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Abstract

We propose and construct novel measures of the effectiveness and potential of trade blocs, combining estimation with granular data and simulation with a New Quantitative Trade Model. We deploy our methods and new indexes to quantify the potential benefits from (i) further integration within the largest and most successful trade liberalization effort in the world – the Single European Market – and (ii) a possible enlargement. Three main results and implications stand out from our analysis. First, European integration has been very effective in promoting trade among its members, with heterogeneous effects across industries and member states. Second, and most novel and important, our estimates reveal that only half of the potential benefits from EU membership have been realized to date. Third, EU accession will generate very large gains from trade for the new joiners and moderate gains for existing members, with larger benefits for some small and peripheral EU members. Importantly, our methods enable us to construct confidence bounds for the effects of EU enlargement.

JEL Classification Codes: F10, F14, F16
Keywords: European Integration, Trade Costs, Trade Cost Efficiency, Single Market Potential

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1 Introduction

More than ever, against a backdrop of growing geopolitical and trade tensions, many European countries are looking to anchor themselves in the European Union. Although enlargement has often been presented as a substitute for deepening, the future of the Single Market offers new opportunities. The Letta report, while recalling the necessary conditions (notably the rule of law) and the stages of accession, envisages "The Single Market as a key tool in the enlargement process". The modeling work reported in this paper is based on this hypothesis and uses the latest methods to quantify the potential economic gains associated with the deepening *and* the enlargement of the Single European Market.

Performing ex-ante simulations about the impact of future trade liberalization (or protection) is challenging because it is not clear what would be the initial impact of such policies on the direct bilateral trade costs between the liberalizing partners. For example, it is easy to simulate the impact of the removal of tariffs (because they are observable); however, it is well documented that free-trade agreements (FTAs) lead to deeper trade liberalization than simply removing tariffs. Since the Single Market is much more than a FTA, measuring the potential decrease in direct bilateral trade costs between member States can pose a significant challenge.

Against this backdrop, our broad contribution is to propose (and implement) methods for ex-ante evaluation of the effects of market integration with a focus on the completion and enlargement of the Single European Market. To this end, we make four contributions. First, we obtain industry-specific and country-industry specific estimates of the impact of the Single Market on Member's trade. Second, we use these estimates to construct a series of indexes that measure the potential of the Single Market for further liberalization within the EU and for potential EU enlargement. Third, we use the newly-constructed indexes to perform three sets of counterfactual simulations: (i) one that captures the benefits already reaped by Member States from their participation in the Single Market and its untapped potential; (ii) one that evaluates the potential benefits if the Single Market operated at its full potential; and (iii) one that simulates the impact of a potential enlargement of the Single Market. Our results confirm that further benefits of the Single Market are a low-hanging fruit.

To obtain our estimates, we build on established developments from the structural gravity literature, regarding estimation techniques (Larch et al., 2025). Specifically, for each industry, and capitalizing on the properties of the Poisson Pseudo Maximum Likelihood (PPML) estimator, our econometric model is estimated in levels with data that include international as well as domestic trade flows. 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 fixed effects as well as a vector of bilateral trade policy control variables. Importantly, in addition to obtaining industry-specific Single Market estimates that are common across the EU members, we also obtain country-specific estimates of the impact of the Single Market for each industry in our dataset. Finally, we note that our estimating model is based on, and therefore, perfectly consistent with, the theoretical framework that will be employed for the counterfactual analysis. Section 2 offers further details on our identification strategy and econometric methods. A by-product of our analysis is a database of country-industry specific indexes/estimates of the impact of the Single Market, which can be employed to perform a systematic econometric analysis of the determinants of the effectiveness of the Single Market.

An important contribution of our work is that, in addition to obtaining a rich set of country-industry specific estimates of the impact of the Single Market on trade among its members, we construct two new indexes that can be used, as we demonstrate in this paper, to evaluate the further potential of the Single Market for existing members as well as the impact for existing members and accession countries from an EU enlargement.

Specifically, we define and construct the Trade Cost Efficiency Bound (TCEB) as the most successful decrease in bilateral trade costs for a given industry within the Single Market. Thus, by construction and consistent with our econometric specification, $TCEB$ captures the maximum decrease in direct bilateral trade costs for any EU member, conditional on size, comparative advantage, and many other observable and unobservable bilateral characteristics that are captured in our model. We use the proposed $TCEB$ to quantify the potential gains from further integration within the Single Market and also to simulate the effects of EU enlargement.

The second index that we propose is the Single Market Potential (SMP). SMP is related to the $TCEB$ index by construction and measures how far the impact of the single market is from its maximum possible effect for a given country-industry combination. The SMP and $TCEB$ indexes are of the same dimensions as the data of country-industry specific estimates that are used to construct them, i.e., we can construct up to 4,760 SMP indexes (28 members $\times$ 170 industries).[1] This is potentially important because the new database of SMP and $TCEB$ indexes can be used to study the determinants of the effectiveness of the Single Market in promoting trade among its members.

The chosen framework requires to observe all trade flows for each industry and country, including domestic trade flows. Consequently, usual trade data at the product-origin-destination level is not an option. A good compromise between the granularity of the data and the coverage of domestic flows is provided by *International Trade and Production Database for Estimation* (ITPD-E) (Borchert et al., 2020, 2022).[2] The ITPD-E covers 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. Second, the ITPD-E includes domestic trade flows, which is important for identification purposes and for consistency with the counterfactual analysis that we plan to perform. Third,

[1] The analysis in this paper is performed with a sample on 28 Member States. The reason for this is that the data that we use ends in 2019, which is prior to Brexit.

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

and most 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 several 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.

The following three main results and conclusions stand out from our partial equilibrium analysis and new market potential indexes. First, our common (across countries) EU estimates reveal that the EU has been extremely successful in promoting trade among Member States and that the effects of the EU have been very heterogeneous across the industries and the broad sectors in our sample. Specifically, we find that the EU has led to an increase in the trade volume by 63% between member states on average, but with large variation across industries. Second, the country-specific EU estimates that we obtain confirm our conclusions about the large and positive EU effects from the "common" EU estimates, but also reveal that the EU effects have been very heterogeneous across Member States *within each industry*. Third, the novel Trade Cost Efficiency Bound (TCEB) indexes are large, positive, and very heterogeneous across the industries in our sample. Most importantly, the TCEB estimates are significantly larger than the corresponding "common" EU effects that we obtain, which means that there is potential for significant further trade liberalization and welfare gains for existing EU members.

Armed with the partial estimates of the impact of the Single Market and the new market potential indexes, we rely on a standard NQTM, which is perfectly consistent with our estimating equation, to perform in general equilibrium three counterfactual experiments. First, we quantify ex-post the impact of the Single Market based on the "common" EU estimates. Second, we use the $TCEB$ indices to quantify the potential gains for existing members if each of them was able to trade at the 75% trade cost efficiency bound in the EU. Third, we simulate the impact of a hypothetical EU enlargement, when all accession countries (Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, and

Ukraine) enter simultaneously and enjoy bilateral trade costs with existing EU members as well as among themselves based on the 50% TCEB in the EU. Lastly, we propose confidence bounds for the enlargement in which new member states trade based on the 25% versus 75% TCEB in the EU.

The main findings of our counterfactual simulations can be summarized as follows. First, Our ex-post evaluation of the impact of the Single Market reveals large and positive impact on income for all Member States. The gains are heterogeneous, e.g., varying between 0.8% and 5%, with larger countries (e.g., France, Germany, Italy) gaining less, while smaller and more central Member States (e.g., Luxembourg, Belgium, the Netherlands, and Ireland) gain more. Geography, country size, and sectoral specialization are natural candidates to explain the observed differences. As expected, we see that the EU integration has led to losses for the non-EU members, which are larger for countries that are geographically close and economically integrated with the EU. Importantly, and as expected, some of the countries with the largest losses in this scenario include potential EU members, e.g., Montenegro, Serbia or Albania.

Next, using our $TCEB$ indexes to simulate further integration within the Single Market reveals that there are significant potential gains for existing EU members from strengthening internal EU ties. On average, the current EU gains are only about half of the potential gains if all members could trade at the 75% efficiency bound in all industries. This experiment is possible due to our TCEB indexes, and we are not aware of any existing study that has been able to quantify such effects. The policy implication of this result is that there are very large further benefits and potential of the Single Market, even for the exiting members and without further enlargement. Further policy implications can be drawn on the basis of the heterogeneity of our estimates across the EU members.

Third the simulation of a hypothetical EU enlargement in which accession countries enter the EU simultaneously and trade with other EU members, including themselves, at cost reductions that are based on our $TCEB_{50}^{k}$ estimates shows very large potential gains for accession countries, i.e., varying between 2.4% for Georgia, and 9.5% for Montenegro. In addition, we find that the rest of the countries in the EU will also gain, and the largest gains will be for EU members that are close geographically and economically to the new members, e.g., Croatia, Bulgaria, Slovenia.

Lastly, we also perform two counterfactuals providing confidence bounds for the impact of enlargement, for each accession country based on our $TCEB^k_{25}$ and $TCEB^k_{75}$ estimates. For example, Georgia would gain between 1.4% and 3.9%, but Moldavia between 3.4% and 9.5%

Our paper speaks to the abundant literature on estimating the economic impacts of regional trade agreements and, more specifically, on estimating the economic effects of European integration. The first strand of literature elaborated a proper specification of the gravity equation (Baier and Bergstrand, 2007; Egger and Larch, 2011; Baier et al., 2019). A natural extension of this literature was to use disaggregated trade data for trade in goods and to take stock of general equilibrium effects in counterfactual analysis (Bergstrand et al., 2015; Anderson and Yotov, 2016).

The second strand of literature applied these methods to quantify the trade and welfare impacts of the Single Market (Head and Mayer, 2021). Closer to us, Felbermayr et al. (2022) quantify the cost of European disintegration in a quantitative trade model taking stock of the economic effects of the Single market, the Shengen agreement and the Eurozone. The effects of Single market for the trade in goods (services) are estimated at 46% (resp. 64%), consistent with the first step of our analysis, despite differences in simulation and data choices.

A third strand of literature was initiated by the Cecchini report on the economic cost of "Non-Europe" (Cecchini, 1988), report updated by the European Parliament (European Parliamentary Research Service, 2014). The Letta and Draghi reports have largely publicized the idea of remaining barriers that hamper the completion of the Single Market, economic growth, and productivity in Europe (see also Adilbish, 2025). In fact, in contrast to the *de* *jure* situation, *de facto* border effects among Member States are still sizable: Santamaría et al. (2023) show that the probability that a shipment from an EU region will reach another region outside the country of origin is one fifth.

Taking stock of the two first strands of literature while offering evidence of the trade and income effects of European integration at a higher degree of granularity, our paper contributes mostly to the third strand of literature that aims to quantify the untapped gains of European integration. We investigate two dimensions of further integration: at the intensive margin, by deepening trade integration for goods and services among incumbent Member States, and at the extensive margin for different levels of integration of candidate countries in a one-step enlargement. Our contribution, which combines granular panel data on internal and external trade among a large sample of countries with estimation and calibration of a quantitative model of trade featuring general equilibrium effects, uses the same data and modeling approach as a companion paper that aims to quantify the cost of decoupling Europe from risky trade partners in relation to the agenda of strategic autonomy (Fontagné and Yotov, 2024). While *average* estimates of gains reaped from the Single Market are similar, this paper contributes firstly by providing estimates at the country-industry level, by quantifying the distance to the best performing country in each industry and by assessing the economic impact of filling part of the observed gap. The second novelty is to quantify within the same consistent framework the potential trade and income effects of an European enlargement. Our results confirm that there is room for maneuver leveraging on the further completion of the Single Market and future enlargements.

The remainder of the paper is organized as follows. Section 2 describes the econometric methods used to estimate and decompose bilateral trade costs and the effects of the Single Market on EU trade within the structural gravity model. 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 as well as our novel Single Market potential indexes. Section 5 reviews the model that we use to perform the counterfactual analysis and we discuss our findings from the counterfactual analysis. Finally, Section 6 concludes.

