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The Intersection of History and Trade: Essays in Trade and Trade Policy

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THE INTERSECTION OF HISTORY AND TRADE: ESSAYS IN TRADE AND TRADE
POLICY

BY

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DISSERTATION

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Dissertation Committee

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Dedication

This dissertation is dedicated to Courtney. Thank you for being my Dead Sea, I would not have seen this project to completion with out your love, support, and unwavering encouragement.

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Contents

Abstract

In this research I examine the effects that past institutions have on current day economics. In chapters one and two I focus on empirically measuring the impact of past historical trade institutions on current day trade flows. In chapter three I turn my focus to understanding how implicit institutions impact the economic discipline.

My first chapter begins with examining the historical legacy of trading institutions of membership in the ex-Soviet Union and Comecon on current day Russia's bilateral trade flows. The use of long-term data from 1998 to 2016 allows for examination of changes in the legacy effects over time, finding that overall historical patterns developed by these institutions remain highly significant 26 years after the collapse of the Soviet Union. Specifically finding that historical borders exert a positive, significant, but decaying impact on current day trade. Historical trading blocs also exhibit a similar pattern but are weaker and not as statistically significant. This chapter provides the first estimates of the legacy left by past institutions with an "institutional legacy decay" measure.

Chapter two I continue my focus on the historical institutions of ex-USSR and Comecon membership on bilateral trade flows to and from Russia. This paper is the first of its kind to examine how the components of Intra-Industry Trade (IIT) are impacted by historical trading institutions in the years of 1996 to 2018. In understanding the long reaching effects of the historical USSR border and Comecon trading bloc, this paper finds that all components of IIT are positively impacted by the historical trading institutions. Interestingly only Vertical Intra-Industry Trade (VIIT) shows signs of the impact of these institutions decaying in a

monotonic fashion, while Horizontal Intra-Industry Trade (HIIT) indicates that the effect of historical institutions is much longer.

In chapter three I try to understand an important institution within the discipline of economics. Specifically, I focus on understanding how, given a specific set of assumptions about the market and market actors, the discipline advocates for a policy of free trade. The advocacy of free trade was not always as dominant especially during the first American Progressive Movement (1890-1918). Economists who led the movement (i.e. the Economic Progressives) reconstructed society in their image of a technocrat ran state. In their view *laissez-faire*, and ultimately free trade as an expression of *laissez-faire*, was the antithesis of the new economic order they created. In spite of all their success, the Economic Progressives were unable to banish free trade from economic theory. I argue this failure was a function of a contradiction in their core research philosophies as well as their inherent philosophical bias. These biases and contradictions, when contrasted with other schools of thought, made the Economic Progressives movement seem less attractive and potentially led to its downfall.

Introduction

Institutions have long been identified as worthy of investigation in economics. Institutions have often been cited as instrumental in determining rates of economic growth since Adam Smith made them a central theme in *The Wealth of Nations*, yet, understanding their theoretical and direct impact has always been difficult. The break through in both the theoretical and empirical measurement of institutions came from Acemoglu et al. (2005). Acemoglu et al. provided a framework for why institutions matter. Their paper shows that institutions shape and incentivize market actors, this in turn organizes productivity, and results in the observed differences in economic growth between countries. In recognizing the importance of modern-day and historical institutions on growth results in an important corollary.

Undeniably international trade generates institutions that are worth studying as well. These institutions take the form of long-term commercial agreements between nations, both modern and historical trade, that exert some effect trade values and flows of specific goods. The central questions this dissertation grapples with is what are the effects of historical trading institutions on trade and society? The study of international trade institutions was formalized by Eichengreen and Irwin (1995). Eichengreen and Irwin's paper focused on studying the impact of previous trade institutions and international borders on future trade patterns. Their specific focus was not only on historical trade institutions' creation, but also on their dissolving, and how those impacts ripple out through time.

Research into historical trade institutions have examined the impact of free trade agree-

ments, currency unions, trading blocks, and international borders. Although theoretically sound, the empirical examination of these historical institutions are met with two important challenges. The first is the question of if these institutions have truly developed exogenously to international trade. To elucidate the issues of endogeneity more succinctly, the literature has grappled with the question: does high trade flows between nations result in new political trade agreements or does politically motivated trade agreements result in high trade flows.

