The economic consequences of geopolitical fragmentation: Evidence from the Cold War*

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September 22, 2024

Abstract

The Cold War was the defining episode of geopolitical fragmentation in the twentieth century. Trade between East and West across the Iron Curtain (a symbolic and physical barrier that divided Europe into two distinct areas) was restricted, but the severity of these restrictions varied over time. We quantify the trade and welfare effects of the Iron Curtain and show how the difficulty of trading across the Iron Curtain fluctuated throughout the Cold War. Using a novel dataset on trade between the two economic blocs and a quantitative trade model, we find that while the Iron Curtain represented a tariff equivalent of 48% at its height in 1951, trade between East and West gradually became easier until the fall of the Berlin Wall in 1989. Despite the easing of trade restrictions, we estimate that the Iron Curtain roughly halved East-West trade flows and caused substantial welfare losses in the Eastern bloc countries that persisted until the end of the Cold War. Conversely, the Iron Curtain led to an increase in intra-bloc trade, especially in the Eastern bloc, which outpaced the integration of Western Europe in the run-up to the formation of the European Union.

Keywords: International trade, Cold War, Iron Curtain, geopolitical fragmentation, trade costs of borders

JEL codes: F13, F14, N74

*We thank Rodrigo Peña for excellent research assistance and Marina Diakonova for her help in locating the digitized copies of the statistical reports on foreign trade of the USSR. We thank Markus Lampe, Evi Pappa, Joschka Wanner, and audiences at the XXV Conference on International Economics, Alicante, the Workshop on European Integration, Economic Convergence and Productivity at the College of Europe, Bruges, the PSE Macro Days 2024, and the Banco de España research seminar for helpful comments and suggestions. Heid gratefully acknowledges financial support from the Spanish Ministry of Universities (Ministerio de Universidades, Plan de Recuperación, Transformación y Resiliencia) under María Zambrano contract MAZ/2021/04(UP2021-021) financed by the European Union - NextGenerationEU, from PID2020-114646RB-C42 funded by MCIN-AEI/10.13039/501100011033 (a project from the Ministerio de Ciencia e Innovación (MCIN), Agencia Estatal de Investigación (AEI), Spain), from Prometeo project CIPROM/2022/50 financed by the Generalitat Valenciana, and from the Plan de Promoción de la Investigación de la Universitat Jaume I, UJI-B2022-36-(22I587). The funding sources had no involvement in the writing of this paper nor the decision to submit it for publication. Declarations of interest: none. The views expressed in this paper are those of the authors and do therefore not necessarily reflect those of the Banco de España or the Eurosystem. The date of the first version of this paper is 4 April 2024.

1 Introduction

Throughout the Cold War, Europe was divided by political, military, and cultural barriers between the Soviet-dominated East and the capitalist democracies of the West. Winston Churchill used the term "Iron Curtain" as a metaphor to describe the division between the Soviet-dominated East and the Western democracies in his "Sinews of Peace" speech in 1946. The Iron Curtain encompassed both a physical border, of which the Berlin Wall was the most famous representative, and also a complex system of policies that restricted the flow of goods and services. But while the physical border did not move, the politically motivated restrictions on trade did. Contrary to popular perceptions of the Cold War as a period of absolute isolation between East and West, trade policies toward each other varied considerably over time, and little is known about the extent to which these changes affected effective trade barriers.

This paper quantifies the impact of changes in trade policy on trade flows across the Iron Curtain. In particular, we estimate the level of trade barriers imposed by the Iron Curtain and how they fluctuated over time. A major challenge in this endeavor is the lack of complete historical data on bilateral trade flows for key Eastern bloc countries. For example, the IMF's Direction of Trade Statistics (DOTS) database, which is one of the main sources of bilateral trade data in the postwar period, does not include trade flows involving East Germany and the USSR, either as exporters or importers, for many years.

To overcome this problem, we collect information from several editions of the statistical yearbooks of East Germany and the statistical reviews of foreign trade of the Soviet Union. We also use data on trade flows with East Germany published by the Federal Statistical Office of West Germany. We use exactly the same methodology as the IMF to incorporate these additional observations into the DOTS database. Where the DOTS database contains data for specific years, we verify that our approach closely matches the existing information. We consider the construction of this dataset as a major contribution of this paper and make all the data we collect available online.[1]

With this completed dataset, we estimate a structural gravity equation to identify the effect of the Iron Curtain on bilateral international trade flows. Trade barriers associated with the Iron Curtain can be identified by the difficulty of trade across the Iron Curtain (i.e., trade between an Eastern bloc country and a Western bloc country in either direction) relative to international trade that does not cross the Iron Curtain. For ease of interpretation, we convert the trade barrier estimates into a tariff-equivalent

[1]We have set up a web page under `https://rolf-campos.github.io/project/east_data/`.

measure. In a second step, we feed these estimates into a quantitative trade model to simulate the trade and welfare effects of a counterfactual world without the Iron Curtain.

Our estimates suggest a progressive easing of trade barriers over the course of the Cold War. While there were intermittent fluctuations in the difficulty of trading across the Iron Curtain, the overall pattern shows a gradual easing of trade restrictions over time. Using a tariff-equivalent measure, we find that, at its height, the Iron Curtain had an effect similar to a 48% ad valorem tariff. The tariff-equivalent measure declined sharply in the second half of the 1950s and throughout the 1960s, settling at around 25% in the 1970s and 1980s.

In addition to the increased trade barriers between the blocs, the presence of the Iron Curtain may also have contributed to the greater integration in each of the two economic blocs. Our estimates show an increase in trade facilitation within the Western bloc in the period from the signing of the Treaties of Rome in 1957, which marked the beginning of the institutional process that led to the European Union, to the period immediately before the creation of the Single Market in 1993. Interestingly, and perhaps surprisingly, our estimates also suggest that integration within the Eastern bloc outpaced integration in the West. This movement toward greater integration in the East started with the establishment of Council for Mutual Economic Assistance (COMECON) in 1949 and continued steadily through the end of the Cold War, while Western integration appears to have slowed down in the 1970s.

There were countries in Europe that were not explicitly aligned with either the Western or the Eastern bloc, although they differed in their allegiances. Switzerland, Ireland, and Sweden were not aligned with either bloc, but can be considered closer to the West in terms of their economic relations, while Austria and Finland were considered closer to neutral during the Cold War. Yugoslavia was originally aligned with the East, but moved to a more neutral position. We examine how trade barriers developed between these three groups of countries and the two blocs on either side of the Iron Curtain. Western-leaning countries such as Switzerland, Ireland, and Sweden faced increasing trade barriers with the East, as did neutral countries such as Austria and Finland, at least until the early 1970s. Yugoslavia, on the other hand, experienced relatively high trade costs with both blocs. As a result, the Eastern bloc countries were the most disconnected from the rest of the world, as they experienced increased trade costs not only with the West, but also with non-aligned or neutral countries.

We conduct counterfactual simulations using a standard aggregate general equilibrium trade model that belongs to the class of "universal gravity" models described by Allen et al. (2020). We use this model to

quantify how the presence of the Iron Curtain affected trade flows and welfare over the course of the Cold War. For our preferred calibration of the model, we find that the Iron Curtain roughly halved East-West trade flows. Welfare losses in the median Eastern country were close to 1% of per capita consumption per year. In particular, welfare losses increased toward the end of the period, reflecting the increasing burden imposed on the East by its economic isolation from the rest of the world prior to the end of the Cold War. This suggests that the lack of international trade may have been behind the push to liberalize East bloc economies at the end of the Cold War, with initiatives such as *perestroika* launched by Gorbachev in the Soviet Union.

Related literature. Our paper contributes to the existing literature by quantifying the effect of the Iron Curtain on trade and welfare, and demonstrating how these effects vary over time. Previous research that has examined the effect of the Iron Curtain on trade, such as the studies by van Bergeijk (2015) and Egger et al. (2023), estimated a level effect, by using cross-sectional data for a single year. Beestermöller and Rauch (2018) estimated a gravity equation to analyze the effects of the Iron Curtain, but they focused on the period *after* its fall and on trade relations among countries formerly part of the defunct Austro-Hungarian Monarchy; their main finding is that these countries tended to trade more after the fall of the Iron Curtain than implied by standard gravity equations, suggesting a persistent trade-enhancing institutional legacy of the Austro-Hungarian Monarchy.

The post-Cold War period is also the focus of Nitsch and Wolf (2013), who analyze the evolution of intra-German trade flows for the period after the fall of the Berlin Wall and find persistent differences in trade patterns along the former East-West German border. Other papers on the topic of the Berlin Wall include Ahlfeldt et al. (2015), who use the Berlin Wall as a source of exogenous variation to explain changes in urban structure, and Redding and Sturm (2008), who exploit the division and subsequent reunification of Germany to explain population dynamics across the country. Additional papers that analyze trade integration between Eastern and Western Europe after the fall of the Berlin Wall include Piazolo (1997), Jakab et al. (2001), Bussière et al. (2008), and Ravishankar and Stack (2014).

In a broader context, our paper is related to the literature that attempts to estimate the effects of borders on trade. This literature begins with the work of McCallum (1995), who compares regional trade within and between Canadian and US regions, and the modern treatment by Anderson and van Wincoop (2003).[2] Many recent studies have examined the effects of international borders on trade around the

[2]Related to this work, Agnosteva et al. (2019) also use trade between Canadian provinces to examine the variation in domestic trade costs across geographic units.

world. For example, Lawless et al. (2019) focus on trade between Ireland and Northern Ireland, while Santamaría et al. (2023), Frensch et al. (2023), and Spornberger (2022) look more broadly at borders within Europe. Carter and Poast (2020) and Kamwela et al. (2023) instead examine the effect of border walls and argue that physical border barriers significantly reduce bilateral trade.[3] In the context of the literature of border effects, our study adds to the body of knowledge by quantifying the impact over time of one of the most important borders in recent European history.

Our paper is also related to a literature that examines the relationship between geopolitics and trade. This body of research examines how geopolitical factors affect international trade. Martin et al. (2008) and Karlsson and Hedberg (2021) study how civil and interstate wars affect bilateral trade and Berger et al. (2013) analyze how political influence resulting from CIA interventions increases U.S. exports to targeted countries. Yu (2010), Fuchs and Klann (2013), Du et al. (2017), Felbermayr et al. (2020), Larch et al. (2022), Flach et al. (2023), and Jäkel et al. (2023) examine how bilateral political relations or broader political institutions (such as democracy or sanctions) affect trade.

An emerging strand of this literature analyzes how so-called "trade fragmentation"—a multipolar world characterized by the emergence of multiple regional economic blocs—may affect international trade patterns and economic dynamics. Recent examples in this vein include Aiyar et al. (2023a), Aiyar et al. (2023b), and Campos et al. (2023). The Iron Curtain serves as an important case study in this context, as it represents one of the most prominent instances of geopolitical fragmentation in recent history. This point is also made in contemporary work Gopinath et al. (2024) in which they compare the recent decline in trade flows between geopolitically distant blocs after the outbreak of the war in Ukraine with the evolution of trade flows between the Eastern and Western blocs during the Cold War. Our work complements this work by providing quantitative estimates of the strength of trade barriers during the Cold War period. In this regard, we show that the use of data collected for East Germany and the USSR is crucial for a correct quantification of the level and evolution of trade barriers during the Cold War which serve as a comparison for today.

Overview. The rest of the paper is organized as follows. Section 2 gives a brief account of the historical context surrounding the Cold War. Section 3 shows the problems of existing data for countries in the Eastern bloc and describes our attempts to resolve them. In this section, we describe how we obtained and treated the data for East Germany and the USSR from primary sources. We also show that the data

[3]In a related vein, Larch et al. (2023) show how the measurement of the impact of borders on trade can be used to study the ex ante effects of trade liberalization and protection.

we collected are consistent with the data in DOTS, where available. Section 4 presents the methodology used to estimate the evolution of trade barriers. In Section 5 we present the estimates of trade barriers between blocs and additional empirical results, and in Section 6 we quantify the costs of the Iron Curtain in terms of trade flows and welfare using counterfactual simulations. Section 7 concludes.

2 Historical context

During the Cold War, trade and foreign policy were closely intertwined, especially in shaping relations between the Eastern and Western blocs. As a result, political and ideological differences between the communist-dominated Eastern bloc and the capitalist-dominated Western bloc resulted in significant restrictions on trade between the blocs.

On the one side of the Iron Curtain, the Eastern bloc, led by the Soviet Union, adopted a command economy with centralized planning and state ownership of industry. This system lacked market mechanisms and therefore discouraged foreign trade because the state was directly involved in foreign trade decisions. Existing trade relations were driven by political or ideological motives. In addition, the Eastern bloc had limited convertibility, meaning that their currencies could not be freely exchanged for hard (or Western) currencies. This made transactions difficult and hindered trade between the blocs. The Soviet Union and its allies relied on bilateral agreements and barter trade rather than convertible currencies.

On the other side of the Iron Curtain, the Western bloc established a set of trade policy instruments linked to its foreign policy goal of containing the spread of communism. These included a wide range of instruments such as export controls, particularly the export of strategic materials and technological goods under the auspices of the Coordinating Committee for Multilateral Export Controls (COCOM); sanctions; import barriers (such as quotas or licensing requirements); and restrictions on the provision of trade finance.