2 Econometric Methods

The objective of this section is two-fold. Our primary goal is to obtain estimates of the effects of the EU integration across various dimensions (e.g., industries, countries, pairs, etc.) that fit well the bilateral trade costs in sample. To estimate the effects of the EU and to flexibly model and decompose bilateral trade costs, we rely on the workhorse model of trade – the gravity equation – and we follow the data and estimation recommendations for estimating gravity equations from (Larch et al., 2025). Our second goal is to introduce the new TCEB and SMP indexes.

2.1 Estimating the impact of the Single Market

We estimate alternative specifications of the following econometric model, which we deem as the most comprehensive and up to-date version of the estimating gravity equation:

$$X_{ij,t}^{k} = \exp[EU_{ij,t} \times \beta^{k} + POLICY_{ij,t} \times \alpha^{k} + GLOB_{ij,t}^{k} + \overrightarrow{\mu}_{ij}^{k} + \pi_{i,t}^{k} + \chi_{j,t}^{k}] \times \epsilon_{ij,t}^{k}. \quad (1)$$

Before we continue to describe each of the elements in equation (1), we note that our econometric model is consistent with a wide class of theoretical foundations, which, subject to parameter interpretation, lead to isomorphic gravity equations Arkolakis et al. (2012). 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 rely on established practices for gravity estimations (Larch et al., 2025). The dependent variable, $X_{ij,t}^{k}$, denotes raw 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.[3] $X^k_{ij,t}$ is in levels because, following 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. More importantly, the PPML estimator successfully handles heteroskedasticity in trade flows data, which, due to Jensen's inequality, may render the corresponding OLS estimates inconsistent.

Because a theory-consistent identification strategy requires the inclusion of domestic trade flows in gravity estimations (Yotov, 2022), $X^k_{ij,t}$ includes both cross-border/international and domestic/internal trade flows. Most important for our purposes, the use of domestic trade flows would enable capturing possible diversion from domestic to international sales, which has been shown to lead to improved estimates of the effects of regional trade agreements (Dai et al., 2014; Baier et al., 2019), and which may be particularly important in the case of the Single Market.

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, sectors, aggregate. This is important for the current purposes, as it would allow us to estimate the model separately, and consistent with theory, for each of the 170 industries that are available in our data,[4] 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 to the sectoral and, if needed, to the aggregate level.[5]

Finally, based on the analysis of Egger et al. (2022), we will use data for consecutive

[3]We offer further details on the trade data in Section 3.

[4]See the Data Section 3.

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

years, instead of data with intervals (Cheng and Wall, 2005). This would be particularly important for obtaining estimates of the impact of the EU at the industry level. As noted above, we may also gain efficiency by pooling together some of the industries in our sample. Eventually, we will obtain 170 industry estimates for each of the EU variables in our setting.

Next, we turn to the covariates in our model. The most important term 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 also obtain country-industry specific estimates of the impact of the Single Market by allowing the EU effects to be heterogeneous across countries for each of the 170 industries in our sample. Thus, subject to data availability, we can obtain up to 4760 (170×28) estimates of the effects of the Single Market. Given its importance for our analysis, we discuss the specification with the country-industry specific EU effects in more detail in the next subsection.

The vector $POLICY^k_{ij,t}$ in equation (1) denotes time-varying bilateral policy variables, including membership in Regional Trade Agreements (RTA) *other than the EU*, membership in the World Trade Organization (WTO), membership in the OECD, complete trade sanctions ($COMPL\_SANCT$), partial trade sanctions ($PARTL\_SANCT$), other sanctions ($OTHER\_SANCT$), membership in the Euro Zone (EURO), and membership in other currency unions ($COMM\_CURR$).[6] The explicit account for membership in the Euro Zone is important for our purposes, as we do not want to inflate the estimates of the Single Market effects that will be used to simulate EU accessions. Note 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 the estimates of the policy coefficients (α^k) to vary by product/sector and type of policy.

Next, we motivate and discuss the fixed effects in our model. Equation (1) includes four

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

sets of fixed effects. $GLOB_{ij,t}^{k}$ denotes a vector of time-varying border indicators, 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, which are allowed to vary at the industry/sector level, would capture the impact of common (de-)globalization trends that have affected the international relative to the domestic trade at alternative levels of aggregation. Thus, our key EU variables would capture EU effects that are in addition to any common globalization trends among the countries in our sample.[7]

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 time-invariant bilateral trade costs.[8] Fontagné and Yotov (2024) decompose the importance of the covariates in specification (1), and show that the set of covariates is good proxy for the cross-border bilateral trade costs within the EU. This is important for our counterfactual counterfactual analysis, i.e., because we can rely directly on our policy and trade frictions from the same specification. Finally, as the estimates of free trade agreements can be very asymmetric (Baier et al., 2019), we explicitly allow for directional, i.e., depending on the direction of trade flows, EU effects.

Guided by theory, equation 1 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 remain at the source-industry-time and the destination-

[7]Notice that, due to perfect collinearity with the pair fixed effects in our preferred specification, we cannot estimate all border effects 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.

[8]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).

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 standard approach in the gravity literature, the current specifications cluster the standard errors by country pair, i.e., $Cov[\varepsilon_{ijt}, \varepsilon_{ijd}] \neq 0$, for all t, d, and zero otherwise. However, motivated by Egger and Tarlea (2015), Pfaffermayr (2019), and Pfaffermayr (2022), we may consider experimenting with three-way clustering by source, destination, and year in the robustness analysis.

2.2 Three novel measures of EU integration and potential

We propose three novel trade cost indexes to measure the impact and potential of the Single Market on the trade costs and trade flows among the EU member countries: (i) We obtain *country-industry specific effects of the EU* on the direct bilateral trade costs between the EU members; (ii) We propose the *Trade Cost Efficiency Bound (TCEB)* index, which is defined as the maximum realized decrease in the direct bilateral trade costs between an EU member country and the rest of the states within the Single Market for a given industry; and (iii) We construct the *Single Market Potential (SMP)* index, which measures the potential for further decrease in the trade costs between a given EU member and the rest of the Single Market states, and it is defined as the difference between TCEB and the already realized impact of the Single Market on the direct bilateral trade costs between this country the rest of the EU members. We construct the three new indexes in three related steps.

The country-industry-specific EU effects. To obtain the country-industry-specific estimates of the EU effects on trade among its members, we modify our benchmark gravity specification (1) to the following econometric model:

$$X^k_{ij,t} = \exp[\sum_{C \in EU} \beta^k_C \times EU\_C_{ij,t} + POLICY^k_{ij,t} \times \alpha^k + GLOB^k_{ij,t} + \overrightarrow{\mu}^k_{ij} + \pi^k_{i,t} + \chi^k_{j,t}] \times \epsilon^k_{ij,t}. \quad (2)$$

The only difference between equation (2) and our main estimating equation (1) is that we have replaced the common EU covariate from specification (1), $EU_{ij,t}$, with a series of country-specific EU variables, $\sum_{C \in EU} EU\_C_{ij,t}$. Given the dimensions of our data, the maximum number of estimates (and corresponding standard errors) that we can obtain is 4,760=170 industries $\times$ 28 EU members. As with any other gravity estimate, the country-industry-specific EU effects can be expressed in terms of trade-volume effects, i.e., $[\exp(\hat{\beta}^k_{\tilde{C}}) - 1] * 100$, and tariff-equivalent effects, i.e., $[\exp(\hat{\beta}^k_{\tilde{C}}/\sigma) - 1] * 100$, where σ is the trade elasticity.

We see several important implications of the new country-industry-specific EU estimates. First, the distribution of EU estimates would reveal potential heterogeneity of the EU effects across countries. Second, on a related note, the new results may point to specific areas for policy intervention. Third, the new database of EU estimates that we will create would enable us to study econometrically the importance of various country- and industry-specific characteristics on the impact and effectiveness of the Single Market on trade. Finally, the new country-specific estimates will enable to construct the TCEB and SMP indexes, which we describe in turn next.

The Trade Cost Efficiency Bound (TCEB). We define the trade cost efficiency bound for a given industry k as the maximum across all country-specific estimates, $\hat{\beta}^k_C$, for the same industry:

$$TCEB^k_p = \max_C \{\hat{\beta}^k_C\}. \tag{3}$$

In words, the $TCEB$ measures the most successful decrease in bilateral trade costs for a given industry within the Single Market. Note that, by construction and consistent with our econometric specification, $TCEB$ captures the maximum decrease in direct bilateral trade costs for any EU member, conditional on size, comparative advantage, and many other observable and unobservable bilateral characteristics that are captured in our model. We use the subscript p in the formulation of $TCEB^k_p$ to denote 'percentile'. Thus, for example, $TCEB^k_{90}$ is a $TCEB$ index that uses the 90^{th} percentile value of the country-specific EU estimates instead of their maximum value. An advantage of $TCEB_{90}^{k}$ is that it mitigates the influence of outliers. We also construct $TCEB_{75}^{k}$, $TCEB_{50}^{k}$ and $TCEB_{25}^{k}$, which will be used for performing *ex-ante* counterfactual analysis and to provide bounds for the possible gains from accession of new members to the EU. Finally, we note that, similar to the country-specific EU gravity estimates, the $TCEB$ indexes can be expressed in terms of trade-volume effects and tariff-equivalent effects.

The Single Market Potential (SMP). The SMP index is country-industry-specific. It is constructed for each country-industry combination as the difference between the industry-specific $TCEB$ index and the already realized corresponding impact of the Single Market on the direct bilateral trade costs between this country the rest of the EU members, i.e., the country-specific estimate for a given industry, $\hat{\beta}_{C}^{k}$:

$$SMP_{C}^{k} = TCEB_{p}^{k} - \hat{\beta}_{C}^{k} \tag{4}$$

In words, the SMP measures how far is the impact of the Single Market from its maximum possible effect for a given country-industry combination. Similar to the country-specific EU gravity estimates and the $TCEB$ indexes, the SMP indexes can be expressed in terms of trade-volume effects and tariff-equivalent effects. We also note that, by construction, the database of SMP indexes is of the same dimensions as the data of country-industry specific estimates that are used to construct it, i.e., we can construct up to 4,760 SMP indexes (28 members $\times$ 170 industries).

3 Data and Sources

This section offers a brief description of the datasets that we use, along with their original sources. To perform the estimation analysis, we rely on the following data.

Trade data. The main trade data that we use 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).[9] 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 cover 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. Second, the ITPD-E includes domestic trade flows. This is 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.[10]

Production data. Counterfactual trade policy analysis requires balanced production and trade data or, equivalently, balanced data on international and domestic trade. Given our purposes, existing balanced datasets 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 do not have corresponding datasets based on raw data appropriate for estimation.[11] Services or raw agricultural products, two important sectors for our analysis, are not covered. 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 Inter-

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

[10] 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 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.

[11] An exception is Tradeprod (Mayer et al., 2023). Although this dataset as a longer time coverage (1966-2018) the disaggreagtion level is lower (9 industrial sectors: Food, Textiles, Wood-Paper, Chemicals, Minerals, Metals, Machines, Vehicles, Other).

national Trade Commission (Borchert et al., 2023).[12]

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), and it 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.[13] Thus, the ITPD-S has two advantages. First, it is the most disaggregated existing balanced database for simulation/counterfactual analysis. Second, it has a corresponding dataset for estimations (i.e., the ITPD-E), which can deliver some key parameters and elasticities for the counterfactual analysis, e.g., the EU estimates that we will obtain and use in the simulations. At such level of sectoral detail input-output data is absent. Beyond intermediate consumption, other factors of production, such as embedded capital, are not documented either. This constrains us to perform a comparative static analysis.

To perform our simulation analysis, we experimented with two alternative baseline datasets based on ITPD-S. First, we used the data for the last year – 2019. Then, we used averaged data from 2017 to 2019. While our results were very similar across the two samples, for the main analysis we relied on the averaged data for two reasons. First, because by averaging the data across the last three years we gained about 14,000 non-zero observations. Second, because averaging diminishes the possibility that our results are influenced by outliers.