Unfortunately, a large number of empirical studies of historical trading institutions have assumed *a priori* that the formation of international agreements is exogenous in order to facilitate their work (Barro and Tenreyro, 2007). Thus, more robust studies have endeavored to find "natural experiments" in which trade agreements, monetary unions, or international borders have formed exogenously to trade rationales.

The second, and more easily remedied, issue in empirical studies of historical trading institutions comes from the empirical methodology employed. Traditionally, these empirical studies have applied a gravity trade model to understanding the impact of organizations forming on trade between nations, or the welfare implications of the formation of these bodies. As the gravity trade literature has grown, a number of bias and misspecification issues have been identified. The two most important empirical developments that have shifted the literature are Anderson and van Wincoop (2003) and Silva and Tenreyro (2006). Anderson and van Wincoop (2003) illustrated a theoretically consistent gravity trade model and identified the omission of a variables to properly capture the dynamics of international borders. Anderson and Van Wincoop coined these variables as Multilateral Resistance Terms, and demonstrated how their omission injected bias into any gravity trade model. Silva and Tenreyro prove that a log-linearization empirical specification results in biasing the resulting coefficients. The bias, the authors show, is a function of heteroskedasticity present in most empirical trade and error corrections don't solve the innate higher order statistical distribution problems that result in incorrectly estimated standard errors.

The work in chapters one and two of this dissertation seeks to resolve the aforementioned problems in empirical research focused on historical trading institutions. First, to solve the exogeneity problem, this research utilizes Russia's post-Soviet trade flows. The work endeavors to show that the formation of the Soviet Union and it's main trading bloc the Council for Mutual Economic Assistance (also known as Comecon), were generated exogenously to trade motivations. Instead these historical institutions were created for political reasons. Utilizing this natural experiment allows for an empirically clean investigation into the effects of historical trading institutions on modern day trade flows. Secondly, following best empirical practices outlined by the likes of Anderson and Van Wincoop and Silva and Tenreyro, the model employed is a theoretically consistent Poisson Pseudo Maximum Likelihood Model (PPML).

In addition to generating theoretically and empirically consistent work, chapters one and two further push the literature forward by not simply showing that historical institutions affect current day trade flows, but by measuring how those effects decay over time. In doing so these chapters are able to show that historical trading institutions, well over 80 years old, have a positive effect that decays in magnitude as time marches further away from their removal.

Chapter one measures the lagged impact of previous membership in the Soviet Union and Comecon on trade volume (imports plus exports) to and from Russia. The chapter's 19 year data set is employed to generate three-year panel coefficients on each of the historical legacy variables. These coefficients are used to examine the change in the impact of the legacy of previous trading institutions over time. Further, this chapter develops a "back of the envelope" estimator of institutional legacy decay on trade flows.

Chapter one finds large and persistent legacy effects on trade between Russia and former Soviet and Comecon countries. The estimates of institutional legacy decay of the impact of former membership in the Soviet Union were found to be 18 years while former membership

in Comecon is 11 years. The results point to the effect of the membership of the Soviet Union is stronger than that of Comecon. The result is most likely driven by the impacts of borders on trade. The absence of borders in the past between former members of the Soviet Union established strong trade patterns that hold even today. The strength of this conclusion is demonstrated by both the steeper slope of a plot of the coefficients for the USSR indicator variable and the decay measure.

Chapter two builds off the previous chapter by applying the same technique to all the of the components of trade, i.e. Total Trade (TT), Intra-Industry Trade (IIT), Inter-Industry Trade (INT), Horizontal Intra-Industry Trade (HIIT), and Vertical Intra-Industry Trade (VIIT). The chapter utilizes data on Russia's trade with 183 countries from 1996-2018, via a correctly specified PPML gravity trade model with measures for historical borders and trade union membership, five different regressions are run, one for each component of trade. Chapter two is unique in that it employs a method of decomposing total trade into it's parts that is both empirically free from researcher bias as to how to differentiate HIIT from VIIT, and consistent with theoretical literature that defines HIIT and VIIT.