In parallel, both blocs sought to coordinate trade within their borders. The Eastern bloc countries formed the Council for Mutual Economic Assistance, an economic organization designed to coordinate economic planning and trade among the socialist states. Similarly, the Western bloc established several initiatives to facilitate trade and economic cooperation among its member countries: for example, the Organization for European Economic Cooperation (OEEC), which later evolved into the Organization for Economic Cooperation and Development (OECD); the European Coal and Steel Community (ECSC,

later the European Economic Community, EEC, and the European Union, EU); or the European Free Trade Association (EFTA).

Moreover, while the Cold War led to an overall major divide in global trade, as both blocs restricted and limited trade with each other, the extent of these trade barriers and the degree to which they were enforced also varied over time, along with changes in the foreign policy landscape or reverberations of geopolitical tensions.

The many complex instruments used to either hinder or encourage trade between countries, both within and across trade blocs, make it difficult to obtain an accurate measure of the magnitude of trade barriers during this period, as is often the case when tariffs coexist with non-tariff measures. Economists know how to back out so-called iceberg trade costs using standard trade models that lead to a gravity equation and bilateral trade flows. However, as we discuss in the next section, the bilateral trade flows for East bloc countries obtained from the usual data sources are particularly problematic.

3 Data

One of the most widely used data sources containing bilateral trade flows for the post-war period is the DOTS database compiled by the IMF, which starts its coverage in 1948, although there are many missing observations in the early years. The TRADHIST database by Fouquin and Hugot (2016) combines several data sources in an attempt to fill in as many bilateral trade flows as possible. In our period of interest, it is a strict super-set of the DOTS database, as it contains all trade flows in the 2002 and 2015 vintages of the DOTS database. It extends the coverage by using bilateral trade flows compiled for various countries by Mitchell (2007a,b,c) and version 3.0 of the Correlates of War project (Barbieri and Keshk, 2012). It also incorporates data compiled for the United States by Carter et al. (2006), for Spain by the economic historian Antonio Tena, and for Sweden by the Swedish National Central Bureau of Statistics (Statistiska centralbyrån, 1972).

TRADHIST is the ideal database for our purposes: It not only provides bilateral and total trade data but also nominal GDP figures. This allows us to construct our proxy measure for domestic trade using the very same database that we use for international trade. As all data come from the same database, the same exchange rate data are applied to both trade and GDP figures, improving the internal consistency

of our trade data. Most importantly, it provides data across our period of interest.[4]

We use version 4.0 of TRADHIST as the starting point for the creation of the final dataset used in our analysis, but as we show in this section, it needs to be supplemented with additional sources for our particular research question.

3.1 Missing and implausible data for East bloc countries

Lack of data. The TRADHIST database does not contain the full set of observations for trade flows within the Eastern bloc. This is illustrated in Figure 1, where we show a matrix of the number of years (out of a maximum of 40) for which the TRADHIST database contains bilateral trade flows, by country pair. The countries in the rows and columns are all countries belonging to either the East or the West bloc. The square in the upper left corner corresponds to trade flows between East Bloc countries. The difference between the numbers in this square and the rest of the matrix is striking, indicating the widespread absence of data for intra-East bloc trade.

Looking at individual countries, the absence of data for the Soviet Union is particularly striking. For example, there are no observations for trade flows between Bulgaria and the Soviet Union in either direction. The number of trade flows between the Soviet Union and East Germany and Czechoslovakia is also significantly lower than the number of trade flows with other Eastern Bloc countries. This is probably a consequence of the disappearance of these three countries as such after the end of the Cold War. The three countries that survived the end of the Cold War with the same borders (Hungary, Poland and Romania) have a higher number of trade flows.

Implausible zeros. Besides the lack of data, there is an additional problem in that East bloc countries have an implausibly high number of trade flows that are reported as zero. Figure 2 shows the number trade flows that are zero in TRADHIST. If we compare trade within the East bloc with the West bloc in the lower right quadrant, where trade flows are almost never reported as zero (except for exports from Portugal and Greece to Iceland and a single year of exports from Spain to Greece), we find that zeros are more common. There are many zeros for trade flows between the Soviet Union and other East bloc countries. This is implausible since the historical record clearly indicates the existence of non-zero trade flows between the Soviet Union and all other East bloc countries. The largest number of zeros is

[4] An alternative, high-quality source for bilateral trade data such as the RICardo Project by Dedinger and Girard (2017) ends in 1938.

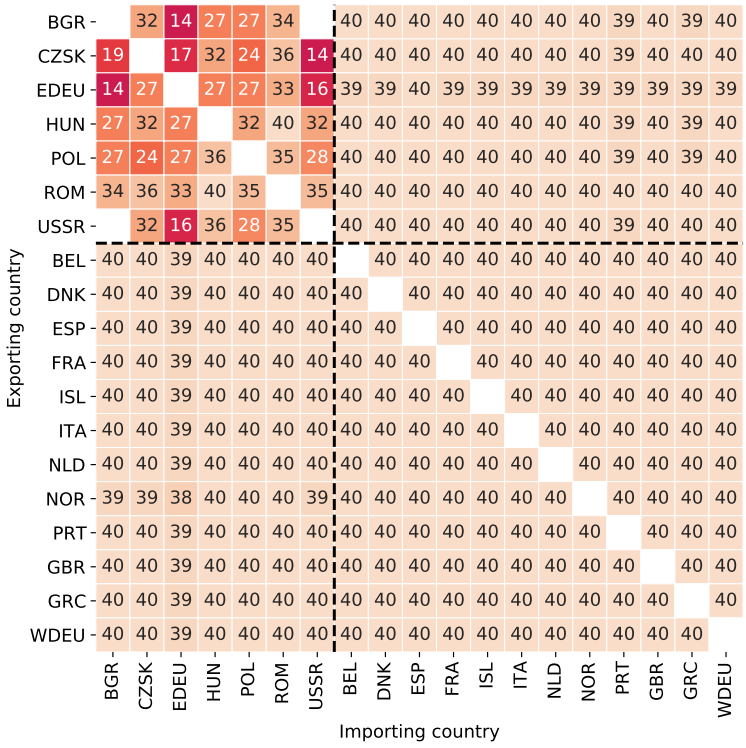


Figure 1: Number of observations for bilateral trade flows involving East bloc and West bloc countries

Notes: The matrix counts the number of observations for each directed pair of countries in the TRADHIST database. Exporting countries are shown in the rows and importing countries in the columns of the matrix. A dashed line separates East bloc countries from West bloc countries.

for trade flows involving East Germany and, to a lesser extent, Bulgaria.

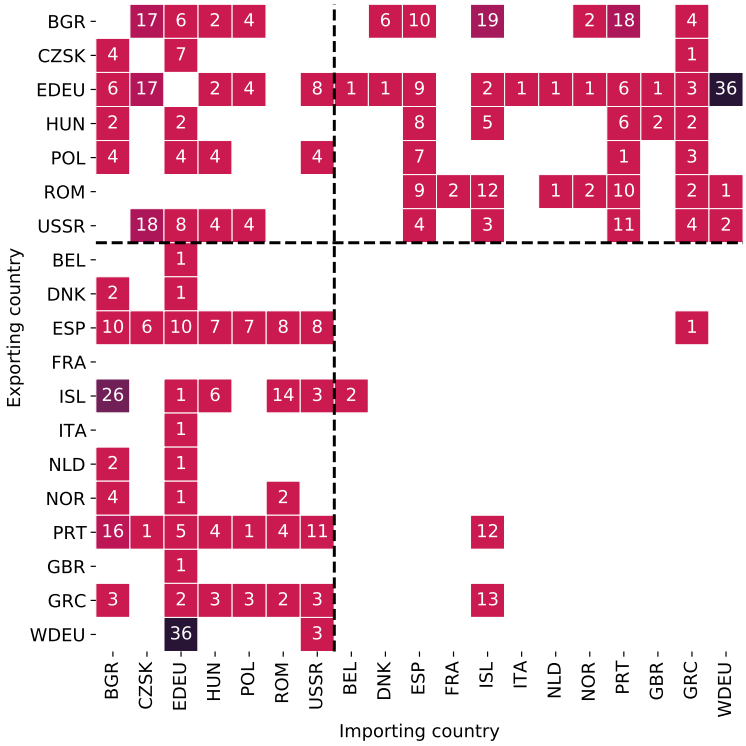


Figure 2: Number of years with bilateral trade flows reported as zero

Notes: The matrix counts the number of observations for each directed pair of countries in the TRADHIST database that are reported as zero. Exporting countries are shown in the rows and importing countries in the columns of the matrix. A dashed line separates East bloc countries from West bloc countries.

The abundance of zeros for intra-East bloc trade also raises questions about the accuracy of zeros reported for trade flows between East bloc countries and West bloc countries. The upper right quadrant in Figure 2 (exports from East bloc countries to West bloc countries) and the lower left quadrant (exports from West bloc countries to East bloc countries) contain a very large number of zeros. The figures for East Germany and, to a lesser extent, the Soviet Union appear to be the most problematic, as they have the highest number of zero trade flows.

The biggest anomaly in the data is undoubtedly the trade flow between East and West Germany. According to the data in TRADHIST, this flow is zero in 36 out of 39 observations, in both directions. However, it is well known that East and West Germany had a very active trade relationship during

the Cold War. The problem can be traced back to the way these two countries reported trade flows in their official statistics. In their national statistics, East and West Germany referred to trade with the other party as intra-German trade ("innerdeutscher Handel") and reported the value of these trade flows separately from international trade flows, which then led to these trade flows not being correctly added to the DOTS database and later to TRADHIST.

3.2 Data collection from primary sources and data processing

We collect data from three different primary sources.

East Germany. We obtain bilateral trade flows for East Germany from the country's statistical yearbooks (Statistisches Jahrbuch der Deutschen Demokratischen Republik in the original), which have been digitized and are available at DigiZeitschriften, a German online journal archive. The current link to the statistical yearbooks is `https://www.digizeitschriften.de/search?q=514402644` We have preserved a snapshot of this web page for 6 October 2023 at: `https://web.archive.org/web/20231006162901/https://www.digizeitschriften.de/search?q=514402644`.

International trade flows in the statistical yearbooks are reported in Valuta-Mark, a unit of account used by East Germany for international trade that has a 1:1 relationship with the West German mark. Reports up to 1974 include bilateral exports and bilateral imports. After that year, reports switch to reporting trade volume (the sum of exports and imports) for trade with each country. Both exports and imports are reported on a free on board (f.o.b.) basis.[5]

Soviet Union. We obtain bilateral trade flows for the Soviet Union from the yearly foreign trade statistical reviews for the USSR (Внешняя торговля СССР (Статистический обзор) in the original), which have been digitized and are available at `https://istmat.org/taxonomy/term/344`. He have preserved a snapshot of this web page for 24 June 2023 at: `https://web.archive.org/web/20230624083918/https://istmat.org/taxonomy/term/344`.

Trade flows in the statistical reports from the Soviet Union are reported in rubles. Both exports and imports are reported on a free on board (f.o.b.) basis.[6]

[5]The methodological statement in the original language is the following: "Die Werte enthalten den Warenpreis zuzüglich aller Fracht- und Nebenkosten im Lieferland (frei Grenze Lieferland bzw. fob Verschiffungshafen)."

[6]The methodological statement in the original language is the following: "Стоимость товаров подсчитывается по ценам контрактов, приведенным к единому базису, а именно: по экспорту - к ценам фоб советские порты или франко-сухопутная граница СССР; по импорту - к ценам фоб иностранные порты или франко-граница страны отгрузки. Пересчет иностранных валют в рубли произведен по официальному курсу Государственного банка СССР за соответствующий период."

Intra-German trade from West German sources. In addition to East German sources, we also use West German sources to obtain the value of intra-German trade. The West German Statistical Office has published a dataset for intra-German trade in 2010 (Statistisches Bundesamt, 2010). This dataset can be freely downloaded from the GESIS data archive at the link `https://doi.org/10.4232/1.10259` after registration. Trade flows are reported in West German marks. Exports are reported on an f.o.b. basis and imports on a c.i.f. basis. We take the values from Table A.01 of this database, which contains trade flows including Berlin for the years 1952–1989 and trade flows excluding Berlin for the period 1948–1961.

Data processing. Using the methodological guide for DOTS (International Monetary Fund, 1993), we replicate the exact steps that the IMF would have performed if it had had access to the data in the statistical yearbooks. Therefore, to convert the values from local currency into US dollars, we use the exchange rates as reported in the International Financial Statistics (IFS), or the official exchange rate if it is unavailable. This complies with Section 3.1.1 in the methodology.