In addition, for computational ease and without impact on the results, we kept all EU countries, all potential EU members,[14] 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

[12]The ITPD-S is not yet available to the public. However, we have access to its pilot version since Yotov is a member of the team that constructed the ITPD-S.

[13]The only reason why ITPD-S is not balanced in all years is due to the fact that some countries do not exist in all years while new ones appear in some years.

[14]Due to data limitations, Kosovo is the only potential member that does not enter our analysis.

that are included separately account on average for 99 percent of the data, and the minimum per industry is 92 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 membership in the World Trade Organization (WTO) come from the *Dynamic Gravity Dataset* (DGD) of the USITC (Gurevich and Herman, 2018).[15] We also construct our own indicator variable for countries that use the Euro based on data from the European Union.[16] Data on other currency unions were constructed by Jose de Sousa.[17] We also construct our own indicator for OECD memberhsip. Data on membership in Regional Trade Agreements (RTAs) are from Egger and Larch (2008) and comprise information on enforced RTAs until year 2021.[18] Finally, data on trade and other sanctions are from the latest edition of the *Global Sanctions Database* (Felbermayr et al., 2020).[19]

4 Estimation Results and Analysis: The EU Impact

This section presents four sets of estimates. First, we report and discuss the estimates of the average (across member states) EU effects for each industry in our sample. Then, we present the country-industry-specific EU estimates. Third, we introduce our novel Trade Cost Efficiency Bound (TCEB) measure. Finally, we present the Single Market Potential (SMP) indexes.

Common EU effects. These results are very similar to the corresponding indexes from Fontagné and Yotov (2024), and the small differences are due to the improved set of bilateral

[15]https://www.usitc.gov/data/gravity/dgd.htm
[16]https://european-union.europa.eu/institutions-law-budget/euro/countries-using-euro_en
[17]http://jdesousa.univ.free.fr/data.htm
[18]https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html
[19]https://www.globalsanctionsdatabase.com/

policy covariates, where we now also control for OECD membership. Since we obtain estimates for each industry in our sample (i.e., a total of 170 industries), we rely on a mixture of Tables and Figures. Our main estimates of the EU effects are reported in Table 1. The first three columns of the table list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E, respectively. Columns (4) and (5) 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. Several findings stand out from Table 1.

First, the EU has been extremely successful in promoting trade among Member States.[20] 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). 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.

Second, on average, our estimates imply that the EU has lead to about 63 percent increase in member's trade, calculated as $(\exp(0.49) - 1) * 100$, where 0.49 is the mean of the EU estimates from Table 1. The corresponding number based only on the positive values in the Table is 115%, suggesting that the EU has doubled trade among its members. We do obtain some negative (although mostly not significant) estimates. These deserve further attention. Some may be explained by directional trade cost asymmetries, others may point to anomalies in the data.

Third, using a standard value for the trade elasticity of 5,[21] our estimates suggest that EU membership has led to direct trade volume gains that are equivalent to tariff reductions of 11% and 17%, respectively. The tariff-equivalent across all estimates is calculated as

[20]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.

[21]The 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).

$(\exp(0.49/(1-\sigma))-1)*100$, where $\sigma = 5$.

Finally, we find that the effects of the EU have been very heterogeneous across the industries and the broad sectors in our sample. Specifically, using the average across the positive estimates for each of the four broad categories in Table 1, we find that the EU has lead to an increase in the trade volume by 440% in Agriculture, 30% in Mining and Energy, and 34% in Manufacturing. The large estimate for Agriculture is consistent with and can be interpreted through the lens of the EU Common Agricultural Policy. It contrasts with the relatively small estimate for manufacturing that 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.

Concerning services, the results are more mixed due to two large and negative estimates for 'Other personal services' and 'Heritage and recreational services'. Consequently, while the average estimate for the broad services sector is essentially zero (-0.0107), based only on positive estimates, the EU has led to an increase in services trade of about 92%.

Our main estimates are visualized in Figure 1, and the results across the four broad sectors in our sample appear in Figure 2. Each figure reports the estimates for every individual industry, however, for clarity, in each figure, we have dropped the top and bottom 5% of the estimates. As expected, the estimates in Figure 2 reveal that the impact of the EU has been the strongest in Agriculture, followed by Services and Mining. Manufacturing estimates are smaller but still mostly positive and statistically significant. In sum, the analysis in this section lead to two 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.

Country-specific EU effects. Due to the large number of estimates, we present our country-industry-specific estimates graphically, in Figure 3. Moreover, for clarity, we split the 170 sets of industry estimates into six panels; one for services and mining, one for services, and four panels for manufacturing. Four main messages stand out from Figure 3. First, the majority of the country-industry EU estimates that we obtain are positive. Second, consistent with our findings about the common EU effects, most of the EU estimates are large in magnitude. Some countries have been able to decrease their trade costs with the other EU members dramatically. Third, the new EU estimates are very heterogeneous across countries within each sector. This result already reveals the potential for large further gains from deeper integration within the EU, which we highlight further in the discussion of our SMP indexes and also translate into GE effects in the next section. Finally, we also obtain a significant fraction of negative EU estimates. Specifically, about 25% of the estimates in Figure 3 are negative. We do not have a good explanation for the negative estimates, however, we note that many of them are concentrated in three services industries, including "Heritage and recreational services", "Services not allocated", and "Other personal services".

We complement Figure 3 with an additional Figure 4, where we only report the statistically significant EU estimates that we obtained in Figure 3. The structure of Figure 4 is the same as the structure of Figure 3. The estimates in Figure 4 reinforce our conclusions based on Figure 3. The most notable result is that not only the number of negative estimates is smaller in Figure 4, but they are also less as a fraction. Specifically, only 13% percent of the estimates in Figure 4 are negative and statistically significant.

The Trade Cost Efficiency Bound (TCEB). The $TCEB$ indexes are presented in Table 2. Specifically, in the last two columns of this table, we include our $TCEB_{75}$ and $TCEB_{25}$ measures. We focus on $TCEB_{75}$ and $TCEB_{25}$ because these indexes will be used in the counterfactual analysis below. In addition, for comparison purposes, we also include the common EU estimates and their corresponding standard errors.[22] To complement Table 2,

[22]Note that, while most of the 'common' EU estimates are between the $TCEB_{25}$ and the $TCEB_{75}$ indexes, it is possible for some 'common' EU estimates to be above $TCEB_{75}$ or below $TCEB_{25}$, since the 'common' estimates can be interpreted as a weighted average of all the country-specific effects. Thus, intuitively, for

we visualize the $TCEB$ indexes in Figure 5. The figure includes two panels. Each panel reports four sets of TCEB indexes – $TCEB^k_{90}$, $TCEB^k_{75}$, $TCEB^k_{50}$, and $TCEB^k_{25}$. The top panel reports all estimates, while in the bottom panel, for clarity, we restrict the values the $TCEB^k_{90}$ index to be less than 5. In each case, we only report the positive TCEB estimates.

The following findings stand out from the results in Table 2 and Figure 5. First, we note that, due to convergence issues with the country-industry EU estimates, we were unable to obtain estimates for three industries, including 'Raw and refined sugar and sugar crops', 'Electricity production, collection, and distribution', and 'Gas production and distribution'. The explanation is that positive trade flows in these industries are sparse, and we will investigate them further. Second, the $TCEB$ indexes are large and positive, and only few of them (especially for $TCEB^k_{75}$) are negative. Third, the $TCEB$ indexes are very heterogeneous across the industries in our sample. Finally, an important implication of our findings is that a comparison between the $TCEB_{75}$ indexes and the 'common' EU estimates from the same table reveals the potential for significant further trade liberalization and welfare gains for the existing EU members. Motivated by this relationship, we quantify the potential welfare gains for the member states in one of the counterfactuals below.

The SMP indexes. We conclude with a discussion of our SMP indexes. Once again, due to their large number, they are presented graphically, in Figure 6. The structure of Figure 6 is the same as the structure of Figures 3 and 4. We draw two conclusions based on Figure 6. First, most countries would gain significantly more from the Single Market if they traded at the bound of 'efficient' EU trade costs. In fact, on average, across countries and industries, the SMP index (2.11) is significantly larger than the average EU estimate (0.73), the average significant EU estimate (1.56), and the average positive EU estimate (1.34). An important message from this analysis is that there is a significant scope for further gains from deeper

the instances when the 'common' estimate is below the corresponding $TCEB_{25}$ estimate, it must be the case that some countries with large weight have small estimates. We have confirmed this hypothesis for some industries, e.g., "Pulses and legumes, dried, preserved", where the correlation between output and the corresponding country-specific estimate is negative.

EU integration among its member countries. We explore this opportunity in the next section. Second, the SMP indexes are very heterogeneous across the countries in our sample within each industry. In combination with their large number, the heterogeneity in the country-industry EU estimates offers an exciting opportunity to use them in a second-stage analysis in order to study the determinants of the EU effects.

5 Counterfactual analysis

This section delivers and discusses the results of four simulation scenarios, which obtain welfare-like indexes based on the estimates from Table 2. Our first set of counterfactuals simulates the gains already reaped by Member States from the Single Market, and the potential gains of further deepening EU integration. First, we quantify ex-post the impact of the Single Market based on the "common" EU estimates from Table 2. Our second counterfactual uses the $TCEB^k_{75}$ indexes from the same table to quantify the potential gains for existing members if each of them could trade at the 75% trade cost efficiency bound in the EU. In a sense, this second counterfactual is informative on the trade and economic impact of the intensive margin of European integration.

We then propose a set of counterfactuals that address the extensive margin of European integration, namely the enlargement of the Single Market to candidate countries.[23] Our third counterfactual ("Enlargement 1") uses our our $TCEB^k_{50}$ estimates to simulate the impact of a hypothetical situation where all candidate countries enter simultaneously and enjoy bilateral trade costs with existing EU members as well as among themselves that are set at the our $TCEB^k_{50}$ estimates. The idea behind this scenario is to use the 'average' realized EU effects. Our fourth counterfactual ("Enlargement 2") replicates the previous scenario, however, instead of the 'common' EU estimates we use our $TCEB^k_{25}$ estimates to simulate

[23] In this counterfactual, trade cost between current member States are unaffected. The potential new EU members that enter our analysis are Albania (ALB), Bosnia and Herzegovina (BIH), Georgia (GEO), Moldova (MDA), Montenegro (MNE), North Macedonia (MKD), Serbia (SRB), and Ukraine (UKR). Due to data limitations, Kosovo does not enter our sample.

the change in the trade costs for the new members. We view this scenario as a lower bound for the potential gains for the new EU members. Finally, in scenario "Enlargement 3", we replicate the previous counterfactual but with our $TCEB^k_{75}$ estimates, which will deliver an upper bound of the EU effects. Subsection 5.1 reviews the theoretical framework that we employ. Then, in Subsection 5.2, we summarize the findings from the four counterfactual experiments that we perform.

5.1 Summary of the theoretical model

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 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. 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.[24]

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 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

[24]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. (2023), 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).

consumer's optimization problem leads to the following expression for bilateral trade flows:

$$X_{ij} = \left(\frac{\alpha_i p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j. \tag{5}$$

Although, for exposition simplicity, Equation (5) 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 analysis, which will be conducted at the industry level.[25]

Turning to the different terms in equation (5), 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, 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.[26] Finally, σ denotes the elasticity of substitution.

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

$$\hat{W}_i = (\hat{\pi}_{ii})^{1/(1-\sigma)}, \tag{6}$$

[25] Equation (5) 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.

[26] 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).