In building off chapter one's results showing historical trading institutions impact on trade, chapter two illustrates that the impact of historical institutions decays in heterogeneous ways. Specifically, the pattern of INT, HIIT, or VIIT decay is dependent upon the underlying theoretical foundations which govern each component of trade. It can be observed that variables controlling for historical trading institutions are generally positive both when aggregating for all years as well as disaggregating the data into 3-year chunks, though not uniformly decreasing.

Two distinct narratives emerge when looking into how the impact of historical borders and trade unions affect current day trade flows. Firstly, historical borders present a stronger and more lasting impact. In chapter one, the coefficients on historical borders from total trade showed a monotonic convergence to statistical zero. Chapter two demonstrates this

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convergence is mainly driven by INT not IIT. Although IIT's coefficients on historical borders aren't converging to statistical zero, looking specifically at it's components shows that VIIT is converging to statistical zero while the HIIT seems to be on a much longer convergence path.

The story of the impact of historical trade unions on current trade flows is much less clear. In the previous chapter, the coefficients measuring the impact of a historical trade union was positive and arguably converging to statistical zero in a monotonic patter. Conversely, when disaggregating total trade the data argues that the pattern illustrated by the coefficients on Comecon is driven by the monotonic convergences of INT and possible oscillating convergence of IIT. These results further strengthen the argument in chapter one of that the impact of historical trade unions is much weaker than historical borders. Investigating further into IIT shows that while VIIT is always positive and slowly converging to statistical zero, HIIT is driving the oscillating pattern on IIT by presenting a much more aggressive harmonic pattern.

Chapter three returns to broad question of how does historical trading institutions effect on current day trade and society, but focuses on the latter question of society. Particularly, the question of the institution and advocacy for Free Trade policy within the science of economics. Although in modern times it feels as if free trade (under some specific assumptions and conditions) is one of the few points of agreement among economists this was not always the case.

During the end of the 19th century a number of American students went abroad to Germany to receive their doctorates in economics under the tutelage of the German Historical School. These economists came back and founded the American Economic Association (AEA) and were instrumental in leading the American Progressive Movement. The Progressive movement (1870-1920) was key in altering what it meant to be a professional economist and how the federal government interacted with its citizens. As budding economists steeped

in the traditions of the German Historical School, it impregnated the Progressives with beliefs of the importance of science in solving political and social problems. Central to their ideology was the rejection of classical *laissez-faire* ideology and free trade policy. Even though the Economic Progressives controlled nearly all aspects of the profession, crafted local and federal economic policy, and were the leaders of every higher education institution of note the American economics discipline still embraces free trade and not protectionism.

Progressives are a complex group of thinkers often seen as more homogeneous in their beliefs than they were. Because of this misconception of ideological uniformity, it would be tempting to believe that there is a moment when newer methodologies, which could articulate the gains and losses of free trade, won over members. In truth, research paradigms/schools do not dissolve overnight. Instead the story of the American Progressive Movement's inability to sway the academic discourse around free trade is emblematic to the inherent flaws present at the "hard core" of their research program.

Free Trade, and the Economic Progressives' goals to replace it with "scientific protectionism" is a metaphysical manifestation of the innate problems in their hard core. Their theories lacked science, and although they employed the rhetoric, they were unable to budge when confronted with newer more scientifically based theories. In the face of the growing neoclassical movement and the fallout of WWI the Economic Progressive movement collapsed under its own weight.

The binding thread throughout these chapters is understanding the important and nuanced ways in which historical institutions, whether formalized through international agreements or implicit within the core of an academic discipline affect the present. Historical institutions do not simply guide or act as way markers, but instead reach from beyond the here and now, and shape the future that we all march towards. Like a shadow, there is no way to be rid of them, only to appreciate and understand the unique shapes they take in the light.

Chapter 1

The Institutional Memory of Trade Flows: Russia as a Natural Experiment

by

Travis Freidman

Bruce Elmslie

Sofia Kuznetsova

Abstract:
This paper uses a multilateral resistance gravity model to examine the historical legacy of trading institutions utilizing the impact of membership in the ex-Soviet Union and Comecon on current day Russia's bilateral trade flows. The use of long-term data from 1998 to 2016 allows for examination of changes in the legacy effects over time. The main finding of the paper is that historical patterns do matter in the determination of current trade flows of Russia. Even though there is a declining trend in volume of trade flows between Russia and former members of the Soviet Union and Comecon, overall historical patterns developed by these institutions remain highly significant 26 years after the collapse of the Soviet Union. We provide the first estimates of the legacy left by past institutions with an "institutional legacy decay" measure.