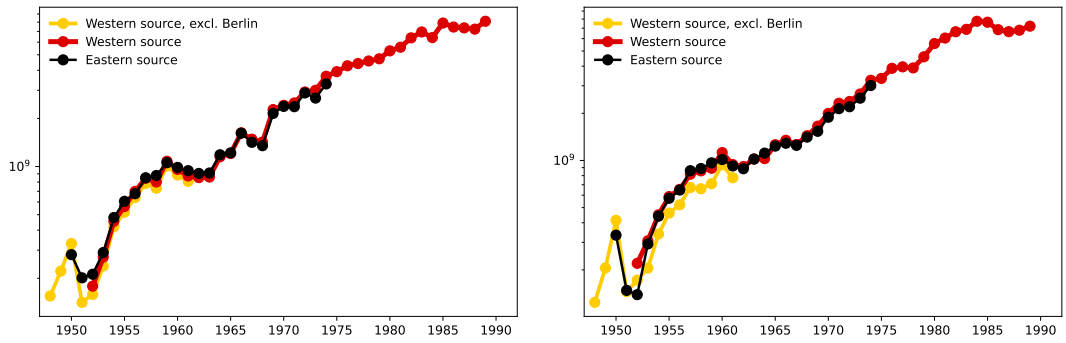
We convert Valuta-marks to US dollars using the exchange rate for West German marks from IFS. We convert values in rubles to US dollars using the official exchange rate between the ruble and the US dollar from an archived spreadsheet that was originally available at the web page of the central bank of the Russian Federation.[7] The permanent link to an archived version of this spreadsheet (3 February 2013) is the following: `https://web.archive.org/web/20130203063808/http://www.cbr.ru/currency_base/OldDataFiles/USD.xls`.

We also make the recommended adjustment for c.i.f./f.o.b discrepancies. In the DOTS database, exports should be recorded using f.o.b. values and imports using c.i.f. values. Section 3.1.2 part (2) recommends using a factor of 10% to increase f.o.b. import values to obtain the c.i.f. value. We have access to several years of statistical yearbooks/reports. In accordance with the general practice of DOTS, we update estimates to the latest published value when there are revisions from one year to the next.

3.3 Data comparison and validation

Intra-German trade. In Figure 3 we compare the values reported for intra-German trade in East and West German sources. There is a notable coincidence in trade flows for the periods in which sources overlap. The figure also shows that using trade flows that exclude Berlin are a reasonable approximation for trade flows in the initial period.

[7]Trade values are converted into US dollars using official rates when market values are not available in the IFS database.



(a) West Germany to East Germany

(b) East Germany to West Germany

Figure 3: Intra-German trade flows according to sources from West Germany and East Germany

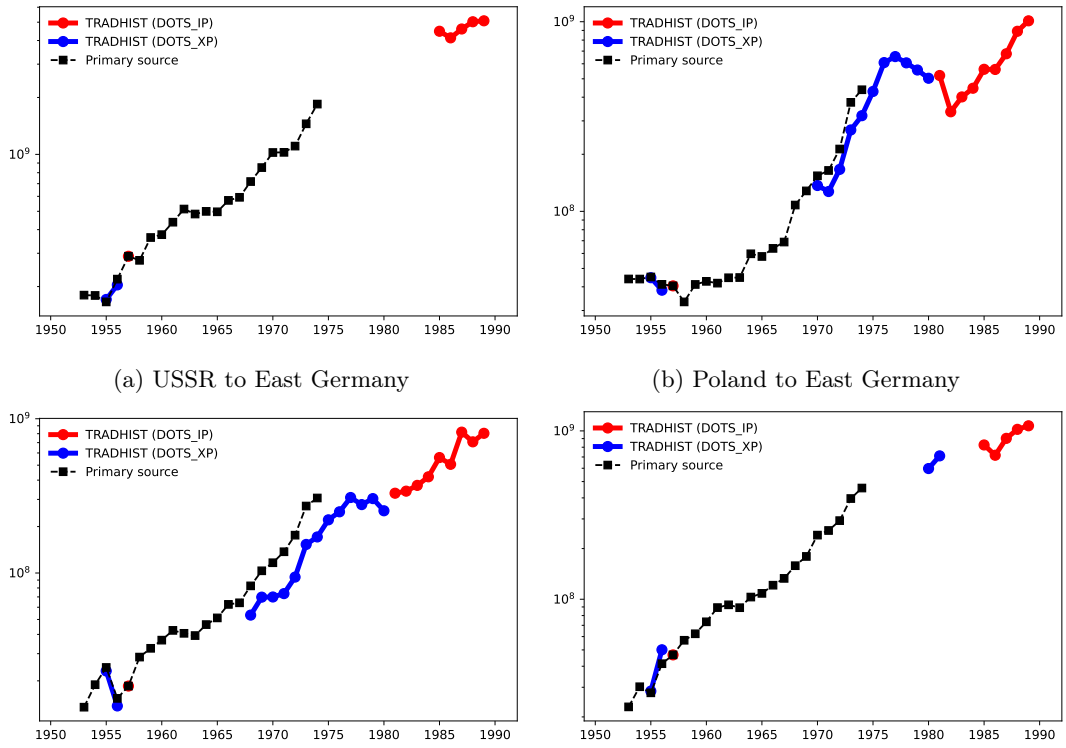
Notes: Values are in German marks (currency code DEM). The vertical axis uses a logarithmic (base 10) scale.

East Germany. We compare the value of trade flows collected from East German primary sources with the trade flow values in TRADHIST. We focus on East German imports because East German sources are most often used for the country's imports. Trade flows in TRADHIST for this period are based on DOTS data, either from reports by the importer (identified by the flag `DOTS_IP` in TRADHIST) or from reports by the exporter (identified by the flag `DOTS_XP`). Values in the TRADHIST database are expressed in British pounds sterling. We use the pound sterling/US-dollar exchange rate from the IFS to convert dollar values into British pounds. We focus on the major trading partners in the East bloc and among Western countries.

In Figures 4 and 5 we plot East German imports from different trading partners. The first of these figures focuses on East German imports from four Eastern Bloc countries: the USSR, Poland, Hungary, and Czechoslovakia. The second focuses on imports from West Germany, France, the United Kingdom and the United States.

As can be seen in the different panels in Figure 4, the observations from the East German primary sources make it possible to fill the gap in data that goes from about the mid-1950s to the late 1960s. In the case of imports from West Germany and Czechoslovakia, primary sources are particularly important, as data from DOTS are missing for a much larger span of years.

In all cases, there is a remarkable coincidence in the value of the observation for the year 1957. This is the only year in which the trade flows from the primary source and from TRADHIST overlap when the data come from the DOTS database and the reporting country is the importer. This coincidence



(a) USSR to East Germany

(b) Poland to East Germany

(c) Hungary to East Germany

(d) Czechoslovakia to East Germany

Figure 4: Trade flows from East bloc countries to East Germany

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

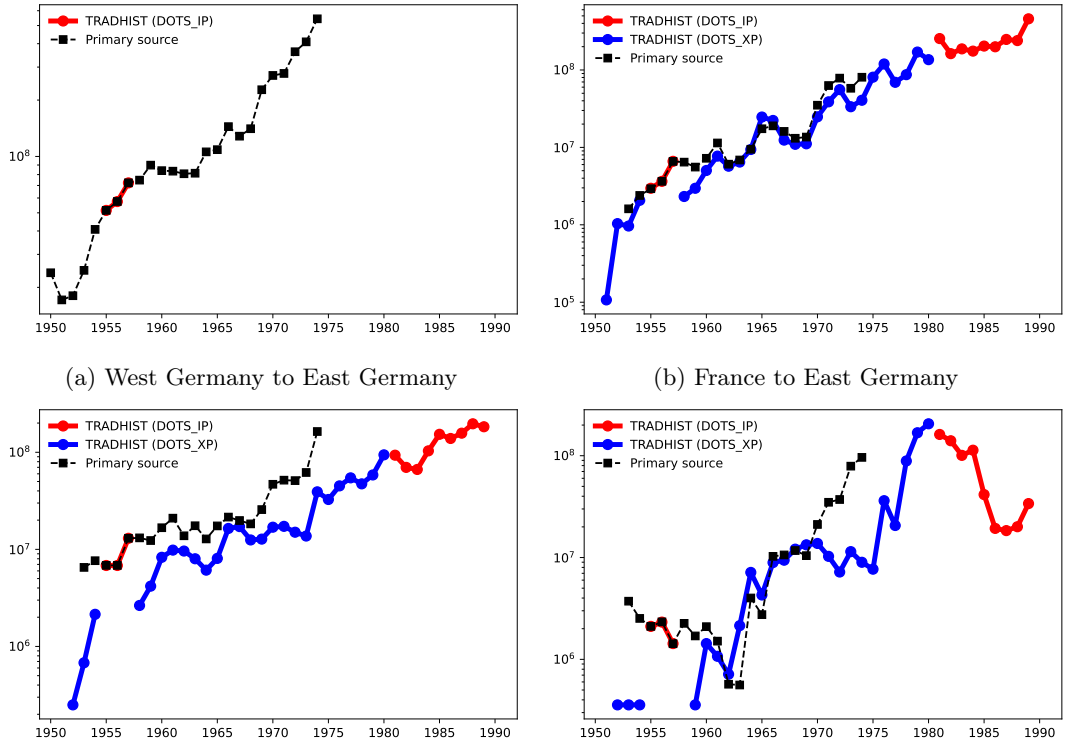
suggests that our data processing successfully replicates the methodology of the DOTS database. In all four cases, there are also observations from TRADHIST for the years 1955 and 1956, although in this case they come from data reported by the exporting country. These observations are also very close, although not identical, which is to be expected given that trade flows reported by the exporter usually do not coincide with those reported by the importer for various reasons.

For Hungary and Poland, there are also TRADHIST observations reported by the exporter for a number of later years, starting in 1968 and 1970, respectively. For these years, we observe that the exporter-reported values follow the trend but are lower than the importer-reported values according to primary sources. The most likely explanation for this discrepancy is the use of f.o.b. accounting for exports and our conversion to c.i.f. values for imports, as recommended by the DOTS methodology. The fact that data in TRADHIST obtained from DOTS according to what was reported by the exporter uses f.o.b. valuation while data obtained from DOTS according to what was reported by the importer uses c.i.f. valuation seems to be a pervasive feature in this dataset. The implication of this is that it may be desirable to control for the ultimate origin of the data in empirical applications. We return to this point when we explain how we implement our empirical strategy.

Figure 5 shows East German imports from West Germany, France, the United Kingdom and the United States. The importance of the primary source is particularly evident for imports from West Germany, as data in TRADHIST are particularly scarce for trade between West and East Germany. For France, the United Kingdom and the United States, TRADHIST contains more observations, although most of them are constructed from data reported by the exporting countries.

As in the case of East bloc imports, the trade values constructed from primary sources are virtually identical to those in TRADHIST for the year in which that database contains importer-reported data. The three years of overlap are 1955, 1956 and 1957. For West German exports, these are also the only three years available. For the other three countries, there are values reported by the exporter.

An analysis of the exporter's reported values shows large discrepancies for certain years in the case of the United Kingdom and the United States, especially in the early years and after 1970, where the exporter's reported trade flows are lower than those reported as imports by East Germany. The fluctuation in the magnitude of the discrepancies over the years suggests that they are probably not due to the gap in c.i.f./f.o.b. accounting, but that other forces are at work. The fact that France does not experience this discrepancy suggests that it is not a problem related to the currency in which trade flows are expressed



(a) West Germany to East Germany

(b) France to East Germany

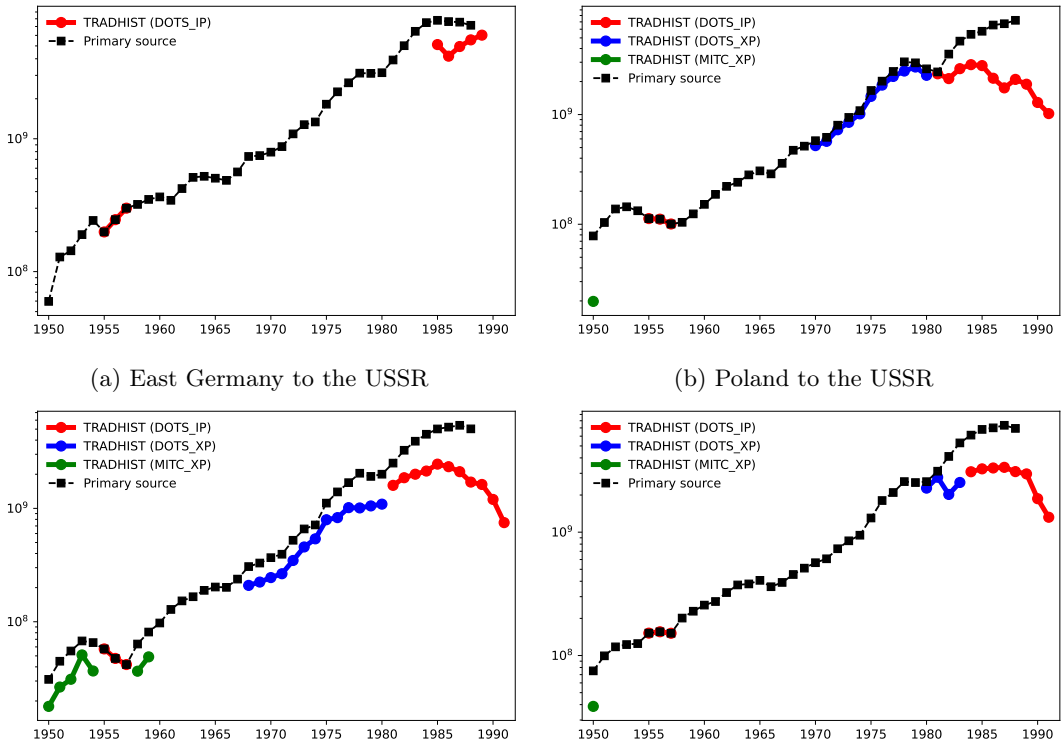
(c) United Kingdom to East Germany

(d) United States to East Germany

Figure 5: Trade flows from Western countries to East Germany

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

in the original source (the Valuta-mark). The most likely explanation, therefore, is that the missing trade flows correspond to trade routed through third countries. In the export data for the United States and the United Kingdom, these third countries would then appear as the destination of the exports, while East Germany would probably be in a better position to report the true origin of its imports.