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 real GDP or welfare consecutive 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. It is possible to obtain complementary sectoral 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 and the indexes that we report are purely industry-specific.[27]

The shocks in the counterfactual experiments that we will perform will be triggered by changes in trade costs (t_{ij}, $\hat{t}_{ij}$), e.g., lower trade costs due to the formation of the Single Market or increases in trade costs with 'riskier' partners. These changes in trade costs will translate into 'welfare/ToT' 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 (5), we calculate the change of π_{ij} between the baseline (denoted with superscript b) and the counterfactual (denoted with superscript c) as follows:

$$\hat{\pi}_{ij} = \frac{\pi_{ij}^c}{\pi_{ij}^b} = \frac{\left(\hat{p}_i \hat{t}_{ij}\right)^{1-\sigma}}{\sum_l \pi_{lj} \left(\hat{p}_l \hat{t}_{lj}\right)^{1-\sigma}}. \tag{7}$$

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:

$$Y_i \hat{Y}_i = \sum_j \frac{\pi_{ij}(\hat{Y}_i \hat{t}_{ij})^{1-\sigma}}{\sum_l \pi_{lj}(\hat{Y}_l \hat{t}_{lj})^{1-\sigma}} (\hat{Y}_j Y_j + TI_j). \tag{8}$$

[27]By sake of simplicity we show here a simple average across industries.

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. To obtain our main results, we chose a single/common value of 5 for σ, which is standard in the gravity literature. While we are well aware that the disaggregated trade elasticities can be very heterogeneous across the industries in our data (Fontagné et al., 2022), for the current analysis we will use a single trade elasticity value for all industries. This 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.

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" 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 described in the previous section to perform four counterfactual experiments. In what follows, we describe the design for each of the simulations and discuss our findings. In each case, we obtain "welfare-like" effects for each country and for each industry in our data. Due to the large number of indexes (i.e., for each of the 170 industries and all countries in the world), we only focus on the EU countries and the potential new EU members, and we report weighted average (by industry-size) country-specific indexes. Our results appear in Table 3.

Counterfactual 1: The impact of the Single Market. Our first counterfactual analysis evaluates the impact of the EU completion. To this end, we start in the baseline, and we use our own estimates of the partial effects for each industry from column 'COMMON' of Table 2 to simulate a scenario *without* the EU (e.g., like Brexit but for all members).[28] Our weighted-average estimates of the gains from the Single Market for each Member State appear in column 'EU Effects' from Table 3.

Several findings stand out from the first column of Table 2. First, we obtain large and positive gains for all Member States. Second, the gains are heterogeneous, e.g., varying between 0.8% and 5%, with larger countries gaining less. By sake of country size and market potential, in contrast, smaller and more central Member States (e.g., Luxembourg, Belgium, the Netherlands, and Ireland) gain more. The policy implication from these results is that the impact of the Single Market on the EU economies have been positive, remarkably strong, and very heterogeneous. Geography, country size and sectoral specialization therefore explain the observed differences. Finally, and as expected, we see that the EU integration has led to losses for the non-EU members in Table 2.[29] Without any exception, all potential members have suffered losses, which vary across countries between 0.12 percent for Georgia and 0.70 percent for Montenegro. Geographical proximity to the EU is a natural explanation for the heterogeneity in the losses for the 'outside' countries. As expected, the losses for the former Soviet republics, including Ukraine, are smaller than those for the other non-member states. The explanation is geographic and economic distance. The policy implication of this result is that it offers an additional motivation (i.e., to overcome these losses) for the outside countries to pursue EU accession.

Counterfactual 2: Realizing the 'full' potential of the Single Market. Motivated by our earlier finding that the $TCEB^k_{75}$ indexes are significantly larger than the corresponding

[28]In the cases/industries when we got negative EU partial estimates, we set them to zero.
[29]The non-Eu members are marked with * in the first column of the table.

'common' EU estimates in Table 2, in our next counterfactual, we use the difference between the $TCEB_{75}^{k}$ and the corresponding 'common' EU estimates to simulate a scenario in which all existing EU members enjoy trade costs with the rest of the EU states at the 75% efficiency bound.[30] In other words, we use our partial estimates to simulate deeper integration within the existing Single Market. Our findings appear in column 'EU Potential' from Table 3. The main message from this experiment is that there is significant potential for existing EU members to gain further from strengthening the internal EU ties. Specifically, our estimates imply that, on average, the current EU gains are only about half of the potential gains if all members could trade at the 75% efficiency bound. The policy implication of this result is that there are very large additional benefits and potential of the EU even for the exiting members and without further enlargement. Further policy implications can be drawn based on the heterogeneity of the estimates across the EU members in column 'EU Potential' from Table 3.

Counterfactual 3: EU Enlargement at the 50% efficiency bound. In our next experiment, we simulate a scenario where we use the $TCEB_{50}^{k}$ estimates to simulate the impact of a hypothetical EU enlargement, when all potential new EU members enter simultaneously and enjoy bilateral trade costs with the existing EU members as well as among themselves that are equal to the 'average' EU effects that were already realized. Our estimates are reported in column 'Enlargement 1' of Table 3. Two main results stand out from this experiment. First, and most important, the potential gains for the new EU members are large, varying between 2.4%, for Georgia, and 9.5% for Montenegro. Perhaps not surprisingly the gains for the former Soviet republics, including Ukraine, are smaller than those for the other non-member states. The explanation is geographic and economic distance. Also not surprisingly, the correlation between the gains for the new members in this scenario and the corresponding losses for the same countries in the previous scenarios is strong and negative.

[30] An advantage of our estimating procedure is that we can use the smallest positive country-specific EU gravity estimate in order to replace the few (7 out of 170) negative $TCEB_{75}^{k}$ indexes.

Geography and economic ties are the natural explanation. Second, the rest of the countries in the EU will gain as well, and the largest gains will be for EU members that are close geographically and economically to the new members, e.g., Croatia, Bulgaria, Slovenia. Our results may have implications for the votes on accession.

Counterfactual 4: EU Enlargement at the 25% efficiency bound. In our next experiment, we simulate a more conservative scenario, where we use the $TCEB_{25}^{k}$ estimates from Table 2 to simulate the impact of a hypothetical EU enlargement, when all potential new EU members enter simultaneously and enjoy bilateral trade costs with existing EU members as well as among themselves that are set at the 25% trade cost efficiency bound in the EU. Our estimates are reported in column 'Enlargement 2' of Table 3. As expected, the new estimates are smaller in magnitude, but qualitatively almost identical to the corresponding results from 'Enlargement 1'.

Counterfactual 5: EU Enlargement at the 75% efficiency bound. In our last experiment, we simulate a scenario where we use the $TCEB_{75}^{k}$ estimates from Table 2 to simulate the impact of a hypothetical EU enlargement, when all potential new EU members enter simultaneously and enjoy bilateral trade costs with existing EU members as well as among themselves that are at the 75% trade cost efficiency bound in the EU. Our estimates are reported in column 'Enlargement 3' of Table 3. As expected, the results from this scenario generate the largest effects in terms of magnitude. However, in relative terms, the impact on both the new and existing members is similar to the previous scenarios. In combination, columns 'Enlargement 2' and 'Enlargement 3' may be used to provide confidence bounds for the potential impact of the EU on new members.

6 Conclusion

The objective of this paper was to simulate a possible EU enlargement. To this end, we capitalized on established techniques to estimate the partial equilibrium effects of the EU, and we proposed new measures (i.e., the Trade Cost Efficiency Bound (TCEB) and the Single Market Potential (SMP)) to capture the potential of the Single Market for new and existing members.

Three main results stand out from our partial equilibrium analysis: (i) The common (across countries) EU estimates reveal that the EU has been extremely successful in promoting trade among Member States and that the effects of the EU have been very heterogeneous across the industries and the broad sectors in our sample. Specifically, we find that the EU has led to an increase in the trade volume by 440% in Agriculture, 30% in Mining and Energy, and 34% in manufacturing; (ii) The country-specific EU estimates that we obtain confirm our conclusions about large and positive EU effects from the "common" EU estimates, but also reveal that the EU effects have been very heterogeneous across Member States within each industry; (ii) Finally, our novel Trade Cost Efficiency Bound (TCEB) indexes are large, positive and very heterogeneous across the industries in our sample. Most importantly, the TCEB estimates are significantly larger than the corresponding "common" EU effects that we obtain, which means that there is potential for significant further trade liberalization and welfare gains for existing EU members.

We use the partial estimates to perform three counterfactual analysis within a standard/benchmark new quantitative framework. First, we quantify ex-post the impact of the Single Market based on the 'common' EU estimates. The gains are heterogeneous, e.g., varying between 0.8% and 9%, with larger countries (e.g., France, Germany, Italy) gaining less, while smaller and more central Member States (e.g., Luxembourg, Belgium, the Netherlands, and Ireland) gain more. Second, we use the $TCEB$ indices to quantify the potential gains for existing members if each of them was able to trade at the 75% trade cost efficiency bound in the EU. Our estimates reveal that there is significant potential for existing EU members to gain further from strengthening the internal EU ties – on average, the current EU gains are only about half of the potential gains if all members could trade at the 75% efficiency bound.

Third, we use the $TCEB$ estimates to simulate the impact of a hypothetical EU enlargement, when all potential new EU members enter simultaneously, and we capitalize on our new $TCEB$ indexes to provide confidence bounds for the impact of the enlargement. Using our $TCEB_{50}^{k}$ estimates to simulate EU enlargement, we find that the potential gains for the new EU members are large but heterogeneous, e.g., varying between 2.4%, for Georgia, and 9.5% for Montenegro. In addition, we find that the rest of the countries in the EU will gain as well, and the largest gains will be for EU members that are close geographically and economically to the new members, e.g., Croatia, Bulgaria, Slovenia. We also experiment with our $TCEB_{25}^{k}$ and $TCEB_{75}^{k}$ estimates, which may be used to generate confidence bounds for the potential impact of the EU on new members. As expected, in terms of magnitude, the results from these scenarios generate smaller and larger effects, respectively, as compared to the results from the $TCEB_{75}^{k}$ counterfactual. However, in relative terms, the impact on new and existing members is similar to the benchmark results that are based on the $TCEB_{50}^{k}$ indexes.

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Table 1: Industry-Level EU Estimates