1.1 Introduction

We are living in unprecedented times for international agreements. The United Kingdom, after three years of negotiation officially left the European Union at the end of January 2020 (Bennett, 2020). Three days after being sworn into office, President Trump pulled the United States out of the Trans-Pacific Partnership. In another executive order, many have called President Trumps decision to not full judges to the Appellate Court of the World Trade Organization as a final step in killing the trade organization (Johnson, 2019). Given the number of trade institutions that we are seeing either exited by individual members or being disbanded, it is worth asking how long does the impact of previous membership in a trading institution last?

Institutions have been studied widely in economics for a long time. Yet, it was Acemoglu et al. (2005) who provided a framework and makes a case for why institutions matter. In short, Acemoglu et al. argue that institutions shape and incentivize market actors, this in turn organizes productivity and results in the observed differences in economic growth between countries. There is a large literature addressing the impact history and institutions have on trade (Mitchener and Weidenmier, 2008; Karnups, 2008; Estevadeordal et al., 2003; Brodzicki and Uminski, 2018) and economic growth (North, 1995; Zukowski, 2004; Campos et al., 2016). In looking specifically at trade, the literature has found strong legacy effects of previous institutional trading arrangements in virtually all cases that have been studied (Eichengreen and Irwin, 1995; Anderson and Smith, 2007; Stack et al., 2019). However, the ability to confidently determine the extent of trade persistence has been hampered by the question of the endogeneity of the development of trade, customs, and monetary unions.

Empirical studies of free trade agreements, currency unions, or trading blocks traditionally apply a gravity trade model to understanding the impact of these organizations forming on trade between nations or the welfare implications of the formation of these bodies. The

channels in which endogineity becomes an issue for the empirical models is twofold. First, is an implicit *a priori* assumption in the literature, about the exogenous formation of international agreements. As Barro and Teenreyro state "The implicit assumption in various empirical studies is that currency unions (or, more generally exchange rate arrangements) are randomly formed among countries" (Barro and Tenreyro, 2007, p. 3). Second, is a reverse causality issue. Specifically Wolf and Ritschl (2011); Baldwin and Jaimovich (2012); Keller and Shiue (2014) give different examples of how the application of national arrangements, made because of politics may cause higher trade flows, or higher trade flows may result in politics generating a trade agreement. These issues become even more thorny when trying to take historical factors into account. The work in this paper is able to successfully bypass these issues because it exploits the natural experiment of the creation, and eventual disbanding of the USSR and Comecon. As will be argued later on in this paper, the historical trading institutions of the USSR border and the Comecon trading bloc were created independent of trade promotion reasons.

Eichengreen and Irwin (1995), the seminal paper which identifed the importance of history in gravity trade models, find strong endogeneity in the formation of the Ottawa Agreement in 1932, the Reichsmark Bloc, and the Ouchy Accords. Similarly, Nitsch and Wolf (2013) find that the development of the Euro followed a trend of increased economic integration. In general, Wolf and Ritschl (2011, p. 310) conclude that "to a large extent such arrangements [currency and trading blocs] are endogenous to the pre-existing pattern of trade." To the extent that Wolf and Ritschl are correct about the development of trading institutions, the issue of historical legacy can be difficult to determine since the formation of the bloc may have resulted from pre-existing comparative advantages that cannot be picked up by the gravity equation methodology.

This paper utilizes Russia's post-Soviet trade flows to address the persistence and endogineity questions. We argue that both the development of the Soviet Union and its main

trading bloc Comecon were developed independently from any particular trade-related rationale, allowing for a more robust test of institutional persistence in trade flows. We utilize a gravity model with data on 108 countries from 1998 to 2016, and measure the lagged impact of previous membership in the Soviet Union and Comecon on trade volume (imports plus exports) to and from Russia. This 19 year data set is used to develop an estimate of the "decay" of institutional persistence of trade flows. More specifically, we run a Poisson pseudo-maximum likelihood (PPML) gravity model with multilateral resistance controls in three-year panels and for each year, to examine the change in the impact of the legacy of previous trading institutions over time. We find large and persistent legacy effects on trade between Russia and former Soviet and Comecon countries. Our estimates show greater persistence of the legacy effect than most previous studies of other trading institutions.