(a) East Germany to the USSR

(b) Poland to the USSR

(c) Hungary to the USSR

(d) Czechoslovakia to the USSR

Figure 6: Trade flows from East bloc countries to the USSR

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Values from the TRADHIST database derived from the exporter in Mitchell (2007b) (`MITC_XP`) are plotted with a green line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

Soviet Union. Figure 6 shows Soviet Union imports from East Germany, Poland, Hungary, and Czechoslovakia. In addition to DOTS, a few observations in TRADHIST for Poland and Hungary are not from DOTS and come from Mitchell (2007b) and are reported by the exporting countries. These tend to be lower than the primary source.

As with East German imports, there is a very close match between primary source imports and those

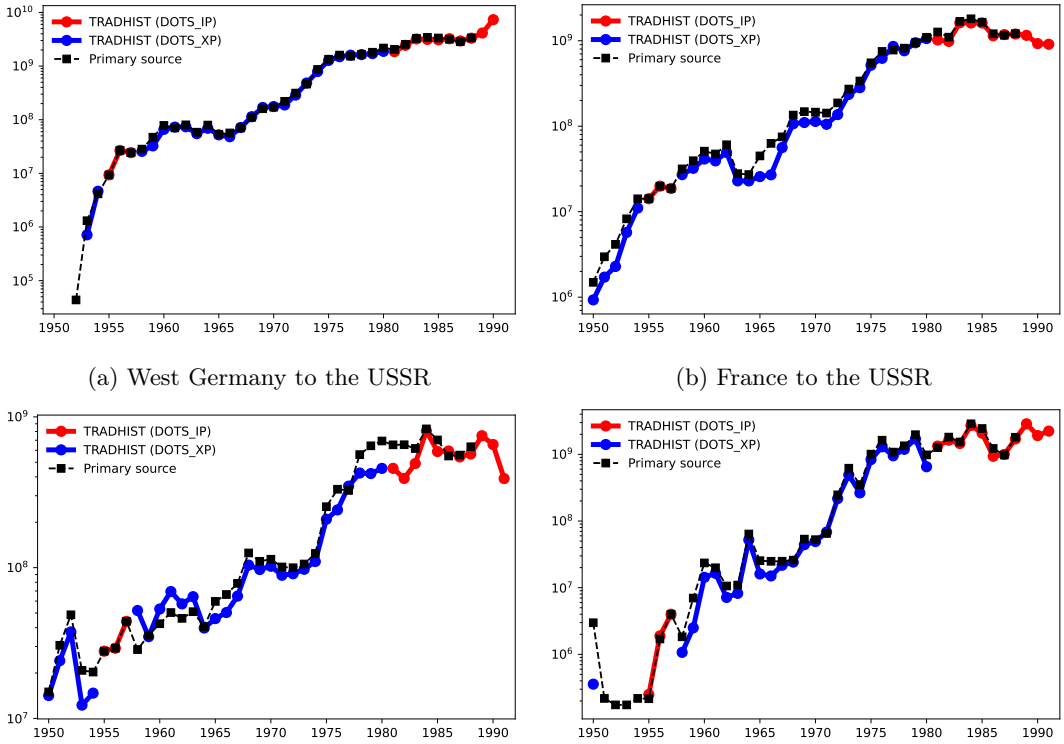
reported in TRADHIST for the three years 1955, 1956, and 1957. After 1980, however, trade values based on importer data in TRADHIST are consistently lower than those from primary sources, with an increasing gap between the two series for three out of four exporting countries. This may raise the concern that the discrepancy is related to the value of the exchange rate of the ruble that we used. However, the data for Western countries in Figure 7 do not show this discrepancy. Since these data are also derived from data expressed in rubles, the hypothesis that the discrepancy is related to the exchange rate is less plausible.

The most likely explanation for the discrepancy is related to data revisions. The documentation of TRADHIST indicates that the 2002 and 2015 vintages of DOTS were used, although TRADHIST does not record the vintage of each observation. Both of these dates place the vintage of TRADHIST after the last year of the primary sources we had access to. Interestingly, the downward revisions seem to have affected only Eastern bloc countries, as the same pattern is not visible in the trade flows shown in Figure 7.

Data reported by the exporting country tend to be lower than those reported in the primary source when the Soviet Union is the importer, as was the case for East Germany. The difference is particularly large for Hungary's exports to the Soviet Union. Comparing with Figure 4, we see that Hungary's exports also show the largest difference when compared to mirror imports reported by East Germany. This suggests that the discrepancy in valuation between exports and imports is country-specific, which we also address when describing our estimation strategy.

The data for exports from Western countries to the Soviet Union in Figure 7 contrast sharply with the data for exports from the same countries to East Germany. In the case of trade with the Soviet Union, the flows reported by the importer match the primary source better than those reported by the exporter, but the difference is not as great as in the case of East Germany. This suggests that re-routing through third countries may have been less of a problem for trade with the Soviet Union than for East Germany.

Other sources in the TRADHIST database. The TRADHIST database includes data from other sources, such as version 3.0 of the Correlates of War project (Barbieri and Keshk, 2012), data collected for Spain by Antonio Tena, and data from the Swedish Statistical Office. In the appendix, we present comparisons of the primary sources with these alternative sources.



(a) West Germany to the USSR

(b) France to the USSR

(c) United Kingdom to the USSR

(d) United States to the USSR

Figure 7: Trade flows from Western countries to the USSR

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

3.4 Supplementing the TRADHIST database with primary sources

Trade flows reported in the TRADHIST database are those reported by the importing country whenever possible. Values reported by the exporting country are used only when they are not available. We therefore replace observations in the TRADHIST database with the data we collected for all trade flows that are an import from East Germany or the USSR whenever they have a source different from the DOTS reported by the importer. We keep data in TRADHIST that are based on DOTS as reported by the importer because they correspond to later vintages. We also complete the data with East German or USSR exports whenever an observation in TRADHIST is either missing or zero and our collected data show positive flows. In all other cases, we keep the original observations in TRADHIST.

In the resulting completed database we clearly signal which observations have been updated by overwriting the values in the variable `SOURCE_TF`. We use the code `"EDEU_IP"` if the original source is an import flow reported in the statistical yearbook of East Germany (1,043 cases), `"EDEU_XP"` if it is an export flow in the statistical yearbook of East Germany (403 cases), `"USSR_IP"` if it is an import flow in the statistical report of the USSR (2,292 cases), and `"USSR_XP"` if it is an export flow in the statistical report of the USSR (676 cases).

The statistical yearbooks of East Germany only record bilateral imports and exports separately until 1974. After that year they report only total trade (i.e., the sum of exports and imports) for each country pair. For these later years, it is sometimes possible to deduce trade flows if the trade flow in the opposite direction is available in TRADHIST. In these cases we obtain the missing observation as a residual by subtracting from total trade reported in the primary source the value of the observation in the opposite direction that is available from TRADHIST. In the database, we identify these cases by setting the variable `SOURCE_TF` to `"EDEU_TOTAL"`. There are a total of 63 cases in which we were able to deduce the value of a trade flow in this way.

When no observation in either direction is available, then we construct a measure of imputed trade flows in both directions by splitting the total trade value in half. In the database, we create a new variable (`FLOW_IMPUTED`) with this measure, but do not overwrite the data in TRADHIST. We calculate these imputed values in case they are useful for other researchers, but we do not use them in the estimations in this paper.

4 Empirical strategy

For estimation purposes, we define the Western bloc as the group of the following European countries: Belgium, Denmark, France, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, United Kingdom, Greece, Spain, West Germany. Similarly, we define the Eastern bloc as the group consisting of Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and the Soviet Union. For countries that separated after the fall of the Berlin Wall, we include all new countries in the group they were originally in. The Czech Republic and Slovakia are defined as part of the Eastern bloc, as are Russia, Estonia, Latvia, Lithuania, Belarus, Ukraine, and Moldova. Post-unification Germany is included in the Western bloc to reflect the relatively larger size of West Germany. We classify trade flows as crossing the Iron Curtain if they are from a country in the Western bloc to a country in the Eastern bloc or vice versa.

To obtain an estimate of trade barriers we estimate a specification that corresponds to a structural gravity model. We include exporter-year and importer-year dummy variables that account for so-called multilateral resistance terms, i.e., unobserved importer- and exporter-weighted averages of trade costs, to avoid omitted variable bias and thus mitigate endogeneity concerns raised by economic theory, following Anderson and van Wincoop (2003).[8]

We follow standard practice and estimate the model using Poisson pseudo maximum likelihood (PPML), as originally proposed by Santos Silva and Tenreyro (2006). This method provides consistent parameter estimates and trade cost elasticities in the presence of zero trade flows and heteroskedasticity. Moreover, it is the only estimator that is consistent with general equilibrium addition constraints, as shown by Fally (2015). Again, following standard practice, we use nominal trade data for all our estimations, as recommended by Baldwin and Taglioni (2007). Note that the included importer-year and exporter-year fixed effects control for inflation differentials across countries.

Baseline specification. To identify the effect of interest, i.e., the impact of the Iron Curtain on international trade, we define a dummy variable (denoted IC_{ij}) that indicates whether trade flows that cross an international border do so from a country i on one side of the Iron Curtain to a country j on the other side. The equation we estimate is as follows:

$$X_{ijt} = \exp(\gamma_t b_{ij} + \theta_t IC_{ij} + \phi_{it} + \psi_{jt} + \boldsymbol{z}'_{ij}\boldsymbol{\beta}) + \varepsilon_{ijt}, \tag{1}$$

[8]See Head and Mayer (2014) and Yotov et al. (2016) for a review of current best practices.

where X_{ijt} represents bilateral trade flows between exporter i and importer j in year t. We identify trade flows that cross international borders by the so-called border dummy b_{ij}, equals one if and only if the exporter i is not the same country as the importer j. This variable controls for the general effect of globalization, by absorbing a time-varying international border effect, following the recommendation of Yotov (2012) and Bergstrand et al. (2015). The expressions ϕ_{it} and ψ_{jt} stand for exporter-time and importer-time fixed effects They control for factors that vary at the country-year level, such as multilateral resistance terms. Note that they also control for the potential influence of variables related to a country's size, such as total expenditure or population. The vector $\boldsymbol{z}_{ij}$ is a vector of gravity variables (distance, common language, contiguity, and colonial relationship), and ε_{ijt} is the error term.

The parameters γ_t measure the semi-elasticity of bilateral trade flows with respect to the presence of an international border for each year in the estimation sample. The coefficient of interest, θ_t, measures the marginal contribution of the Iron Curtain to this elasticity for each year in the sample. To ensure a consistent estimation of the border effect, see Heid et al. (2021) and Yotov (2022), our data set includes both international and domestic trade flows. This also allows to control for the potential trade diversion from international to domestic trade caused by the Iron Curtain, see Dai et al. (2014). However, as a robustness check, in Figure B.3 in Appendix B we also show results from an estimation that does not use domestic trade flows.

Finally, note that as our specification allows the impact of the Iron Curtain to be time-varying, our estimations are robust to the recent critiques of standard gravity specifications that recommend to estimate time-varying cohort-specific effects of the regressors of interest to avoid negative weights and "false comparisons", see **?**.[9]

Tariff equivalent measure of the Iron Curtain. When presenting results, we first transform the estimated coefficients into their tariff equivalent. The formula is:

$$\text{Tariff equivalent}_t = 100 \times \left[\exp\left(-\frac{\hat{\theta}_t}{\epsilon} \right) - 1 \right], \tag{2}$$

where the notation $\hat{\theta}_t$ refers to the point estimates obtained, one for each year in the sample, and ϵ is the trade elasticity. Following Head and Mayer (2014), we assume a value of $\epsilon = 5.03$ for the trade

[9]Technically, all treated countries are members of the same cohort, as countries are affected by the Iron Curtain treatment at the same time. These issues are not specific to gravity models but have been discussed in the context of difference-in-difference (DiD) models with and without staggered treatments and two-way fixed effects models, see **?**, **?**, and **?** for recent surveys and solutions.

elasticity, although in Appendix B (Figure B.1) we also report the coefficients from the estimation that do not depend on the value of the trade elasticity.

The transformation converts the additional trade costs attributable to the Iron Curtain into the effect that an additional tariff would have if that tariff were imposed only on trade flows crossing the Iron Curtain. By construction, the possible values of the tariff equivalent of the Iron Curtain can be positive, zero, or even negative. A positive value indicates that the Iron Curtain restricts trade more than the typical national border. A value of zero means that crossing the Iron Curtain is no different than crossing a national border, while negative values are similar to a subsidy. In the latter case, the Iron Curtain would actually benefit trade.

Caveats. The border effects we identify serve as an indirect measure of the full set of policies implemented during the period under study. This approach has the advantage of capturing the aggregate effects of different policies that are difficult to quantify individually. However, this flexibility comes with the disadvantage of not being able to eliminate concerns that some of the variation is influenced by factors unrelated to government policies that we would prefer to exclude. Thus, a reasonable understanding of the summary measure of border effects, as implicitly applied in this study, is that it represents trade barriers during the Iron Curtain era, regardless of whether they were ultimately caused by government policies or not.