ID	Industry Description	Broad Sector	Estim.	Std.Err.
1	Wheat	Agriculture	2.092	(.209)
2	Rice (raw)	Agriculture	3.176	(.277)
3	Corn	Agriculture	2.033	(.234)
4	Other cereals	Agriculture	1.848	(.199)
5	Cereal products	Agriculture	3.467	(.492)
6	Soybeans	Agriculture	1.962	(.384)
7	Other oilseeds (excluding peanuts)	Agriculture	0.824	(.151)
8	Animal feed ingredients and pet foods	Agriculture	0.600	(.17)
9	Raw and refined sugar and sugar crops	Agriculture	3.323	(.891)
10	Other sweeteners	Agriculture	1.163	(.272)
11	Pulses and legumes, dried, preserved	Agriculture	0.369	(.243)
12	Fresh fruit	Agriculture	1.128	(.142)
13	Fresh vegetables	Agriculture	1.217	(.118)
14	Prepared fruits and fruit juices	Agriculture	0.874	(.24)
15	Prepared vegetables	Agriculture	5.642	(2.096)
16	Nuts	Agriculture	1.118	(.179)
17	Live Cattle	Agriculture	0.687	(.412)
18	Live Swine	Agriculture	4.592	(.463)
19	Eggs	Agriculture	1.946	(.204)
20	Other meats, livestock products, and live animals	Agriculture	-0.117	(.18)
21	Cocoa and cocoa products	Agriculture	3.275	(.505)
22	Beverages, nec	Agriculture	2.625	(.3)
23	Cotton	Agriculture	1.690	(.329)
24	Tobacco leaves and cigarettes	Agriculture	0.802	(.235)
25	Spices	Agriculture	0.924	(.179)
26	Other agricultural products, nec	Agriculture	0.350	(.124)
27	Forestry	Agriculture	-0.167	(.161)
28	Fishing	Agriculture	-0.215	(.318)
29	Mining of hard coal	Mining and Energy	0.520	(.43)
30	Mining of lignite	Mining and Energy	1.870	(.558)
31	Extraction crude petroleum and natural gas	Mining and Energy	-0.254	(.316)
32	Mining of iron ores	Mining and Energy	0.233	(.378)
33	Other mining and quarring	Mining and Energy	0.518	(.191)
34	Electricity production, collection, and distribution	Mining and Energy	1.074	(.27)
35	Gas production and distribution	Mining and Energy	-2.137	(1.284)
36	Processing/preserving of meat	Manufacturing	1.142	(.118)
37	Processing/preserving of fish	Manufacturing	0.960	(.119)
38	Processing/preserving of fruit and vegetables	Manufacturing	0.700	(.09)
39	Vegetable and animal oils and fats	Manufacturing	0.923	(.188)
40	Dairy products	Manufacturing	1.493	(.104)
41	Grain mill products	Manufacturing	1.364	(.146)
42	Starches and starch products	Manufacturing	1.134	(.121)
43	Prepared animal feeds	Manufacturing	0.871	(.121)
44	Bakery products	Manufacturing	0.889	(.131)
45	Sugar	Manufacturing	1.183	(.239)
46	Cocoa chocolate and sugar confectionery	Manufacturing	1.027	(.101)
47	Macaroni noodles and similar products	Manufacturing	1.695	(.255)
48	Other food products n.e.c.	Manufacturing	0.959	(.086)
49	Distilling rectifying and blending of spirits	Manufacturing	1.304	(.149)
50	Wines	Manufacturing	0.804	(.182)
51	Malt liquors and malt	Manufacturing	0.478	(.161)
52	Soft drinks; mineral waters	Manufacturing	0.581	(.134)
53	Tobacco products	Manufacturing	1.929	(.264)
54	Textile fibre preparation; textile weaving	Manufacturing	0.576	(.111)
55	Made-up textile articles except apparel	Manufacturing	0.0580	(.107)
56	Carpets and rugs	Manufacturing	0.913	(.14)
57	Cordage rope twine and netting	Manufacturing	0.218	(.116)
58	Other textiles n.e.c.	Manufacturing	0.195	(.101)
59	Knitted and crocheted fabrics and articles	Manufacturing	-0.169	(.128)
60	Wearing apparel except fur apparel	Manufacturing	-0.481	(.146)
61	Dressing and dyeing of fur; processing of fur	Manufacturing	0.0530	(.17)
62	Tanning and dressing of leather	Manufacturing	-0.171	(.173)
63	Luggage handbags etc.; saddlery and harness	Manufacturing	-0.386	(.171)
64	Footwear	Manufacturing	-0.168	(.155)

Continued on next page

65	Sawmilling and planing of wood	Manufacturing	-0.146	(.165)
66	Veneer sheets plywood particle board etc.	Manufacturing	0.182	(.106)
67	Builders' carpentry and joinery	Manufacturing	0.128	(.119)
68	Wooden containers	Manufacturing	-0.233	(.114)
69	Other wood products; articles of cork/straw	Manufacturing	0.310	(.127)
70	Pulp paper and paperboard	Manufacturing	0.202	(.102)
71	Corrugated paper and paperboard	Manufacturing	0.274	(.092)
72	Other articles of paper and paperboard	Manufacturing	-0.0180	(.104)
73	Publishing of books and other publications	Manufacturing	0.190	(.084)
74	Publishing of newspapers journals etc.	Manufacturing	-0.0870	(.142)
75	Publishing of recorded media	Manufacturing	-0.211	(.183)
76	Other publishing	Manufacturing	-0.0780	(.152)
77	Printing	Manufacturing	0.195	(.102)
78	Service activities related to printing	Manufacturing	0.0330	(.192)
79	Coke oven products	Manufacturing	-0.185	(.386)
80	Refined petroleum products	Manufacturing	0.237	(.12)
81	Processing of nuclear fuel	Manufacturing	-0.159	(.447)
82	Basic chemicals except fertilizers	Manufacturing	0.120	(.084)
83	Fertilizers and nitrogen compounds	Manufacturing	0.669	(.124)
84	Plastics in primary forms; synthetic rubber	Manufacturing	0.415	(.076)
85	Pesticides and other agro-chemical products	Manufacturing	0.772	(.122)
86	Paints varnishes printing ink and mastics	Manufacturing	0.196	(.087)
87	Pharmaceuticals medicinal chemicals etc.	Manufacturing	0.367	(.102)
88	Soap cleaning and cosmetic preparations	Manufacturing	0.827	(.089)
89	Other chemical products n.e.c.	Manufacturing	0.391	(.087)
90	Man-made fibres	Manufacturing	0.660	(.17)
91	Rubber tyres and tubes	Manufacturing	0.550	(.101)
92	Other rubber products	Manufacturing	0.169	(.078)
93	Plastic products	Manufacturing	0.273	(.075)
94	Glass and glass products	Manufacturing	0.284	(.078)
95	Pottery china and earthenware	Manufacturing	0.136	(.122)
96	Refractory ceramic products	Manufacturing	0.179	(.126)
97	Struct.non-refractory clay; ceramic products	Manufacturing	0.132	(.107)
98	Cement lime and plaster	Manufacturing	-0.149	(.176)
99	Articles of concrete cement and plaster	Manufacturing	0.0500	(.109)
100	Cutting shaping and finishing of stone	Manufacturing	-0.0480	(.158)
101	Other non-metallic mineral products n.e.c.	Manufacturing	0.356	(.083)
102	Basic iron and steel	Manufacturing	0.557	(.066)
103	Basic precious and non-ferrous metals	Manufacturing	0.553	(.163)
104	Structural metal products	Manufacturing	0.0210	(.08)
105	Tanks reservoirs and containers of metal	Manufacturing	-0.0830	(.099)
106	Steam generators	Manufacturing	0.0430	(.179)
107	Cutlery hand tools and general hardware	Manufacturing	0.271	(.104)
108	Other fabricated metal products n.e.c.	Manufacturing	0.348	(.098)
109	Engines and turbines (not for transport equipment)	Manufacturing	-0.0110	(.159)
110	Pumps compressors taps and valves	Manufacturing	-0.0810	(.088)
111	Bearings gears gearing and driving elements	Manufacturing	0.159	(.102)
112	Ovens furnaces and furnace burners	Manufacturing	0.0290	(.118)
113	Lifting and handling equipment	Manufacturing	0.158	(.091)
114	Other general purpose machinery	Manufacturing	0.123	(.063)
115	Agricultural and forestry machinery	Manufacturing	0.534	(.092)
116	Machine tools	Manufacturing	0.346	(.129)
117	Machinery for metallurgy	Manufacturing	0.538	(.173)
118	Machinery for mining and construction	Manufacturing	0.338	(.097)
119	Food/beverage/tobacco processing machinery	Manufacturing	0.270	(.086)
120	Machinery for textile apparel and leather	Manufacturing	0.00600	(.145)
121	Weapons and ammunition	Manufacturing	0.259	(.172)
122	Other special purpose machinery	Manufacturing	-0.0320	(.099)
123	Domestic appliances n.e.c.	Manufacturing	0.255	(.118)
124	Office accounting and computing machinery	Manufacturing	0.302	(.149)
125	Electric motors generators and transformers	Manufacturing	-0.133	(.101)
126	Electricity distribution and control apparatus	Manufacturing	0.138	(.1)
127	Insulated wire and cable	Manufacturing	0.322	(.126)
128	Accumulators primary cells and batteries	Manufacturing	0.556	(.166)
129	Lighting equipment and electric lamps	Manufacturing	-0.167	(.141)
130	Other electrical equipment n.e.c.	Manufacturing	-0.246	(.101)
131	Electronic valves tubes etc.	Manufacturing	0.365	(.15)

Continued on next page

132	TV/radio transmitters; line comm. apparatus	Manufacturing	-0.215	(.147)
133	TV and radio receivers and associated goods	Manufacturing	-0.0710	(.131)
134	Medical surgical and orthopaedic equipment	Manufacturing	0.0840	(.094)
135	Measuring/testing/navigating appliances etc.	Manufacturing	0.217	(.073)
136	Optical instruments and photographic equipment	Manufacturing	0.0440	(.165)
137	Watches and clocks	Manufacturing	0.257	(.153)
138	Motor vehicles	Manufacturing	0.473	(.124)
139	Automobile bodies trailers and semi-trailers	Manufacturing	0.244	(.19)
140	Parts/accessories for automobiles	Manufacturing	0.563	(.128)
141	Building and repairing of ships	Manufacturing	-0.492	(.164)
142	Building/repairing of pleasure/sport. boats	Manufacturing	-0.423	(.167)
143	Railway/tramway locomotives and rolling stock	Manufacturing	0.374	(.167)
144	Aircraft and spacecraft	Manufacturing	0.237	(.179)
145	Motorcycles	Manufacturing	0.591	(.156)
146	Bicycles and invalid carriages	Manufacturing	-0.333	(.144)
147	Other transport equipment n.e.c.	Manufacturing	-0.124	(.122)
148	Furniture	Manufacturing	0.294	(.089)
149	Jewellery and related articles	Manufacturing	0.388	(.186)
150	Musical instruments	Manufacturing	-0.182	(.132)
151	Sports goods	Manufacturing	0.0920	(.125)
152	Games and toys	Manufacturing	-0.247	(.3)
153	Other manufacturing n.e.c.	Manufacturing	0.0900	(.102)
154	Manufacturing services on physical inputs	Services	-2.060	(1.281)
155	Maintenance and repair services n.i.e.	Services	-0.754	(.508)
156	Transport	Services	0.435	(.071)
157	Travel	Services	0.984	(.149)
158	Construction	Services	0.267	(.245)
159	Insurance and pension services	Services	0.860	(.262)
160	Financial services	Services	0.940	(.153)
161	Charges for use of intellectual property	Services	0.149	(.259)
162	Telecom, computer, information services	Services	0.633	(.144)
163	Other business services	Services	0.687	(.143)
164	Heritage and recreational services	Services	-2.139	(.861)
165	Health services	Services	0.304	(.229)
166	Education services	Services	0.958	(.224)
167	Government goods and services n.i.e.	Services	0.554	(.227)
168	Services not allocated	Services	-0.899	(.21)
169	Trade-related services	Services	1.083	(.269)
170	Other personal services	Services	-2.185	(.582)

