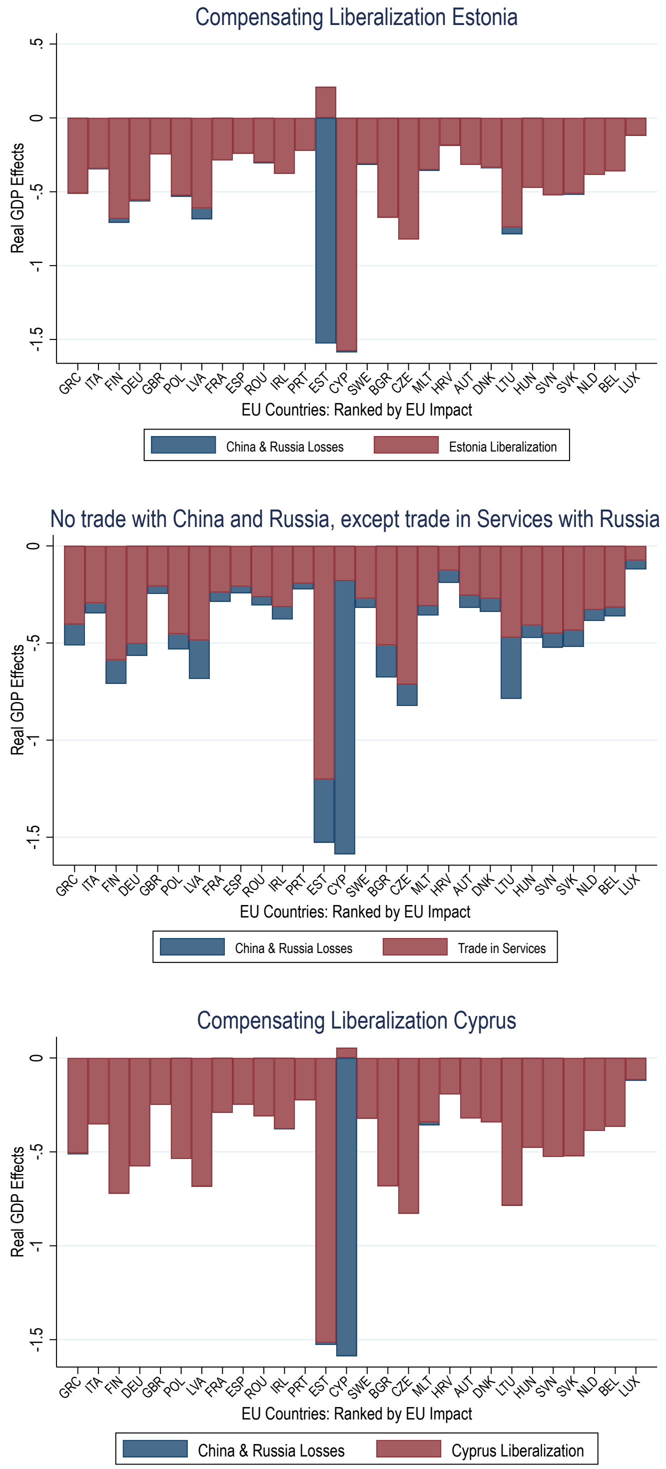
Note: This figure reports a series of simulation results that are generated from a counterfactual scenario that limits EU trade with Russia and China. In each case, we increase bilateral trade costs between the EU countries and Russia and China so that about 98% of the trade flows between the Member States and Russia and China are eliminated in each direction of trade. The simulation analysis are performed at the industry level, and the indexes that we report here are obtained as weighted averages from the underlying country-industry counterfactual results. The top right panel of the figure reports estimates from a scenario where only trade between the EU and Russia is limited. The top left panel reports estimates from a scenario where only trade between the EU and China is limited. The bottom right panel reports estimates from a scenario where both trade with China and Russia is limited. Finally, the bottom left panel reproduces the results from the bottom right panel but it also adds the gains from EU membership from the top panel of Figure 5. See text for further details.

Table 3: Eliminating trade with 'riskier' partners. Most affected industries.

Industry Description	%Δ in Real output
A. Eliminating trade with Russia	
Processing of nuclear fuel	-1.936
Extraction crude petroleum and natural gas	-1.539
Fertilizers and nitrogen compounds	-1.267
Government goods and services n.i.e.	-0.947
Basic precious and non-ferrous metals	-0.945
Dressing and dyeing of fur; processing of fur	-0.810
Refined petroleum products	-0.793
Mining of hard coal	-0.757
Sawmilling and planing of wood	-0.670
Other mining and quarring	-0.556
Animal feed ingredients and pet foods	-0.513
Veneer sheets plywood particle board etc.	-0.480
Basic iron and steel	-0.447
Rubber tyres and tubes	-0.356
Domestic appliances n.e.c.	-0.350
B. Eliminating trade with China	
Luggage handbags etc.; saddlery and harness	-6.186
Other manufacturing n.e.c.	-4.521
Optical instruments and photographic equipment	-3.908
Sports goods	-3.522
Domestic appliances n.e.c.	-3.421
Other transport equipment n.e.c.	-3.306
Musical instruments	-3.227
Games and toys	-3.106
Lighting equipment and electric lamps	-3.056
Office accounting and computing machinery	-3.051
Dressing and dyeing of fur; processing of fur	-2.738
TV/radio transmitters; line comm. apparatus	-2.622
Knitted and crocheted fabrics and articles	-2.548
Made-up textile articles except apparel	-2.537
TV and radio receivers and associated goods	-2.412