To guard against certain types of confounding factors, our specification includes multilateral resistance terms consisting of exporter-time and importer-time fixed effects. For confounding factors to significantly affect the estimation, they would have to vary at the bilateral level rather than at the country level. These confounding factors must not be constant over time, as they would already be accounted for by the standard gravity variables that vary bilaterally and are included in our specification. Thus, for extraneous factors to affect the Iron Curtain border measure, they must vary bilaterally, and change over time.

Alternative measures of trade costs used in the literature. Our approach builds on the aggregate trade cost measure developed by Jacks et al. (2008), Jacks et al. (2010), and Jacks et al. (2011) to analyze globalization over long periods of time. Our approach differs from theirs in a way that is particularly relevant to our research question. While both approaches use the same underlying trade models to convert data into trade costs, their measure identifies only the full effect of a border. In our approach, we distinguish global border effects from those specific to the Iron Curtain. In addition, because our border

effects are based on an estimation rather than a calibration process, we are able to perform inference on the estimated border effects.

Structural gravity models as a description of non-market economies. A potential objection to using structural gravity models to analyze international trade flows of non-market economies might be that the countries of the Eastern bloc were not market economies, but centrally planned economies. Indeed, most descriptions of the gravity model derive the structural gravity equation for perfectly or imperfectly competitive markets populated by profit-maximizing firms (see, e.g., Head and Mayer, 2014; Heid and Stähler, 2024). However, the equilibrium trade flows implied by the structural gravity model of a market economy are identical to the trade flows chosen by a central social planner.[10] The equivalence between trade flows in the decentralized market equilibrium and the trade flows chosen by a central social planner holds even when firms are heterogeneous in their productivity. The key assumptions for these results are that demand has a constant elasticity of substitution (CES) and that the tradable goods produced are efficiently allocated across trading countries, i.e., there is no waste. Both are standard assumptions in international trade, and they underlie all structural gravity models. The intuition for this perhaps surprising result is that the structural gravity model describes the static efficient allocation of trade flows across countries for a given level of production, independent of the particular details of how production is actually organized. This is what Anderson (2011) calls modularity.

This still leaves the empirical question of whether centrally planned economies were actually allocatively efficient. This is particularly relevant because the conventional wisdom is that socialist economies were notoriously inefficient. This perception stems from a conflation of static efficiency for a given level of technology, i.e. allocative efficiency, and dynamic efficiency, i.e. efficiency in terms of investment and innovation decisions.[11] The available empirical evidence on allocative efficiency finds that Soviet trade followed patterns of comparative advantage and was generally consistent with opportunity cost principles. See Rosefielde (1974) for the case of Soviet international trade, and Murrell (1991) for a broader review of the relevant empirical literature. As Murrell (1991) notes, empirical approaches derived directly from neoclassical models—such as the structural gravity model—may well be applied to both centrally planned and market economies.[12] Finally, note that while Soviet economies were less productive than Western

[10] In fact, in the canonical Armington (1969) type of structural gravity popularized by Anderson and van Wincoop (2003), only a representative household maximizes its utility, so the consumer's problem is identical to the social planner's problem.

[11] For a lucid discussion of these issues, see Withesell (1990).

[12] To be precise, Murrell (1991), p. 72 states: "If one takes the neoclassical paradigm seriously in formulating empirical work, then one finds little to distinguish the two sets of economies."

economies, such country-specific differences in absolute levels of technology are adequately captured by the fixed effects included in our structural gravity model.[13]

The upshot of the preceding discussion is that the structural gravity model is an adequate tool for analyzing trade flows in both market and centrally planned economies.

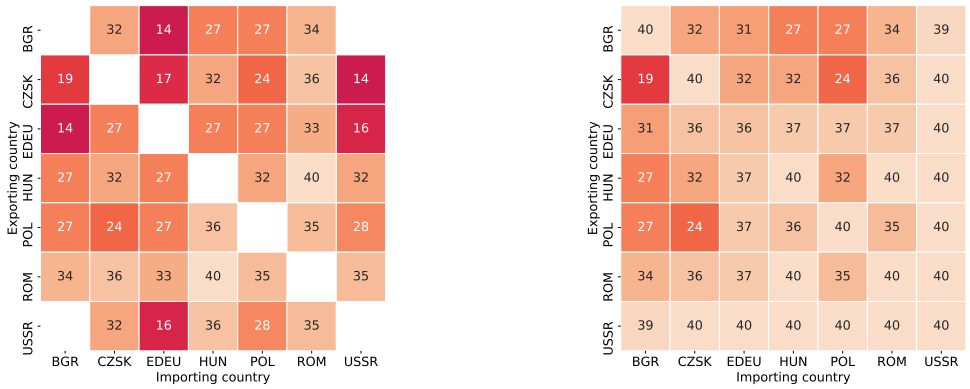
Bilateral trade data and domestic trade. Our data on trade flows come from version 4 of the TRADHIST database (Fouquin and Hugot, 2016) expanded with data from the statistical reports of East Germany and the Soviet Union, as described in the previous section. The TRADHIST database compiles historical bilateral trade flows of goods from various sources. Specifically, the original provenance for more than 95% of the data in the period we consider (1950–2000) is the Direction of Trade Statistics (DOTS) database produced by the International Monetary Fund. Trade flows are measured in gross and nominal terms and are expressed in British pounds.

To calculate domestic trade flows, we subtract nominal total exports from nominal GDP, taking both variables from the TRADHIST database. Although it would be consistent with economic theory to use gross output instead of GDP, there are no internationally comparable sources of gross output for our period of analysis. Moreover, a recent study (Campos et al., 2021) shows that the presence of country and time fixed effects in gravity equations makes the distinction between GDP and gross output less important in practical applications. We use the variables distance, common language, contiguity and colonial relationship from the same database. The observations are annual. Due to the anomalous trade data during World War II and the limited availability of data prior to 1950, we start our estimation period in 1950. We extend the estimation period beyond the end of the Cold War and include the years 1991-2000.

Summary statistics. Our final dataset contains 1,178,793 observations of bilateral trade flows, including domestic flows. As is common with bilateral trade data, a large fraction of these trade flows (48.9%) are zero. Trade flows across the Iron Curtain account for 0.9% of the observations.

Eastern bloc countries make up 5% of exporting and importing countries. Western bloc countries account for 10% of exporting and importing countries. Of all bilateral pairs, 18% belong to countries that share a common language, while the share of bilateral pairs where the exporter and importer are contiguous countries or where both are part of a colonial relationship is 2% in both cases.

[13] See Eaton and Kortum (2002) for a derivation of a structural gravity model with absolute technology differences across countries.



(a) TRADHIST

(b) Estimation sample

Figure 8: Number of observations in the TRADHIST database and in the estimation sample

Notes: The two heatmaps show the number of observations for the 40-year period 1950–1989.

Table 1: Summary statistics

Variable	Mean	Standard deviation	Minimum	Maximum
Bilateral trade (billion pounds sterling)	0.27	18.85	0.00	6253.94
Exporter belongs to the East bloc	0.05	0.22	0.00	1.00
Importer belongs to the East bloc	0.05	0.21	0.00	1.00
Exporter belongs to the West bloc	0.10	0.30	0.00	1.00
Importer belongs to the West bloc	0.10	0.30	0.00	1.00
Border dummy	0.99	0.08	0.00	1.00
Log-distance	8.66	1.04	0.00	9.90
Common language	0.18	0.38	0.00	1.00
Contiguous	0.02	0.14	0.00	1.00
Ever in colonial relationship	0.02	0.12	0.00	1.00

Notes: Summary statistics for all variables are calculated over 1,178,793 bilateral observations. With the exception of trade value and log distance, all other variables are dummy variables.

5 Results

The trade costs of the Iron Curtain. The estimates from our baseline estimation are shown in Figure 9. They provide evidence of significant trade costs imposed by the Iron Curtain. Before the fall of the Berlin Wall in 1989, the Iron Curtain served as a barrier that imposed high trade costs between the Eastern and Western blocs. The chart also shows a dramatic shift in trade costs following the events of 1989. With the fall of the Iron Curtain, trade costs between the Eastern and Western blocs appear to have fallen rapidly.

Focusing on the period of the Cold War, trade barriers between East and West showed a trend of progressive easing. While there were minor fluctuations in the difficulty of trading across the Iron Curtain, the overall pattern indicates a gradual reduction in trade restrictions. This easing of barriers between East and West can be translated into a tariff-equivalent measure.

At its height, the Iron Curtain imposed trade barriers equivalent to a 48% ad valorem tariff. Over time, however, there was a decline in this tariff-equivalent measure, which started in the second half of the 1950s and continued throughout the 1960s. By the 1970s and 1980s, trade barriers had settled at around 25%, indicating a significant reduction in trade barriers between East and West.

We formally test whether trade barriers associated with the Iron Curtain decreased over time by comparing four decade averages for the years 1948–1957, 1958–1967, 1968–1977, and 1978–1986. The statistical test for equality between the first two decades clearly rejects the null hypothesis (the p-value is 0.0004). The second and third decades are also statistically different (the p-value is 0.0081). For the last two decades, however, the null hypothesis of equality cannot be rejected at standard significance levels (the p-value is 0.6293).

Discussion. To put the ad valorem tariff into perspective, it is useful to compare it with estimates derived using similar models for changes in trade policy. Using a virtually identical value for the trade elasticity ϵ, Head and Mayer (2021) estimate that the reduction in trade barriers caused by the deepening of the European single market after the Maastricht Treaty in 1992 was equivalent to an ad valorem tariff reduction of between 20% and 30% for trade in goods and between 10% and 20% for trade in services. The estimates reported by Felbermayr et al. (2024) indicate that GATT or WTO membership is equivalent to an ad valorem tariff reduction of between 6% and 13% when for a trade elasticity of ϵ=5.03.

The estimated ad valorem tariff equivalents of major trade policy changes (such as entry into the GATT, the WTO, or the European Union) are therefore substantially lower than those that can be attributed to the Iron Curtain during the Cold War. In fact, the estimated trade barriers for the Iron Curtain during the height of the Cold War are similar to those that arise between opposing factions during actual wars, which Glick and Taylor (2010) estimate to be about 40% in tariff-equivalent terms.

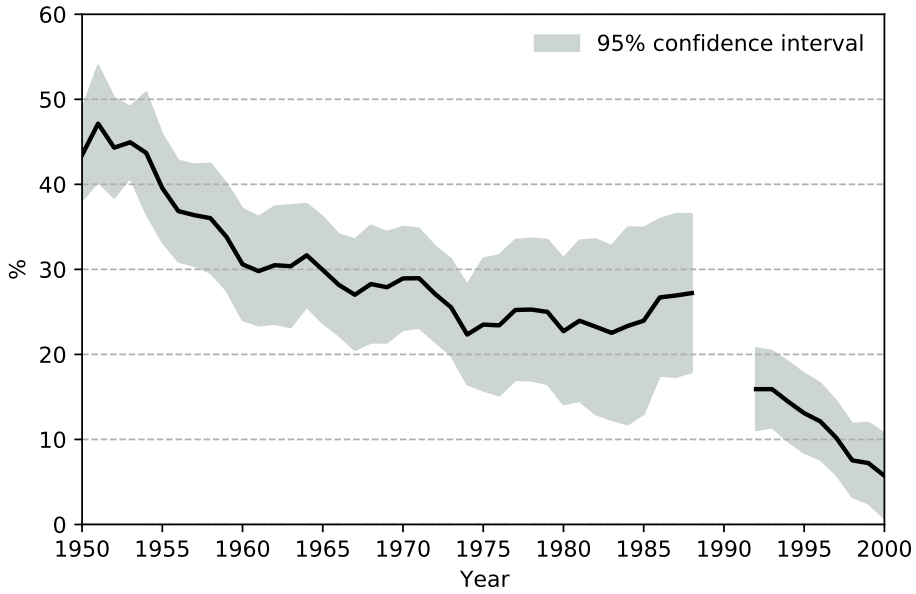


Figure 9: Estimated tariff equivalent of the Iron Curtain

Notes: The figure shows the estimated tariff equivalent of the Iron Curtain's borders measured in percentage points. The estimation uses the specification in (1). The tariff equivalent is calculated from the estimates $\hat{\theta}_t$ using the transformation $100 \times [\exp(-\hat{\theta}_t/5.03) - 1]$. The 95% confidence interval is calculated using the delta method.

Dissecting the effect of the Iron Curtain. In addition to the evolution of trade costs due to the presence of the Iron Curtain, we can also examine the variation of trade costs within the Eastern and Western bloc countries. To estimate this effect of trade costs, we extend the baseline specification in the following way:

$$X_{ijt} = \exp(\gamma_t b_{ij} + \theta_t^{EW} EW_{ij} + \theta_t^{WE} WE_{ij} + \theta_t^{EE} EE_{ij} + \theta_t^{WW} WW_{ij} + \phi_{it} + \psi_{jt} + \boldsymbol{z}_{ij}'\boldsymbol{\beta}) + \varepsilon_{ijt}. \quad (3)$$

In this equation, the dummy variables EW and WE correspond to international trade going from the Eastern bloc to the Western bloc and vice versa. Together, these two variables represent the Iron Curtain.