Figure 1: EU Effects on Trade: All Industries

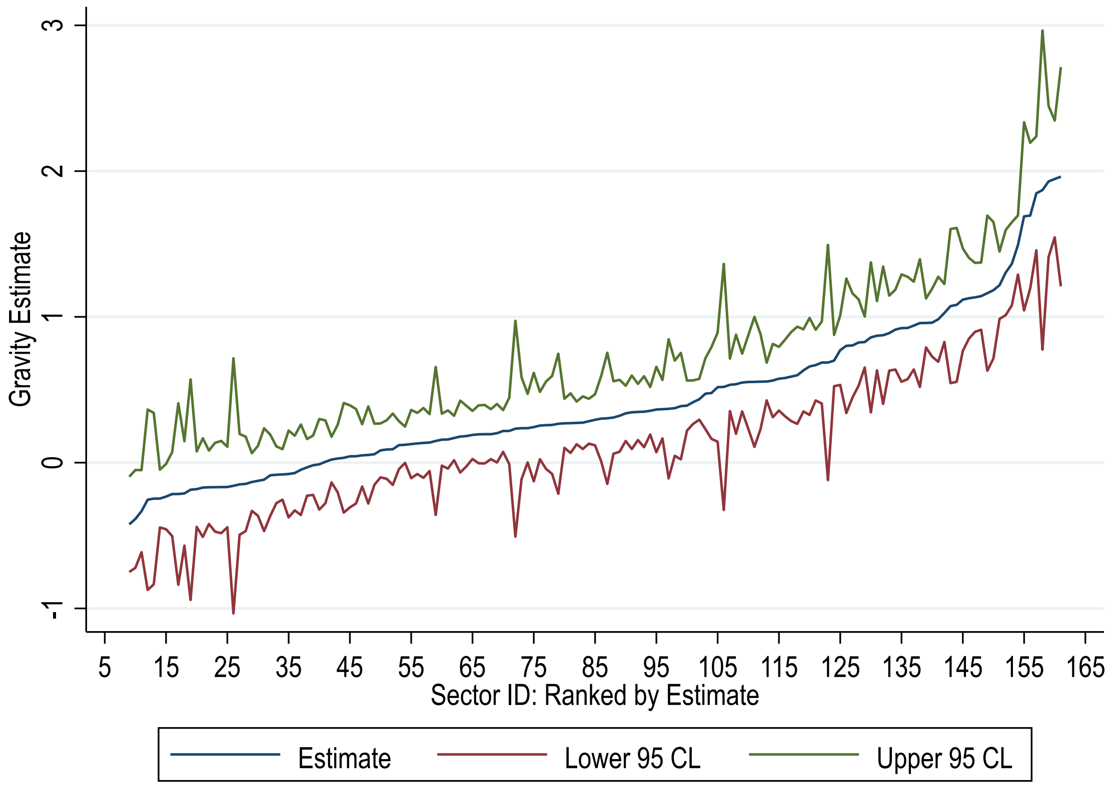

Figure 2: EU Effects on Trade: Broad Sectors

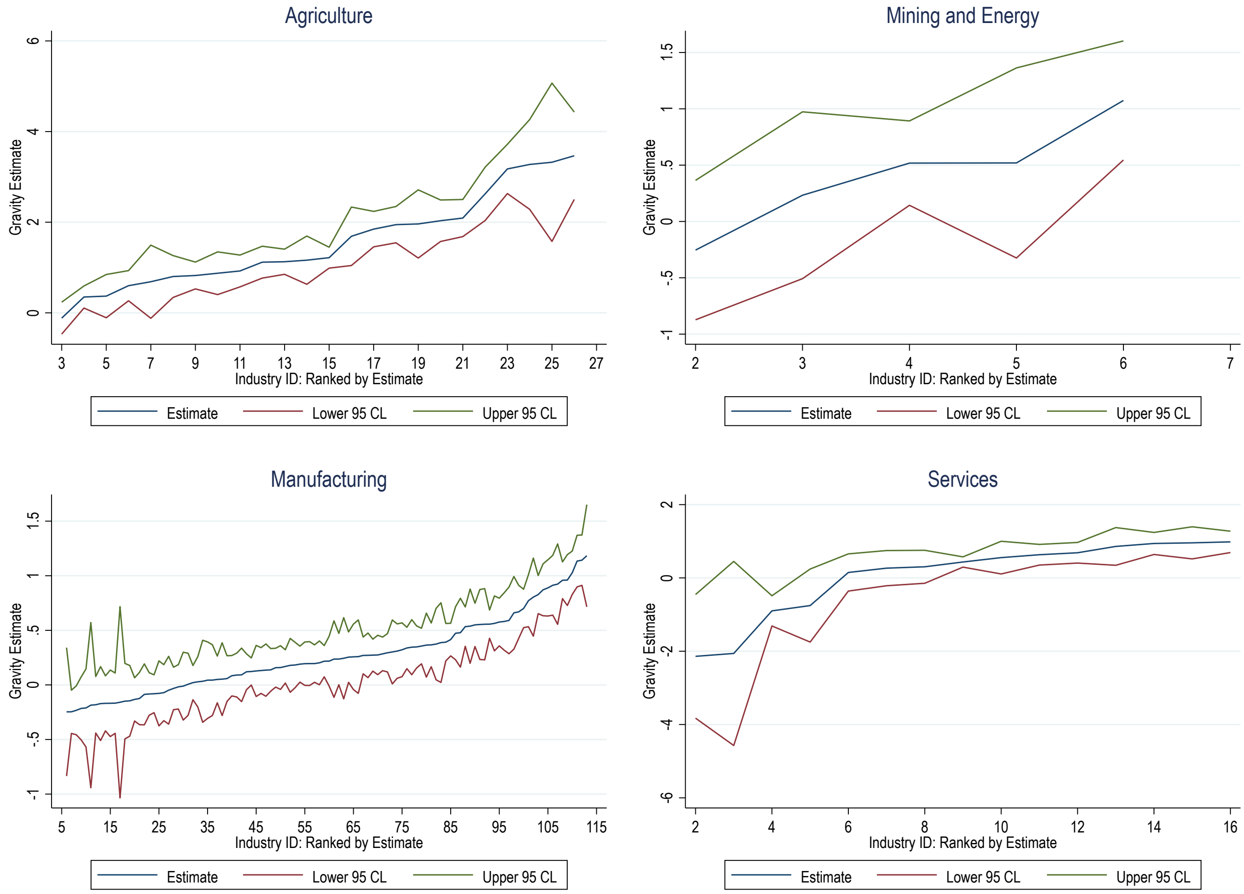

Figure 3: EU Effects by Country and Industry: All Estimates

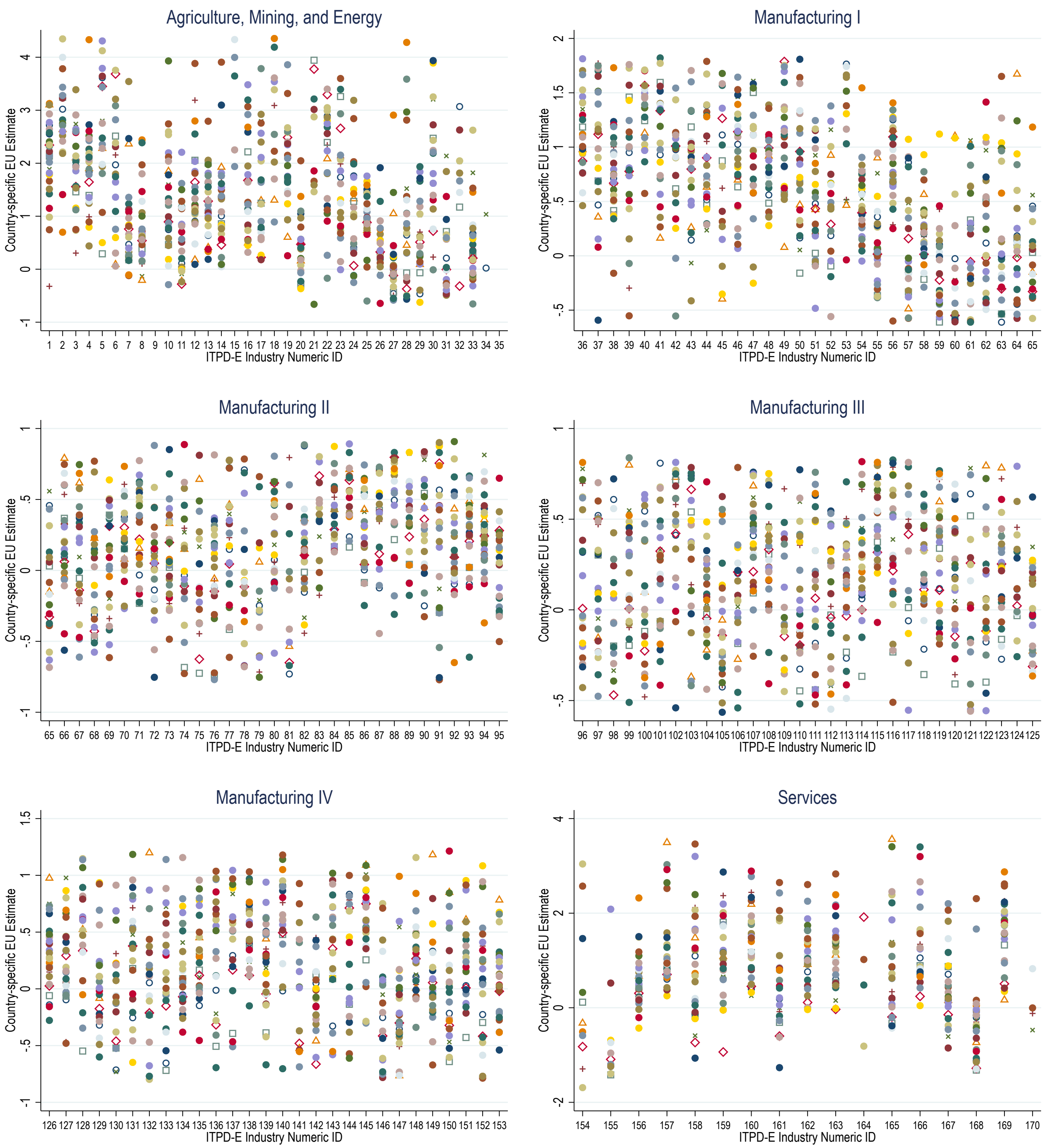

Figure 4: EU Effects by Country and Industry: Significant Estimates

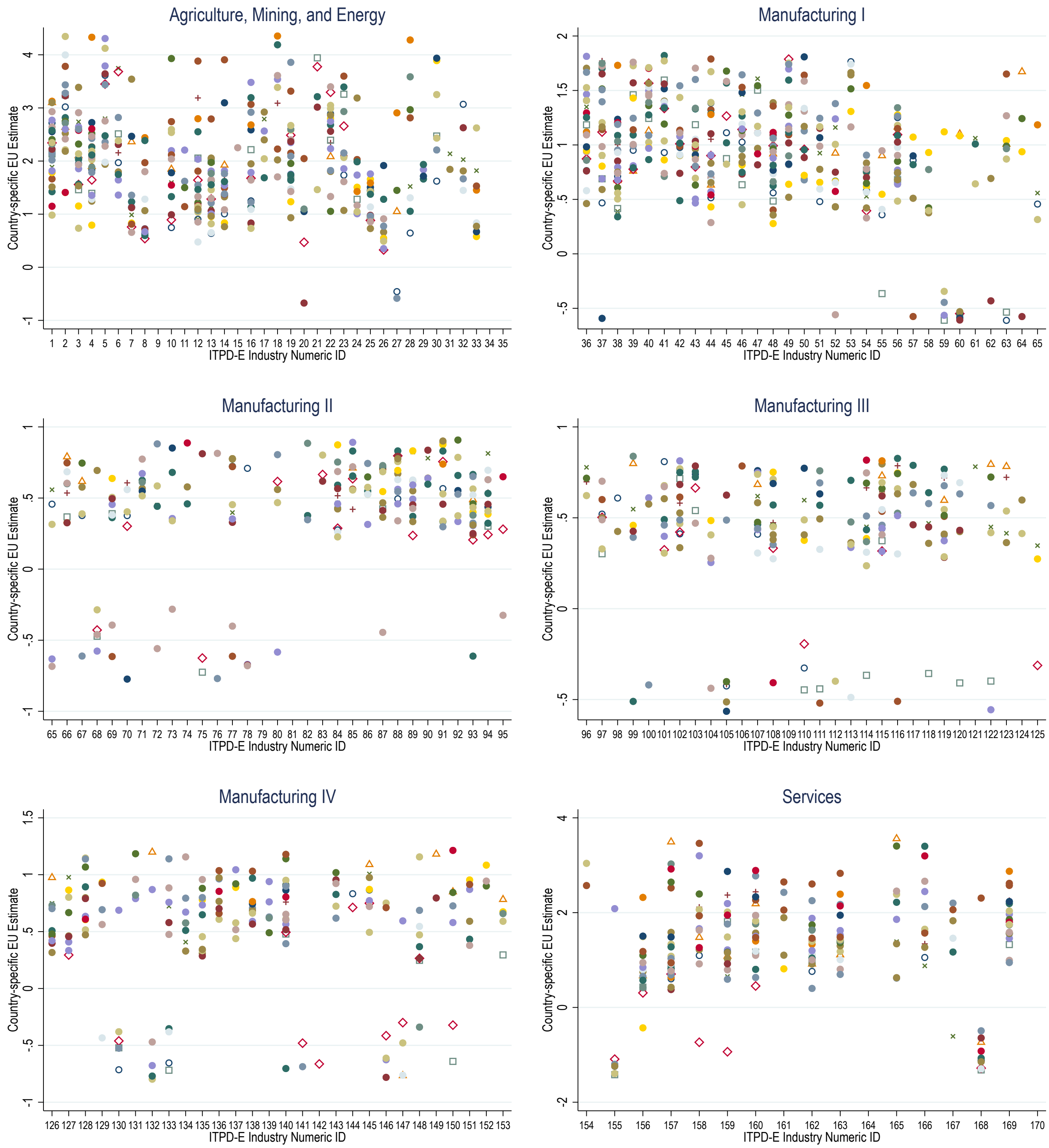

Table 2: Industry-Level EU and TCEB Estimates

ID	Industry Description	COMMON	STD.ERR.	$TCEB_{75}$	$TCEB_{25}$
1	Wheat	2.092	(.209)	2.641	1.816
2	Rice (raw)	3.176	(.277)	4.346	2.599
3	Corn	2.033	(.234)	2.621	1.710
4	Other cereals	1.848	(.199)	2.266	1.786
5	Cereal products	3.467	(.492)	5.418	2.755
6	Soybeans	1.962	(.384)	3.684	1.747
7	Other oilseeds (excluding peanuts)	0.824	(.151)	1.356	0.832
8	Animal feed ingredients and pet foods	0.600	(.17)	1.800	0.668
9	Raw and refined sugar and sugar crops	3.323	(.891)	.	.
10	Other sweeteners	1.163	(.272)	2.538	1.330
11	Pulses and legumes, dried, preserved	0.369	(.243)	1.618	1.142
12	Fresh fruit	1.128	(.142)	1.922	1.078
13	Fresh vegetables	1.217	(.118)	1.767	0.963
14	Prepared fruits and fruit juices	0.874	(.24)	1.815	1.326
15	Prepared vegetables	5.642	(2.096)	6.725	5.221
16	Nuts	1.118	(.179)	2.680	1.130
17	Live Cattle	0.687	(.412)	5.471	2.043
18	Live Swine	4.592	(.463)	5.615	3.540
19	Eggs	1.946	(.204)	2.584	1.685
20	Other meats, livestock products, and live animals	-0.117	(.18)	1.096	0.471
21	Cocoa and cocoa products	3.275	(.505)	7.124	3.860
22	Beverages, nec	2.625	(.3)	3.047	2.233
23	Cotton	1.690	(.329)	3.598	1.855
24	Tobacco leaves and cigarettes	0.802	(.235)	1.736	1.109
25	Spices	0.924	(.179)	1.461	0.922
26	Other agricultural products, nec	0.350	(.124)	0.774	0.351
27	Forestry	-0.167	(.161)	1.448	-0.458
28	Fishing	-0.215	(.318)	2.967	1.054
29	Mining of hard coal	0.520	(.43)	1.935	1.716
30	Mining of lignite	1.870	(.558)	3.936	2.432
31	Extraction crude petroleum and natural gas	-0.254	(.316)	6.757	-1.390
32	Mining of iron ores	0.233	(.378)	5.595	1.665
33	Other mining and quarring	0.518	(.191)	1.674	0.721
34	Electricity production, collection, and distribution	1.074	(.27)	.	.
35	Gas production and distribution	-2.137	(1.284)	.	.
36	Processing/preserving of meat	1.142	(.118)	1.408	0.938
37	Processing/preserving of fish	0.960	(.119)	1.713	0.850
38	Processing/preserving of fruit and vegetables	0.700	(.09)	1.060	0.638
39	Vegetable and animal oils and fats	0.923	(.188)	1.760	0.951
40	Dairy products	1.493	(.104)	1.841	1.243
41	Grain mill products	1.364	(.146)	1.821	1.192
42	Starches and starch products	1.134	(.121)	1.543	0.988
43	Prepared animal feeds	0.871	(.121)	1.331	0.798
44	Bakery products	0.889	(.131)	1.322	0.654
45	Sugar	1.183	(.239)	2.687	1.112
46	Cocoa chocolate and sugar confectionery	1.027	(.101)	1.266	0.839
47	Macaroni noodles and similar products	1.695	(.255)	2.090	1.110
48	Other food products n.e.c.	0.959	(.086)	1.082	0.662
49	Distilling rectifying and blending of spirits	1.304	(.149)	1.751	1.018
50	Wines	0.804	(.182)	1.613	0.881
51	Malt liquors and malt	0.478	(.161)	1.110	0.626
52	Soft drinks; mineral waters	0.581	(.134)	1.854	0.654
53	Tobacco products	1.929	(.264)	2.733	1.742
54	Textile fibre preparation; textile weaving	0.576	(.111)	0.778	0.568
55	Made-up textile articles except apparel	0.0580	(.107)	0.924	-0.00300
56	Carpets and rugs	0.913	(.14)	1.164	0.746
57	Cordage rope twine and netting	0.218	(.116)	0.900	-0.576
58	Other textiles n.e.c.	0.195	(.101)	0.774	0.376
59	Knitted and crocheted fabrics and articles	-0.169	(.128)	1.120	-0.628
60	Wearing apparel except fur apparel	-0.481	(.146)	-0.549	-0.790
61	Dressing and dyeing of fur; processing of fur	0.0530	(.17)	1.062	0.643
62	Tanning and dressing of leather	-0.171	(.173)	3.113	0.130
63	Luggage handbags etc.; saddlery and harness	-0.386	(.171)	1.023	-0.751
64	Footwear	-0.168	(.155)	2.275	0.937

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65	Sawmilling and planing of wood	-0.146	(.165)	0.386	-0.912
66	Veneer sheets plywood particle board etc.	0.182	(.106)	0.685	0.367