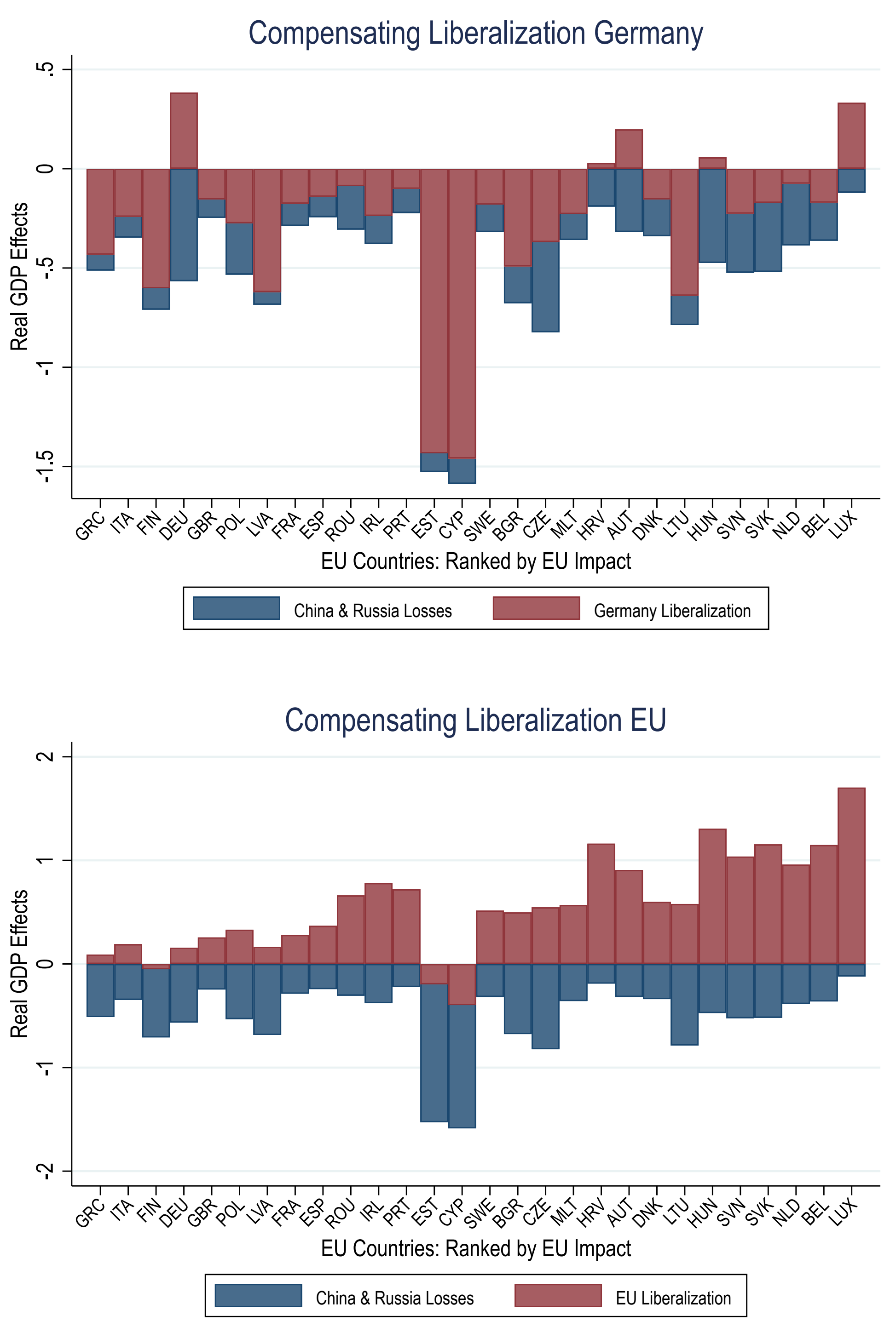
Notes: This table lists the 15 most affected industries from a scenario that eliminates trade with Russia (in panel A) and from a scenario that eliminates trade with China (in panel B). The rankings are based on the effects on real output per industry, which are obtained as weighted averages from the country-industry counterfactual results that are based on our ETWFE partial equilibrium estimates of the effects of the EU on intra-EU trade. See text for further details.

Figure 7: Compensating liberalization, Estonia and Cyprus



Note: This figure reports three sets of simulation results. In each case, the simulation analysis are performed at the industry level, and the indexes that we report here are obtained as weighted averages from the underlying country-industry counterfactual results. The top panel of the figure reports estimates from a scenario where we liberalize trade between Estonia and the EU using a shock that is equivalent to a partial equilibrium gravity estimate of 0.2. The results in the middle panel are from a scenario, where we increase trade costs between all EU Member States and Russia and China, except for trade in Services between the EU countries and Russia. Finally, the bottom panel of the figure reports estimates from a scenario, where we limit all trade between the EU Member States and Russia and China as in the bottom right panel of Figure 6 but, at the same time, we liberalize trade in Services only between Cyprus and the EU using a shock that is equivalent to a partial equilibrium gravity estimate of 0.3. See text for further details.

Figure 8: Compensating liberalization, Germany and the EU



Note: This figure reports two sets of simulation results. In each case, the simulation analysis are performed at the industry level, and the indexes that we report here are obtained as weighted averages from the underlying country-industry counterfactual results. The top panel of the figure reports estimates from a scenario where we liberalize trade between Germany and the EU using a shock that is equivalent to a partial equilibrium gravity estimate of 0.2. The bottom panel of the figure reports estimates from a scenario, where we limit all trade between the EU Member States and Russia and China as in the bottom right panel of Figure 6 but, at the same time, we liberalize trade among all EU members using a shock that is equivalent to a partial equilibrium gravity estimate of 0.2. See text for further details.