1.2   Background

1.2.1   History & Trade Flows

Institutional legacy has been found important in the determination of trade flows by several authors. de Ménil and Maurel (1994) analyze the breakup of the Austro-Hungarian in 1919 and find that the "dissolution of the Empire did not result in the immediate reversal of the trade patterns of the former union. Even after their dramatic post-war contraction, trade flows between the successor states remained significantly much larger than would have been predicted by economic, demographic and geographic factors alone" (ibid, p. 564-5). Eichengreen and Irwin (1998) investigate the influence of pre-WWII trade (1928 and 1938) on post-war trade flows. They find strong, but diminishing effects for 1949 and 1954, but no logically consistent effects by 1964. And with specific reference to countries that had once been part of the British Empire, they find that "Former British colonies traded disproportionately more with one another in 1949. . . because of the effects of history" (ibid,

p. 55). But again, this effect disappears by 1954 and 1964. In general, Eichengreen and Irwin persuasively argue that history is fundamental for the determination of trade flows in any gravity approach.

Anderson and Smith (2007) attempt to validate the results of seminal papers on the hysteresis of past trading institutions. They use a panel data set and a lagged trade variable specification from Eichengreen and Irwin (1998) and find strong evidence that historical patterns do matter in the estimation of trade flows in Canadian trade. Using a fixed effects approach to estimate the gravity equation, they show that importer and exporter time fixed effects can capture the effects of history without the use of a lagged dependent variable approach. They make the case that researchers need to put time and effort into ensuring that the gravity trade model is correctly specified.[1] In thinking about the correct specification of the gravity trade model, the authors argue that accounting for the "border puzzle" is much more empirically important than accounting for hysteresis. The importance of the border puzzle will be discussed more in-depth below.

As the empirical literature has evolved, the application of history's effect in empirical models has been deployed in a more nuanced way. Instead of simply thinking of history's effects as simply the lag of trade, newer investigations, such as Gowa and Hicks (2013), Brodzicki and Uminski (2018), and Stack et al. (2019) seek to specify the gravity trade model with variables that appropriately calibrate the model to take important historical factors that still affect current (and future) trade volumes into account. Gowa and Hicks (2013) look at trade volume and the effects of trade blocs on trade during the intervening years between World War I and World War II. They take into consideration that the trade blocs that were formed Post World War I, had different political aims(all of which shared the goal of trying to curb intense global economic downturn) depending upon which major power

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[1]Chiţu et al. (2014) show the importance of a history effect in patterns of bilateral financial investment. The authors support the idea of a historical legacy effect, in which patterns of country holdings seven decades ago continue to impact current portfolios.

formulated them when specifying their gravity model. They find that, contrary to recent literature, none of the great power trading blocs affected trade in positively or negatively.

Brodzicki and Uminski (2018) include variables that account for the historical metropolis of Poland to understand foreign trade persistence and development. Using a PPML gravity model they find that there is evidence of trade flows being a function of the historical partitions and metropolises of Poland. Similarly, Stack et al. (2019) look at global trade flows of sugar and account for colonization's part in developing this market. In demonstrating that colonial ties dictate current global sugar trade, they show that the geographical direction those colonial ties originate from can have either positive or negative effects on growth and trade broadly.

1.2.2   The Gravity Model & Border Puzzle

Another key literature involves the "border puzzle": after controlling for distance, regions within countries trade much more with each other than do regions across countries (McCallum, 1995; Anderson and van Wincoop, 2003; Ishise and Matsuo, 2015). In order to fully understand this particular problem in the gravity trade literature, a discussion of the gravity trade model is needed.