67	Builders' carpentry and joinery	0.128	(.119)	0.746	0.377
68	Wooden containers	-0.233	(.114)	0.204	-0.524
69	Other wood products; articles of cork/straw	0.310	(.127)	0.781	0.371
70	Pulp paper and paperboard	0.202	(.102)	0.901	0.339
71	Corrugated paper and paperboard	0.274	(.092)	0.672	0.558
72	Other articles of paper and paperboard	-0.0180	(.104)	0.585	0.442
73	Publishing of books and other publications	0.190	(.084)	0.680	0.340
74	Publishing of newspapers journals etc.	-0.0870	(.142)	0.887	-0.817
75	Publishing of recorded media	-0.211	(.183)	-0.625	-0.918
76	Other publishing	-0.0780	(.152)	0.0220	-1.095
77	Printing	0.195	(.102)	0.723	0.329
78	Service activities related to printing	0.0330	(.192)	0.709	-0.796
79	Coke oven products	-0.185	(.386)	1.479	-1.939
80	Refined petroleum products	0.237	(.12)	0.869	-0.0580
81	Processing of nuclear fuel	-0.159	(.447)	2.398	-2.086
82	Basic chemicals except fertilizers	0.120	(.084)	1.424	0.377
83	Fertilizers and nitrogen compounds	0.669	(.124)	1.338	0.934
84	Plastics in primary forms; synthetic rubber	0.415	(.076)	0.874	0.423
85	Pesticides and other agro-chemical products	0.772	(.122)	1.256	0.652
86	Paints varnishes printing ink and mastics	0.196	(.087)	0.743	0.527
87	Pharmaceuticals medicinal chemicals etc.	0.367	(.102)	1.055	0.467
88	Soap cleaning and cosmetic preparations	0.827	(.089)	0.887	0.595
89	Other chemical products n.e.c.	0.391	(.087)	0.946	0.452
90	Man-made fibres	0.660	(.17)	1.280	0.640
91	Rubber tyres and tubes	0.550	(.101)	0.888	0.457
92	Other rubber products	0.169	(.078)	0.786	0.375
93	Plastic products	0.273	(.075)	0.488	0.306
94	Glass and glass products	0.284	(.078)	0.584	0.355
95	Pottery china and earthenware	0.136	(.122)	1.117	0.281
96	Refractory ceramic products	0.179	(.126)	1.073	-0.675
97	Struct.non-refractory clay; ceramic products	0.132	(.107)	0.600	0.329
98	Cement lime and plaster	-0.149	(.176)	0.609	-1.523
99	Articles of concrete cement and plaster	0.0500	(.109)	0.838	0.426
100	Cutting shaping and finishing of stone	-0.0480	(.158)	1.217	0.0780
101	Other non-metallic mineral products n.e.c.	0.356	(.083)	0.809	0.398
102	Basic iron and steel	0.557	(.066)	0.814	0.527
103	Basic precious and non-ferrous metals	0.553	(.163)	0.923	0.694
104	Structural metal products	0.0210	(.08)	0.406	0.254
105	Tanks reservoirs and containers of metal	-0.0830	(.099)	0.487	-0.513
106	Steam generators	0.0430	(.179)	0.785	-1.186
107	Cutlery hand tools and general hardware	0.271	(.104)	0.739	0.441
108	Other fabricated metal products n.e.c.	0.348	(.098)	0.689	0.352
109	Engines and turbines (not for transport equipment)	-0.0110	(.159)	0.956	-1.452
110	Pumps compressors taps and valves	-0.0810	(.088)	0.773	-0.327
111	Bearings gears gearing and driving elements	0.159	(.102)	0.759	0.326
112	Ovens furnaces and furnace burners	0.0290	(.118)	1.426	-0.520
113	Lifting and handling equipment	0.158	(.091)	0.838	0.345
114	Other general purpose machinery	0.123	(.063)	0.691	0.369
115	Agricultural and forestry machinery	0.534	(.092)	0.796	0.442
116	Machine tools	0.346	(.129)	0.827	0.525
117	Machinery for metallurgy	0.538	(.173)	1.659	0.683
118	Machinery for mining and construction	0.338	(.097)	0.863	0.360
119	Food/beverage/tobacco processing machinery	0.270	(.086)	0.719	0.405
120	Machinery for textile apparel and leather	0.00600	(.145)	0.953	0.428
121	Weapons and ammunition	0.259	(.172)	2.115	1.160
122	Other special purpose machinery	-0.0320	(.099)	0.567	-0.556
123	Domestic appliances n.e.c.	0.255	(.118)	0.869	0.415
124	Office accounting and computing machinery	0.302	(.149)	1.792	0.949
125	Electric motors generators and transformers	-0.133	(.101)	0.347	-0.674
126	Electricity distribution and control apparatus	0.138	(.1)	0.731	0.420
127	Insulated wire and cable	0.322	(.126)	0.865	0.409
128	Accumulators primary cells and batteries	0.556	(.166)	1.214	0.609
129	Lighting equipment and electric lamps	-0.167	(.141)	0.935	-0.434
130	Other electrical equipment n.e.c.	-0.246	(.101)	1.276	-0.715
131	Electronic valves tubes etc.	0.365	(.15)	1.922	0.959