We also include the variables EE and WW, which indicate international trade within the Eastern and Western blocs, respectively. Note that these new variables are set to zero for domestic trade, so they only measure the impact on international trade flows. Formally, the general formula for a variable of the form AB, where A and B are any two regions, is

$$AB_{ij} = \begin{cases} 1 & \text{if } i \in A,\ j \in B,\ i \neq j, \\ 0 & \text{otherwise.} \end{cases} \tag{4}$$

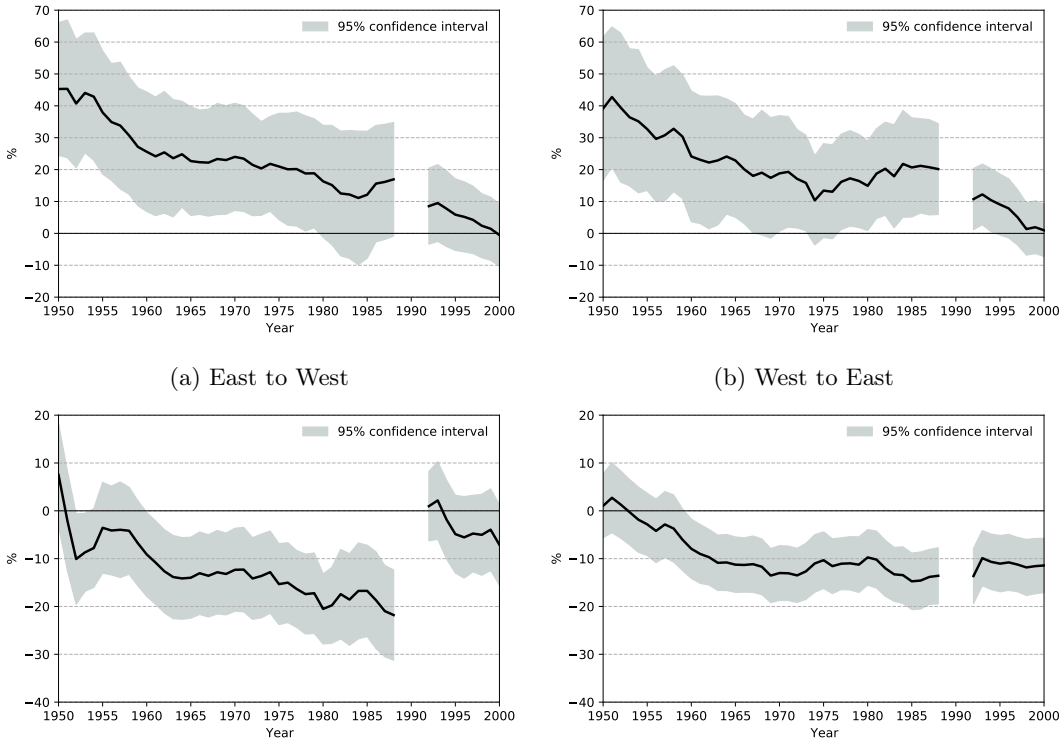
The coefficients on the added variables are time-varying, as before.

The two figures showing trade flows across bloc borders (panels (a) and (b) in Figure 10) are consistent with the Iron Curtain figure. Trade costs are higher and evolve gradually in the years before 1989. The point estimates of trade costs for exports from the West to the East suggest a relaxation of trade barriers in the mid-1980s, but the estimates for these years are very imprecise, as evidenced by the widening of the confidence interval for exactly these years. Looking at exports from West to East, there is a similar decline in trade costs in the early 1970s. In this case, the change in trade costs is not affected by less precision in the estimate, as the entire confidence interval for these years shifts.

Panels (c) and (d) in Figure 10 show three interesting phenomena. First, both graphs show a progressive decline in trade costs for intra-bloc trade until 1989. Second, the trade liberalization is three times greater for the Eastern bloc during this period. Third, after the fall of the Berlin Wall, the ease of intra-Eastern trade drops significantly and falls below that of intra-Western trade.

At first glance, the deep integration of the Eastern bloc countries might cast doubt on the uniqueness of the experience of economic integration resulting from the formation of the European Common Market and ultimately the European Union (EU), whose trade achievements are often cited as one of the most tangible benefits of the EU.

However, these findings are explained by the fact that while the Eastern bloc countries had very limited overall trade relations with the non-Soviet world, Western countries had generally lower trade barriers and hence were more open, and became increasingly so during the period when European institutions were being established. The simultaneous opening to trading partners outside Europe meant that the European integration process did not lead to significant trade diversion. This view is supported by a recent study by Head and Mayer (2021), where the authors use a gravity model to analyze the evolution



(a) East to West

(b) West to East

(c) East to East

(d) West to West

Figure 10: Tariff equivalent of trade costs for flows across blocs and inside blocs

Notes: The figures show the tariff equivalent of the trade costs estimated using the specification in (3). The tariff equivalent measure is calculated from the estimates $\hat{\theta}_t^{ij}$, where $ij \in \{EW, WE, EE, WW\}$, using the transformation $100 \times [\exp(-\hat{\theta}_t^{ij}/5.03) - 1]$. The tariff equivalent measure is expressed in percentage points. The 95% confidence interval is calculated using the delta method.

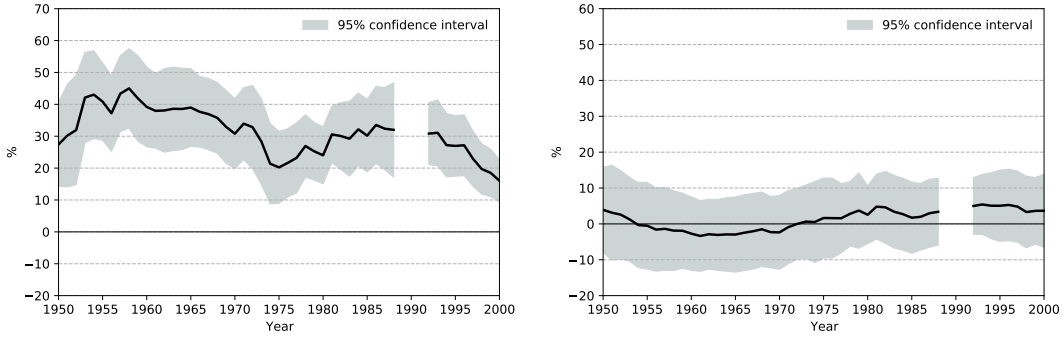
of trade costs among EU members, and between EU members and the rest of the world.

The sharp decline in the ease of trade between Eastern bloc countries after 1989 can probably be explained by the fall of the Berlin Wall, the dissolution of the Council for Mutual Economic Assistance, and ultimately the dissolution of the Soviet Union. The trade-integrating forces associated with these institutions were only gradually and partially replaced by other trade agreements, such as the Central European Free Trade Agreement, which had different objectives: not only to promote trade among the (now former) socialist states, but also to foster their integration with Western Europe.

Trade relations with non-aligned and neutral countries. We now extend the analysis to examine each bloc's trade relations with neutral countries in Europe. We distinguish between three groups of countries: countries that are officially neutral but lean toward the West (Switzerland, Ireland, and

Sweden), countries that are actually neutral (Austria and Finland), and Yugoslavia, a famously non-aligned country.

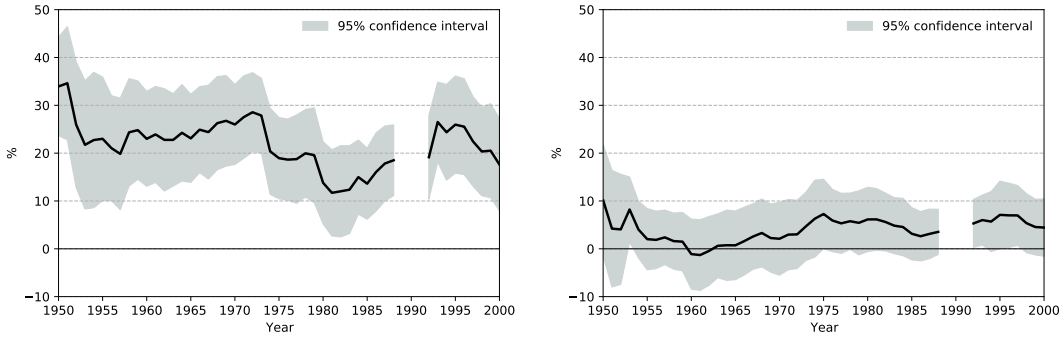
We proceed as before and add dummy variables for trade between these three groups of countries and the Eastern and Western blocs. We also add dummy variables for intra-bloc trade whenever appropriate (i.e., in all cases except Yugoslavia, which is a single country).



(a) Trade with the East (b) Trade with the West

Figure 11: Tariff equivalent of the border for West-leaning countries

Notes: The figures show the tariff equivalent of the trade costs for West-leaning countries (Switzerland, Ireland, and Sweden). The tariff equivalent measure is expressed in percentage points. The 95% confidence interval is calculated using the delta method.

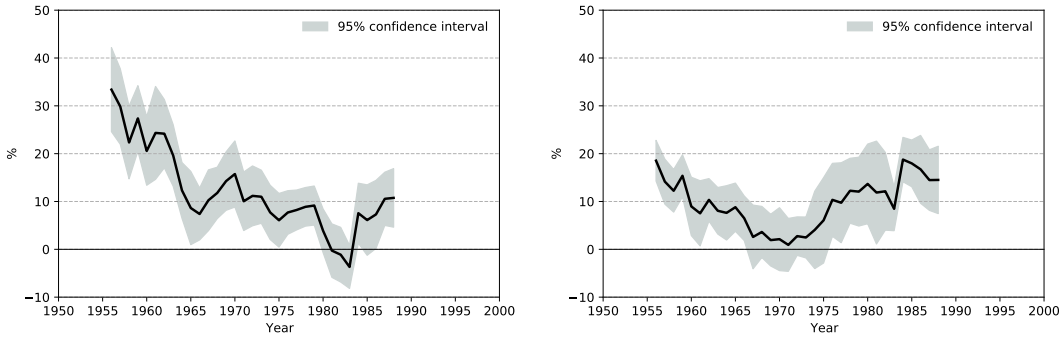


(a) Trade with the East (b) Trade with the West

Figure 12: Tariff equivalent of the border for neutral countries

Notes: The figures show the tariff equivalent of the trade costs for neutral countries (Austria and Finland). The tariff equivalent measure is expressed in percentage points. The 95% confidence interval is calculated using the delta method.

The Western-leaning countries faced similar trade barriers with the East as the Western bloc, while trade with the West did not face any significant trade barrier beyond the average border effect. Austria and Finland had very similar levels of trade barriers with the East as the West-leaning countries, at



(a) Trade with the East

(b) Trade with the West

Figure 13: Tariff equivalent of the border for Yugoslavia

Notes: The figures show the tariff equivalent of the trade costs for Yugoslavia. Estimates are not available for all years because of lack of data. The tariff equivalent measure is expressed in percentage points. The 95% confidence interval is calculated using the delta method.

least until the early 1970s. This suggests that the distinction between westward-leaning and neutral countries is not substantial in terms of trade relations.

Interestingly, both Western-leaning and neutral countries show similar patterns in the evolution of calculated ad valorem tariff equivalents. In particular, after being very high at the beginning of the Cold War period, ad valorem tariff equivalents begin to decline around the late 1960s and until the late 1970s, corresponding to the "détente"–a period of reduced tensions between the United States and the Soviet Union (Villaume and Westad, 2010).

During this period, the enforcement of the Western export control system was relaxed, creating fewer difficulties for exporters in Western-leaning and neutral countries. They could now more easily re-export Western goods to the East. In the early 1980s, ad valorem tariff equivalents began to rise again, coinciding with renewed U.S. pressure on these countries to tighten controls on re-exports (Jensen-Eriksen, 2019).

Yugoslavia, on the other hand, experienced increased trade costs with both blocs. Our estimates capture the almost complete break in trade relations between Yugoslavia and the Eastern bloc after the Soviet-Yugoslav split—Yugoslavia's departure from the Soviet sphere of influence in 1948[14]—and its reversal in the 1950s (McKenzie, 2008).

Together with the previous results, this implies that the Eastern bloc countries were the most disconnected from the rest of the world, as they experienced increased trade costs not only with the West, but also

[14]In 1961, Yugoslavia became a founding member of the Non-Aligned Movement, a group of countries that were not formally aligned neither with nor against either the Western or Eastern bloc.

with non-aligned or neutral countries.

6 A quantification of missing trade and welfare losses due to the Iron Curtain

In this section we quantify the impact of the Iron Curtain on trade and welfare by considering a counterfactual world without the Iron Curtain. For our counterfactual simulations, we use a standard general equilibrium trade model with a production function that leads to a positive supply elasticity. As is well known (cf. Head and Mayer, 2014), the computation of general equilibrium counterfactuals requires only knowledge of bilateral trade flows and a few sufficient statistics. In this case, we need two elasticities: the trade elasticity, which measures how bilateral trade flows respond to a change in bilateral trade costs, all else equal, and the supply elasticity, which measures how output in a country responds to an increase in the relative price of its export good.