The empirical framework for the gravity trade model was introduced in Tinbergen (1962). The gravity trade model uses the metaphor of Newton's Law of Gravity to explain trade flows. Specifically, the theoretical argument states that trade flows between any two locations are positively correlated with their combined GDP (analogous to size in the Newtonian model), and negatively correlated to distance between the two countries (which mirrors the distance between two physical particles in Newtons law).[2] After it's empirical formulation the gravity

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[2]Although it is undeniable that the empirical formulation of trade flows, distance, and GDP were first purposed by Tinbergen in 1962, there were similar models such as Savage and Deutsch (1960)'s probabilistic formulation, that were around at the same time. As to who first conceptualized employing the metaphor of Newton's Law to trade flows is a much more debated question. Elmslie (2018) makes a case that Adam Smith in the *Wealth Of Nations* used a gravity trade model framework in analyzing the gains from trade as

trade model quickly became "the most empirically successful" model in economics (Anderson and van Wincoop, 2003, p. 170).

Although successful, the gravity trade model suffered from a lack of theoretical grounding for it's formulation beyond the parallels to Newton's Law, which resulted in biased estimation results. This problem came to ahead in McCallum (1995), where the author estimated the trade flows of the United States and Canada via a gravity trade model. McCallum found that the presence of an international border between the two countries results in 2200% increase in intranational trade for Canadian Providences. The surprising result from McCallum begged the question of why it is that the presence of a border results in dramatic diversion between international trade and intranational trade. This result became known as the border puzzle.

The border puzzle compelled researchers in the literature to ask if borders do really produce such dramatic effects and/or if the underlying empirical model of gravity was flawed. Anderson and van Wincoop (2003) solved this puzzle by asserting two claims: (i) the gravity theory suffered from an omitted variable bias that the authors term as multilateral resistance terms (MRT) (ii) if one takes into account MRTs, then it is possible to construct a theoretically consistent and and free of bias model. What made Anderson and van Wincoop's MRT model innovative, by comparison to simple remoteness variables proposed by others in the literature, is that their variable decomposes trade resistances into their component parts.

Trade resistance, as argued by Anderson and van Wincoop, between any two countries (i and j) can be decomposed into three specific effects: (i) bilateral trade barriers between region i & j, (ii) i's resistance to trade with all regions in the world, and (iii) j's resistance to trade with all regions in the world. The previously proposed remoteness variables, Anderson and van Wincoop argue, only captures distance from bilateral trading partners (effect (i) from above), while the MRT capture all three affects. In applying MRT's understanding to their theoretical model they are able probe and empirically test three implications: (I) trade

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a function of trade volume.

barriers decrease trade more between large countries than small countries, (II) trade barriers increase trade within small countries more than large countries, and (III) trade barriers raise the ratio of trade within country 1 relative to trade between country 1 and 2 where the smaller country is 1. Mapping this to the United States and Canadian trade results from McCallum (1995), Anderson and van Wincoop show that researchers would observe a border effect (though not nearly as large as previously estimated) given testable implications (II) and (III).

Based on the results of Anderson and van Wincoop, researchers understand that borders pose a more nuanced effect on international trade flows. In thinking about our research question with the lenses of the border puzzle and historical effects on trade, we expect to find that the historical legacy of being a part of the ex-Soviet Union will be stronger than those of being a former member of Comecon, because within country exchange during the Soviet era would have been stronger than any international trade all else equal. The *a priori* prediction will be especially important for Russia and the other ex-Soviet countries since the Soviet Union pursued economic planning based on autarky until 1956 (Korbonski, 1970). This prediction is supported by the border effects literature.

1.2.3   Border Effects

The border effects literature seeks to exploit natural experiments of impact that the generation and disbandment of national borders have on trade flows. Border effects have been studied in a wide variety of settings that include, cultural identity (Falck et al., 2012), war (Che et al., 2015), and the reintegration of economies (Felbermayr and Gröschl, 2014; Nitsch and Wolf, 2013). Each study finds evidence of long term persistence. Regarding war, Che et al. (2015) study the impact of the Japanese invasion and 8-year occupation of China on current trade and other bilateral economic relationships. The authors exploit differences in the negative impact of the occupation on regions within China and find that a

1% decrease in their measure of intensity (civilian casualties) increases imports from China to Japan by 14.7% in 2001. Regarding the elimination of borders, Felbermayr and Gröschl (2014) find that by 1993, the historical border between the Confederate South and the North (the Mason-Dixon Line) reduced trade by 13% to 14%. However, some of this could be the result of endogeneity issues. Additionally, in a study that is similar to ours, Nitsch and Wolf (2013) argue that the reunification of Germany provides a natural experiment regarding the importance of previous borders. Even given the extraordinary resources devoted to ensure a rapid reunification, the authors find that it will take between 33 and 40 years for the impact of the previous border to be statistically eliminated.