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132	TV/radio transmitters; line comm. apparatus	-0.215	(.147)	1.691	-0.770
133	TV and radio receivers and associated goods	-0.0710	(.131)	1.451	-0.354
134	Medical surgical and orthopaedic equipment	0.0840	(.094)	1.157	0.511
135	Measuring/testing/navigating appliances etc.	0.217	(.073)	0.789	0.336
136	Optical instruments and photographic equipment	0.0440	(.165)	1.529	0.702
137	Watches and clocks	0.257	(.153)	1.792	0.577
138	Motor vehicles	0.473	(.124)	1.302	0.678
139	Automobile bodies trailers and semi-trailers	0.244	(.19)	0.940	0.620
140	Parts/accessories for automobiles	0.563	(.128)	1.141	0.565
141	Building and repairing of ships	-0.492	(.164)	0.387	-1.124
142	Building/repairing of pleasure/sport. boats	-0.423	(.167)	-0.663	-0.996
143	Railway/tramway locomotives and rolling stock	0.374	(.167)	1.772	0.827
144	Aircraft and spacecraft	0.237	(.179)	0.833	-1.330
145	Motorcycles	0.591	(.156)	1.172	0.761
146	Bicycles and invalid carriages	-0.333	(.144)	1.310	-0.781
147	Other transport equipment n.e.c.	-0.124	(.122)	-0.300	-0.801
148	Furniture	0.294	(.089)	0.687	0.265
149	Jewellery and related articles	0.388	(.186)	1.554	1.181
150	Musical instruments	-0.182	(.132)	1.032	0.129
151	Sports goods	0.0920	(.125)	0.954	0.379
152	Games and toys	-0.247	(.3)	1.457	0.901
153	Other manufacturing n.e.c.	0.0900	(.102)	0.674	0.591
154	Manufacturing services on physical inputs	-2.060	(1.281)	8.774	-3.180
155	Maintenance and repair services n.i.e.	-0.754	(.508)	12.85	-1.198
156	Transport	0.435	(.071)	1.181	0.428
157	Travel	0.984	(.149)	1.485	0.704
158	Construction	0.267	(.245)	2.255	1.239
159	Insurance and pension services	0.860	(.262)	1.981	0.973
160	Financial services	0.940	(.153)	2.188	1.187
161	Charges for use of intellectual property	0.149	(.259)	2.055	-1.796
162	Telecom, computer, information services	0.633	(.144)	1.631	0.984
163	Other business services	0.687	(.143)	1.946	1.180
164	Heritage and recreational services	-2.139	(.861)	-1.945	-5.804
165	Health services	0.304	(.229)	3.405	1.343
166	Education services	0.958	(.224)	3.572	1.456
167	Government goods and services n.i.e.	0.554	(.227)	2.062	-0.610
168	Services not allocated	-0.899	(.21)	-0.689	-1.287
169	Trade-related services	1.083	(.269)	2.235	1.560
170	Other personal services	-2.185	(.582)	-2.276	-5.223

Figure 5: Trade Cost Efficiency Bounds

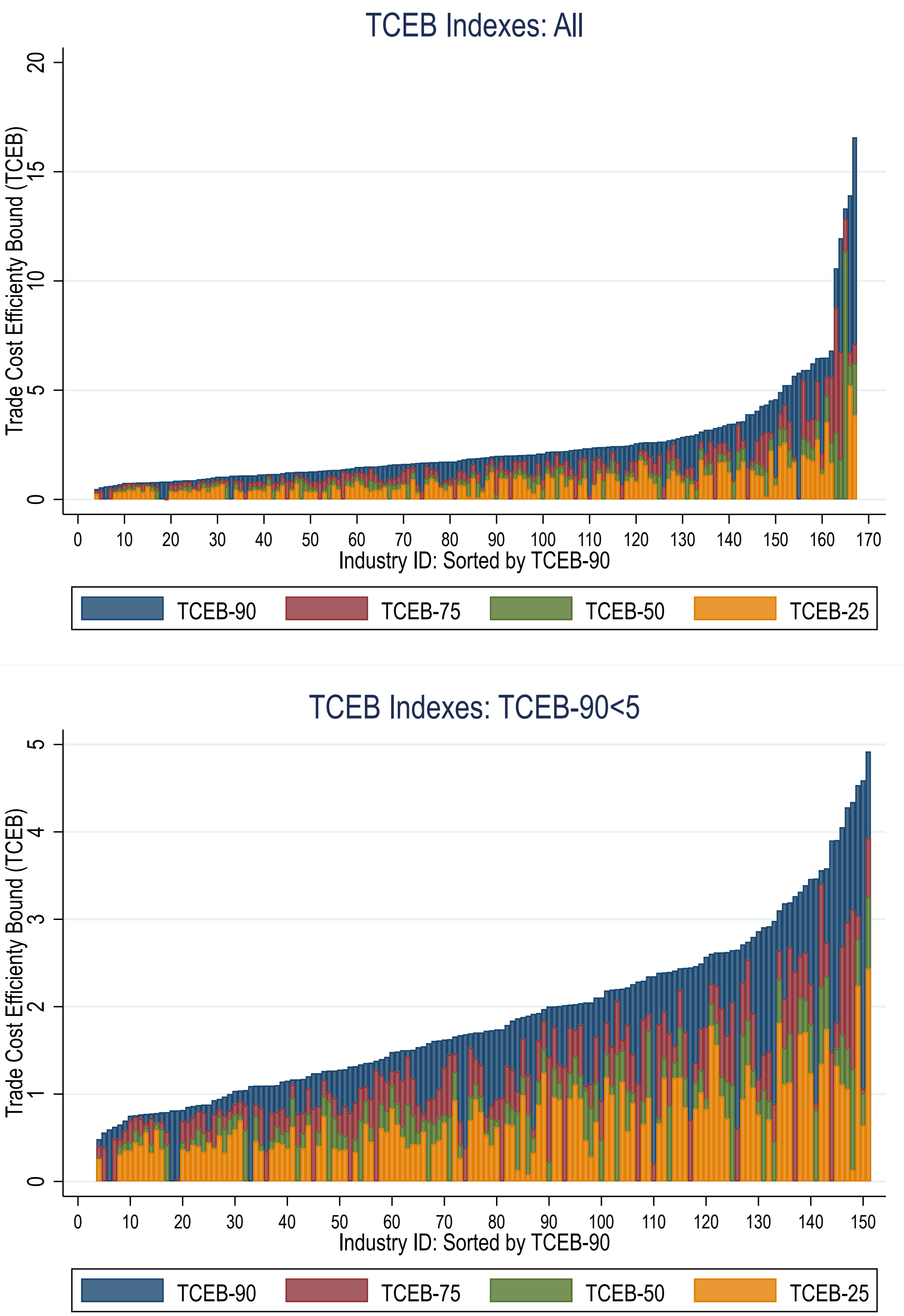

Figure 6: Single Market Potential Estimates

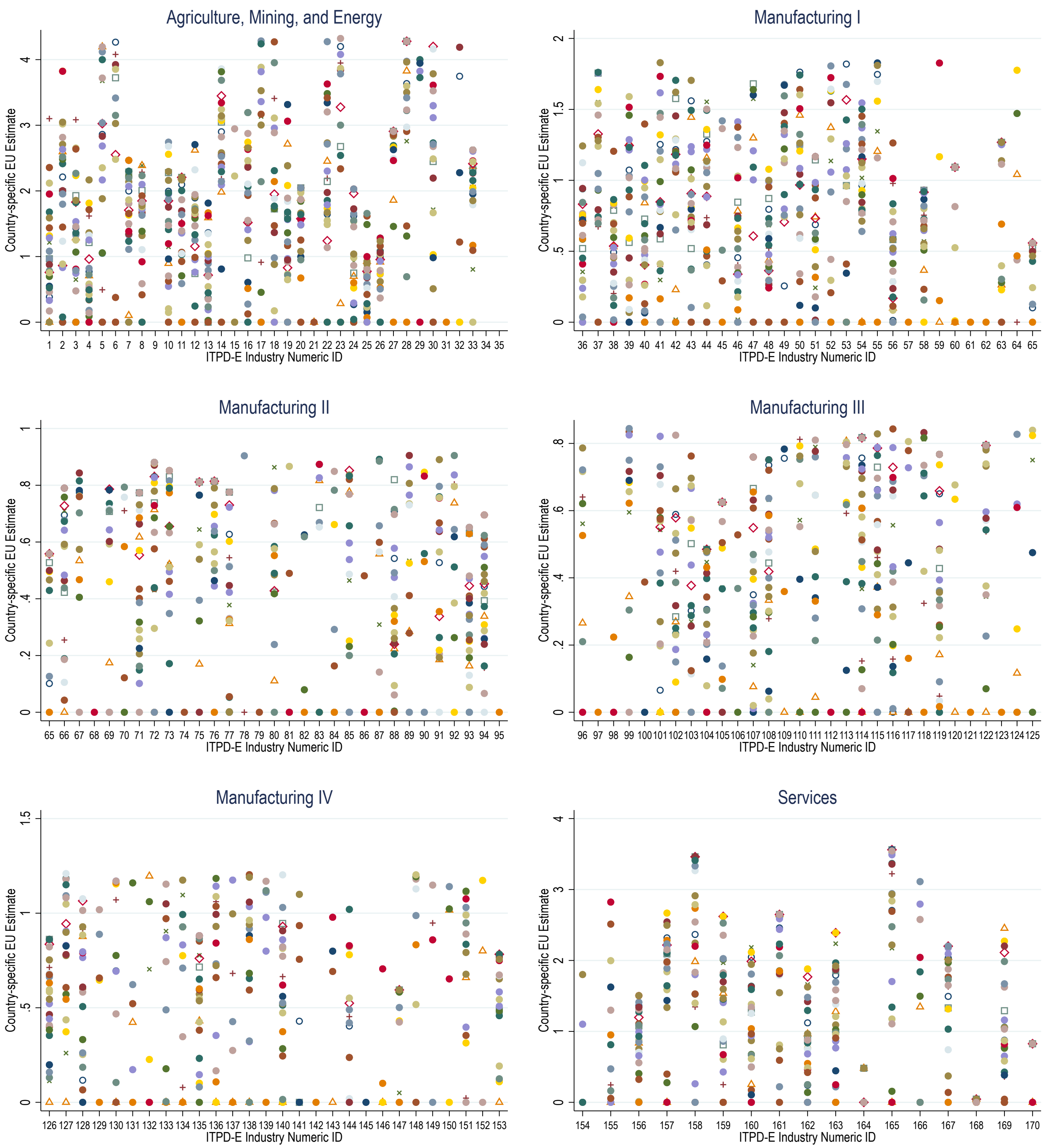

Table 3: Real Output Effects of the EU, Its Potential, and Possible Enlargement.

Country ISO3	EU Effects	EU Potential 75% TCEB	Enlargement 1 50% TCEB	Enlargement 2 25% TCEB	Enlargement 3 75% TCEB
ALB*	-0.335	-0.328	5.992	3.440	11.540
AUT	2.035	5.262	0.048	0.032	0.076
BEL	2.584	7.362	0.012	0.009	0.019
BGR	2.074	4.319	0.273	0.184	0.411
BIH*	-0.482	-1.150	8.757	5.058	14.770
CYP	2.583	6.753	0.089	0.062	0.147
CZE	2.085	6.009	0.044	0.026	0.077
DEU	1.083	3.248	0.020	0.010	0.034
DNK	1.482	4.331	0.008	0.004	0.015
ESP	0.991	2.498	0.012	0.008	0.019
EST	2.031	6.162	0.053	0.037	0.088
FIN	1.070	3.211	0.008	0.004	0.012
FRA	0.916	2.556	0.008	0.004	0.013
GBR	0.866	2.958	0.011	0.007	0.018
GEO*	-0.116	-0.193	2.386	1.448	3.921
GRC	1.093	2.567	0.135	0.088	0.214
HRV	2.978	4.945	0.361	0.244	0.583
HUN	3.067	7.840	0.163	0.078	0.285
IRL	2.150	7.446	0.009	0.006	0.015
ITA	0.812	2.221	0.037	0.021	0.055
LTU	2.247	5.511	0.143	0.073	0.217
LUX	5.226	13.160	0.014	0.008	0.022
LVA	1.891	3.776	0.078	0.058	0.119
MDA*	-0.446	-0.479	5.355	3.431	9.540
MKD*	-0.694	-0.964	6.894	4.718	11.500
MLT	1.929	6.269	0.032	0.023	0.056
MNE*	-0.703	-0.800	9.528	6.489	15.190
NLD	2.367	7.547	0.028	0.017	0.043
POL	1.337	3.264	0.060	0.036	0.092
PRT	1.385	4.229	0.005	0.004	0.007
ROU	1.313	4.017	0.093	0.058	0.158
SRB*	-0.657	-0.799	7.479	4.798	13.13
SVK	2.939	6.846	0.062	0.035	0.108
SVN	2.804	6.047	0.293	0.190	0.457
SWE	1.308	3.942	0.007	0.005	0.018
UKR*	-0.311	-0.251	3.199	1.875	5.583