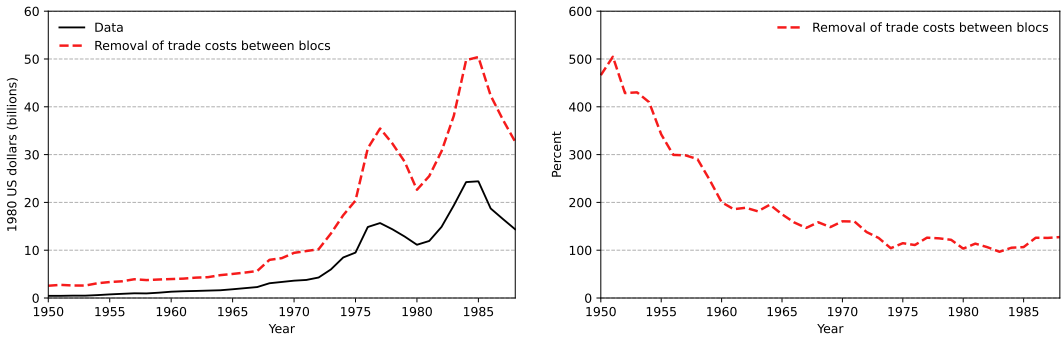
Brief description of the model. The quantitative model is a standard trade model in which goods are produced by combining labor with intermediate inputs. This feature of the production side of the model, called "roundabout production", leads to a positive supply elasticity, as in the general class of trade models analyzed by Allen et al. (2020). Trade is costly and is characterized by ad valorem iceberg trade costs. Demand is given by CES preferences defined over varieties differentiated by origin, i.e., it follows the models of Armington (1969), Anderson (1979) and Anderson and van Wincoop (2003). As demonstrated by Arkolakis et al. (2012) and Allen et al. (2020), for a given set of parameters, this model is isomorphic in terms of its trade and welfare implications to a wide class of alternative trade models. We give a more detailed description of the model in Appendix C.

Choice of elasticities. We take the trade elasticity from the value reported in the handbook chapter by Head and Mayer (2014) and set it to 5.03. This is also the trade elasticity we used to express the effect of the Iron Curtain in tariff equivalent terms. The supply elasticity depends on the importance of intermediates in the production function. We follow the strategy of Campos et al. (2023) and choose the supply elasticity as the midpoint of the supply elasticities implied by the 10th and 90th percentiles of the distribution of the range of intermediate shares for the sample of countries in the KLEMS database, as reported by Huo et al. (2023). This yields a supply elasticity of 1.24, which is slightly higher than the value of 1.0 used by Alvarez and Lucas (2007), but lower than 3.76, the value favored by Eaton

and Kortum (2002) in their work. Since the model is static, we solve the model for a counterfactual equilibrium in each year starting in 1950.[15]

Simulation exercise. The simulation exercise consists of simulating a counterfactual scenario in which the Iron Curtain does not exist, or at least does not raise trade barriers between East and West. In particular, we use the estimated tariff equivalents from Figure 9. In each year, we remove the increased trade costs between East and West and solve for counterfactual trade flows and welfare using exact hat algebra methods. The algorithm we employ is described by Campos et al. (2024).

Results. In Figure 14 we show the counterfactual level of trade between East and West. The left panel shows trade volume (sum of trade in both directions) and the right panel shows the percentage change from what was observed in the data.



(a) Volume (b) Percent differences

Figure 14: Trade flows between East and West

Notes: The figure shows the results of a simulation in which the trade barriers of the Iron Curtain are removed. The solid line in the left panel shows the actual trade volume between East and West. The dashed line shows the counterfactual trade volume. The panel on the right shows the predicted percentage increase in trade volume that would occur if the trade barriers of the Iron Curtain were removed.

Through the lens of our quantitative model, the presence of the Iron Curtain roughly halved East-West trade flows. In relative terms, the trade lost to the Iron Curtain was greatest at the beginning of the Cold War, when inter-bloc trade would have been five times higher if the effect of the Iron Curtain had been removed. This relative measure of the importance of the Iron Curtain declined over time. By the end of the Cold War, the trade lost to the Iron Curtain was about 100%, i.e., the model predicts that inter-bloc trade would double if the Iron Curtain were removed.

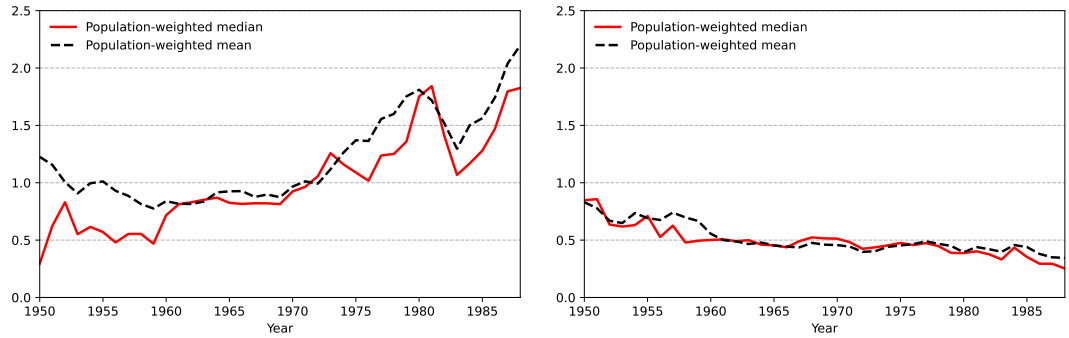
[15]East Germany is missing domestic trade for the years before 1954. For the simulations, we extrapolated domestic trade by regressing log(GDP) on a linear trend for East Germany and imputing the data with fitted values. For this country, we also completed the bilateral data after 1974 with imputed trade flows. Appendix A explains how data are imputed for this country.

The impact of the removal of trade barriers on welfare is shown in Figure 15, where we plot the change in welfare for each country in each bloc over time. According to the theoretical model used to derive these results, the change in welfare can be interpreted either as the change in the per capita consumption of a representative agent or the change in the real wage in each country expressed in terms of the value of the domestic consumption bundle.

Eastern countries tend to be more affected by the change in trade costs, as expected, because they are generally more closed to the rest of the world, except for other countries in their own bloc. The median country in the Eastern bloc (weighting countries by population) would have experienced a welfare gain of about 0.5% per year in the early years of the period if the trade costs of the Iron Curtain had been eliminated. This welfare gain increases from the early 1960s and exceeds 1.5% by the end of the period. The average welfare gain of an East Bloc consumer rises from about 1% in the years up to 1970 to more than 2% at the end of the Cold War.

As shown in panel (b) of Figure 15, the welfare gains from the removal of the trade barriers associated with the Iron Curtain for Western countries clearly decline over time, reflecting both the increase in the size of the Western European economy and the decline in the tariff equivalent measure of the Iron Curtain. This implies that the Iron Curtain became less of a burden for Western Europe in the later years of the Cold War.

This finding for Western countries contrasts with the important role the Iron Curtain continued to play for countries in the East. Not only did the welfare losses associated with the existence of the Iron Curtain persist until the end of the Cold War, but they also tended to increase for the median country. This suggests that welfare losses due to the lack of international trade may have contributed to the drive to liberalize the East bloc economies at the end of the Cold War, such as the implementation of perestroika in the Soviet Union, which allowed ministries to act more independently and introduced market-like reforms in an attempt to adopt some of the characteristics of Western economies.



(a) Eastern countries

(b) Western countries

Figure 15: Welfare gains from removing trade barriers between blocs

Notes: The figure shows the results from a simulation in which the trade barriers due to the Iron Curtain are removed. The black dashed line shows the population-weighted average welfare gains for each group of countries. The red solid line shows the population-weighted median welfare gains for each group of countries. Both measures are calculated year by year.

7 Conclusion

The Iron Curtain—a symbolical and physical barrier dividing Europe into two distinct areas—was an important driver of trade barriers that had large effects on trade between East and West and the welfare of nations during the Cold War.

In this paper, we quantify the evolution of a tariff-equivalent measure of the Iron Curtain using previously unavailable data that include bilateral trade flows for East Germany and the USSR. We also analyze how the Iron Curtain generated trade integration within the East and West blocs and how trade barriers with non-aligned or neutral countries evolved over time.

Using a quantitative trade model, we show that despite the gradual easing of trade restrictions over time, the Iron Curtain still had a significant impact on trade flows and welfare, especially in the Eastern bloc. The division created by the Iron Curtain also led to an increase in intra-bloc trade, especially in the Eastern bloc. In terms of per capita real wages, or welfare, the Iron Curtain led to persistent losses in the Eastern bloc countries of about 1% per year until the end of the Cold War, despite a decline in the tariff-equivalent measure of these barriers. These losses suggest a possible driving force behind efforts to liberalize the Eastern bloc economies, including the implementation of perestroika and other market-oriented changes in the Soviet Union.

In conclusion, the Iron Curtain served as a formidable barrier to trade between Eastern and Western countries, illustrating the perils of geopolitical fragmentation.

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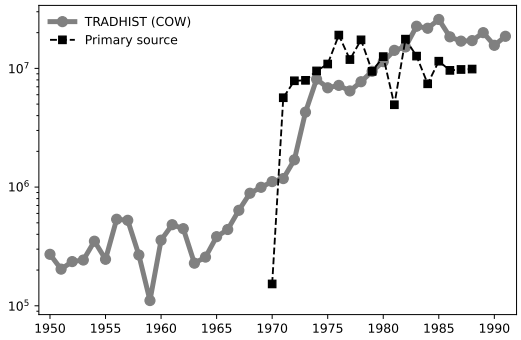
Appendix

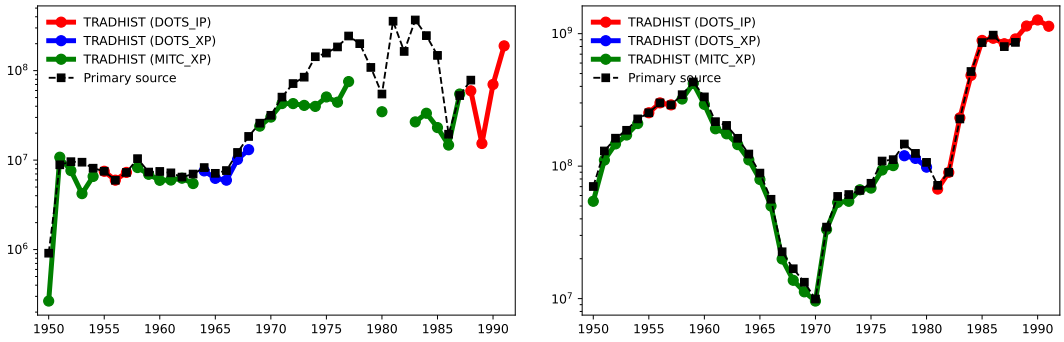
A Data appendix



(a) Luxembourg to the USSR

Figure A.1: Trade flows from Luxembourg to the USSR

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Values from the TRADHIST database derived from the Correlates of War project (`COW`) are plotted with a gray line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

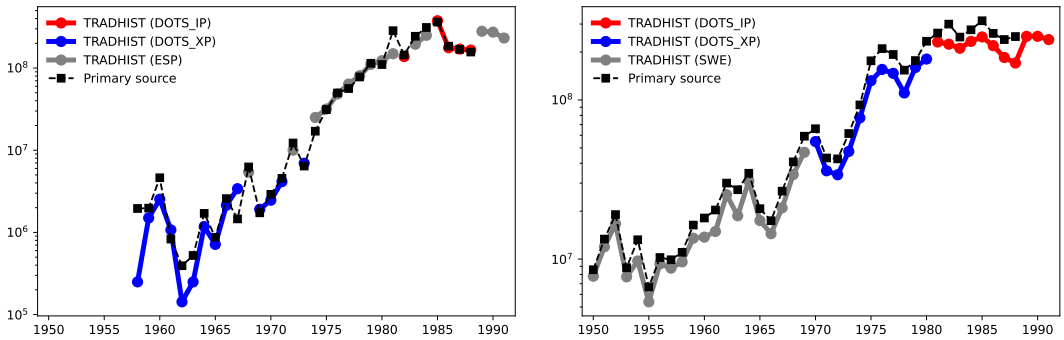


(a) Iran to the USSR

(b) China to the USSR

Figure A.2: Trade flows from Iran and China to the USSR

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Values from the TRADHIST database derived from the exporter from Mitchell (`MITC_XP`) are plotted with a green line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.



(a) Spain to the USSR

(b) Sweden to the USSR

Figure A.3: Trade flows from Spain and Sweden to the USSR

Notes: Values are in pounds sterling. The vertical axis uses a logarithmic (base 10) scale. Values from the TRADHIST database derived from the importer in IMF DOTS (`DOTS_IP`) are plotted with a red line. Values from the TRADHIST database derived from the exporter in IMF DOTS (`DOTS_XP`) are plotted with a blue line. Values from the TRADHIST database derived from the exporter from country-specific sources (`ESP` and `SWE`) are plotted with a gray line. Data from primary sources processed according to the DOTS methodology are plotted with a black dashed line with squares.

B Empirical appendix

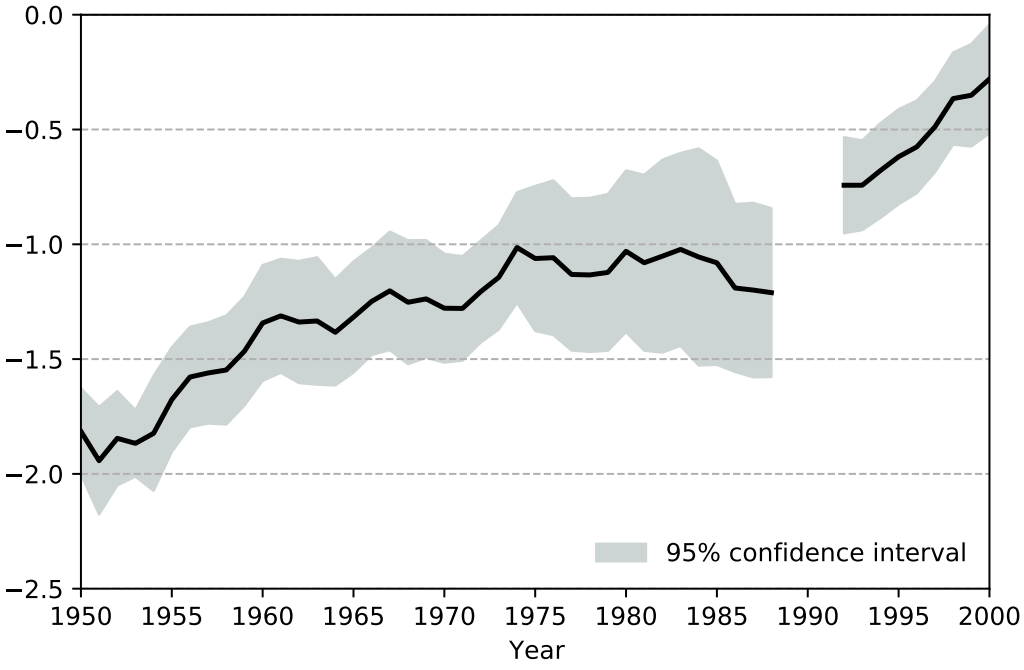
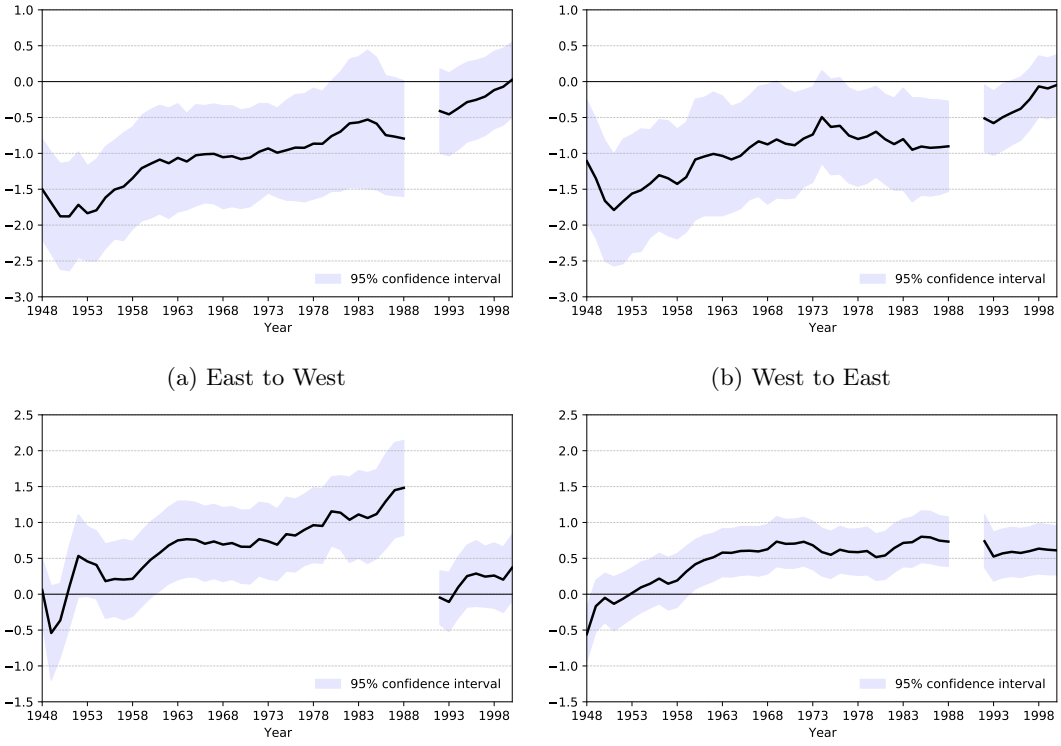


Figure B.1: Estimated coefficients of the Iron Curtain

Notes: The figure shows the estimated coefficient of the Iron Curtain's borders ($\hat{\theta}_t$). The estimation uses the specification in (1). Standard errors are clustered by exporter, importer, and year.

Robustness check that estimates the baseline specification but adds intra-bloc trade.



(a) East to West

(b) West to East

(c) East to East

(d) West to West

Figure B.2: Trade costs for flows across blocs and inside blocs

Notes: The figures show the estimated coefficients from the specification in (3). Standard errors are clustered by exporter, importer, and year.

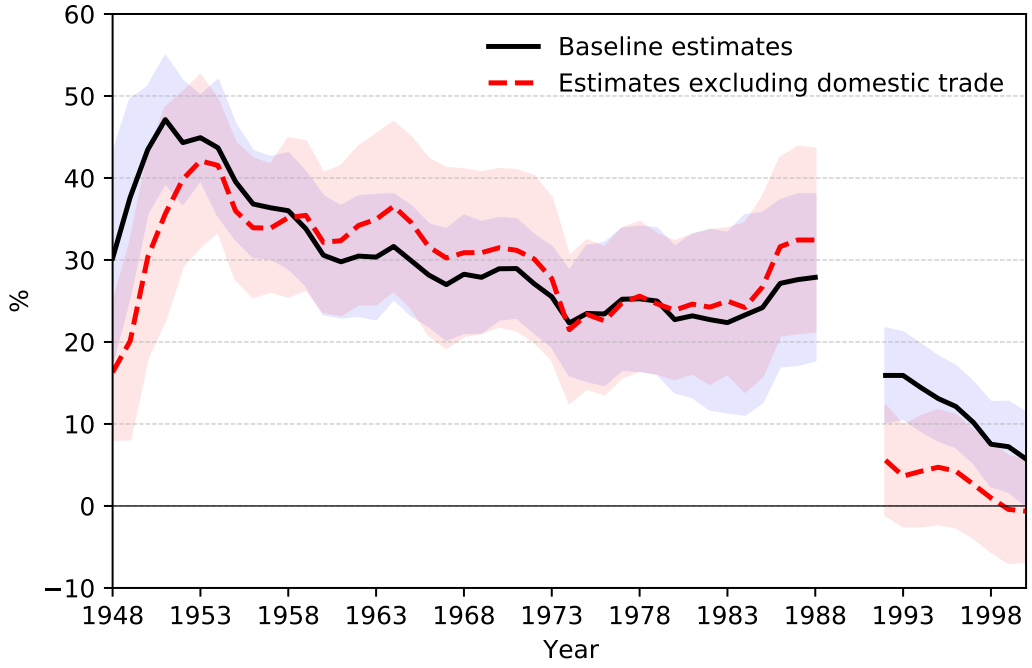


Figure B.3: Estimated tariff equivalent of the Iron Curtain with and without domestic trade

Note: The figure shows the estimated tariff equivalent of the Iron Curtain borders in percentage points. The estimation uses the specification in (1). The solid line shows results from the baseline estimation, which includes domestic trade. The dashed line shows results from an exercise in which all observations involving domestic trade are dropped from the estimation. The tariff equivalent is calculated from the estimates of $\hat{\theta}_t$ using the transformation $100 \times [\exp(-\hat{\theta}_t/5.03) - 1]$. The 95% confidence interval is calculated using the delta method.

C Quantitative trade model

The quantitative trade model we use for our counterfactual simulations is a standard trade model with a positive supply elasticity. It falls into the more general class of models that Allen et al. (2020) define as the universal gravity framework. There are N countries, denoted by the subscript i or j. Goods are produced by combining labor, which is immobile across countries but mobile within countries, with intermediate inputs. Each country produces a different good that is used for final consumption or as an intermediate good. The production function is a Cobb-Douglas function with constant returns to scale, as in the model of Eaton and Kortum (2002), where ζ denotes the share of labor (denoted by L_i) in costs and $1-\zeta$ the share of intermediate inputs (denoted by M_i):

$$Q_i = (A_i L_i)^{\zeta} M_i^{1-\zeta},$$

where $A_i > 0$ is a constant labor productivity parameter. Intermediate goods consist of the same bundle of goods as those entering final consumption, so the price index for intermediate goods for each firm is the price index for all goods. We denote this price index by P_i. Under perfect competition, the price of output at location i is given by

$$p_i = \kappa (w_i / A_i)^{\zeta} P_i^{1-\zeta},$$

where $\kappa > 0$ is a constant that depends on the parameter ζ, and w_i is the wage rate.

The value of output in the country of origin is $Y_i \equiv p_i Q_i$. Since labor is the only factor of production and profits are zero, the value of all production is distributed to the workers. This gives the usual accounting identity:

$$Y_i = p_i Q_i = w_i L_i.$$

In each country there is a representative consumer-worker who supplies labor inelastically and earns the wage w_i. This consumer has a constant elasticity of substitution (CES) utility function that aggregates goods from all origins, as in the models of Armington (1969), Anderson (1979), and Anderson and van Wincoop (2003). The elasticity of substitution is denoted by $\sigma > 1$. The optimization problem of the consumer together with arbitrage in the goods market leads to the well-known result that expenditure on goods from different origins is given by:

$$X_{ij} = \frac{p_{ij}^{-\epsilon}}{\sum_{k \in S} p_{kj}^{-\theta}} E_j,$$

where expenditure E_j is defined by $E_j \equiv \sum_i X_{ij}$ and $\epsilon \equiv \sigma - 1 > 0$ is the trade elasticity.

The representative consumer's indirect utility function is $W_i = w_i / P_i$. As shown by Allen et al. (2020), among others, welfare (W_i) in this model is proportional to the terms of trade index (defined as the ratio of export price to consumer price) raised to $1+\psi$, where $\psi \equiv (1-\zeta)/\zeta$ is known as the supply elasticity:

$$W_i = \frac{w_i}{P_i} = \tilde{\kappa}_i \left(\frac{p_i}{P_i} \right)^{1+\psi},$$

where $\tilde{\kappa}_i > 0$ is a constant.

Exports from country i to country j incur an iceberg trade cost, denoted by $\tau_{ij} \geq 1$. Due to arbitrage in goods markets, this implies that the price paid for imports in country j of the good exported by country j is

$$p_{ij} = \tau_{ij} p_i.$$

Equilibrium requires that output markets clear, that is, that prices and quantities adjust so that output Q_i in each country equals the aggregate demand of all countries, including iceberg costs:

$$Q_i = \sum_{j=1}^{N} \tau_{ij} q_{ij},$$

where q_{ij} is the amount of goods that reach the destination country j after deducting the iceberg cost.

Trade deficits are exogenous. We follow Allen et al. (2020) and assume that for all countries i,

$$E_i = \Xi \xi_i p_i Q_i,$$

where

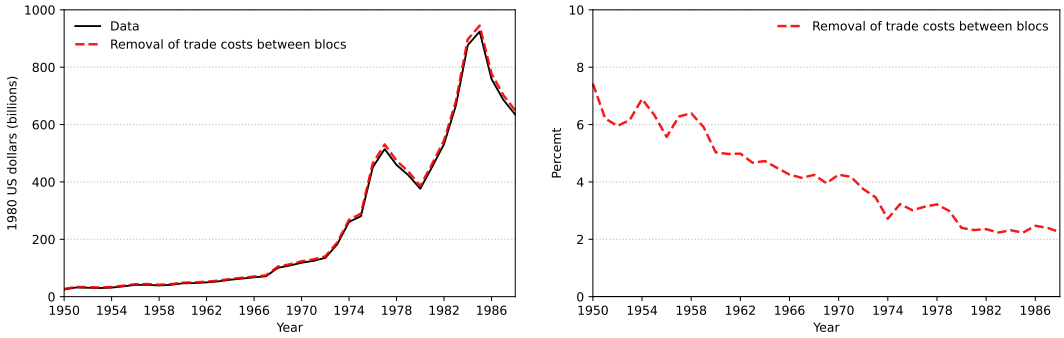
$$\Xi \equiv \frac{\sum_i p_i Q_i}{\sum_i \xi_i p_i Q_i}.$$

The parameter $\xi_i > 0$ is a constant country-specific parameter. This way of specifying trade deficits ensures that the world's trade deficit is zero.

We perform counterfactual simulations using the exact hat algebra method by (Dekle et al., 2008). To solve for the equilibrium changes, we use the algorithm described by Campos et al. (2024).

D World trade in the quantitative simulation

The simulation of Section 6 also yields results for world trade. We report these here. Figure D.1 shows that without the Iron Curtain, world trade would have been about 6% higher in the 1950s and about 2% higher in the 1980s.



(a) Volume

(b) Percent differences

Figure D.1: World trade

Notes: The figure shows the results of a simulation in which the trade barriers of the Iron Curtain are removed. The solid line in the left panel shows the actual trade volume between East and West. The dashed line shows the counterfactual trade volume. The panel on the right shows the predicted percentage increase in trade volume that would occur if the trade barriers of the Iron Curtain were removed.