Other studies that investigate the effects of history and borders on bilateral trade in terms of the disintegration of states, unions and trading blocs including the Soviet Union are Djankov and Freund (2002b,a); Fidrmuc and Fidrmuc (2003); De Sousa and Lamotte (2007). Djankov and Freund (2002b,a) use a gravity equation to examine trade flows among and between 9 Russian regions and 14 former USSR republics during the period of 1987-1996. They find that trade flows between Russian regions and former members of the Soviet Union were significantly impacted by past linkages. In the beginning of this period, the regions did not trade more with each other than they did with republics. In contrast, after the collapse of the Soviet Union, during the period 1994 to 1996, it is shown that Russian regions traded significantly more with each other than with former Soviet Union republics and that trade had been reoriented more within Russian regions. The result indicates that Russian regions tend to trade extensively with former members but over time there is an increasing home bias in Russia as well as in the new republics.

Djankov and Freund (2002b); ? find a classic border effect considering trade within and between regions of the Soviet Union. A limitation of their analysis deals with institutional legacy. The short-term data utilized in the studies (only 5 years after the collapse of the Soviet Union) does not allow for a longer term analysis of the hysteretic nature of the impact

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of past institutional trading arrangements on later trade flows.

Continuing with the investigation of border effects of Eastern Europe, Fidrmuc and Fidrmuc (2003) examine three disintegrated unions - Yugoslavia, Czechoslovakia, and the Soviet Union (represented by Russia, Ukraine and Belarus). To capture different trade relations in gravity equations, they include indicator variables for formal preferential trade areas, common border or language, and successor states of former federations in Europe, with data covering the period 1990 to 1998. The results suggest that the trade effects of former institutions decline rapidly over the 8 years, however, trade relations between former members remain significant to 1998. These results are inconsistent with previously mentioned work that finds strong persistence trade patterns after a political disintegration.

De Sousa and Lamotte (2007) attempt to determine why the legacy effects found by Fidrmuc and Fidrmuc (2003) dissipate quickly relative to other findings. Utilizing controls suggested by (Anderson and van Wincoop, 2003) and a 1993 to 2001 data set that includes all countries created by the political disintegration of the Soviet Union, Czechoslovakia and Yugoslavia, de Sousa and Lamotte find more persistence. The most persistence was found for the former Yugoslavian states. In 1993 the former Yugoslavian states traded 29 times more with each other than expected while the still traded 23 times more by 2001. The form Czechoslovakia states demonstrated the least persistence. The authors found that the results of Firdmuc and Firdmuc were biased by the limited number of former Soviet, Czechoslovakian and Yugoslavian states covered in their study, more than their lack of multilateral resistance controls.

One major difference between our study and those of Fidrmuc and Fidrmuc (2003) and De Sousa and Lamotte (2007), who also address the hysteresis question using ex-Soviet and ex-Soviet satellite countries, is in the general empirical strategy. We focus on Russia's trade legacy with its ex-Soviet and Comecon member states, while the other studies address legacy by analyzing the effect of begin a member of a formerly larger state in general. Firdmuc and

Firdmuc investigate if ex-Soviet, Czechoslovakian, and Yugoslavian states trade more with each other in general than would be predicted by gravity considerations alone. Complicating this question is nature in which goods flowed throughout the USSR and Comecon states. In his overview on trade of ex-soviet and Comecon states Pelzman states "the distortions created by intra-CMEA pricing policy, industrial specialization, and single minded dependence on the Soviet Union as the dominant market, resulted in the formation of industrial structures inappropriate to these economies."(Pelzman, 1991, p. 311)[3] In an earlier article Pelzman also points out that this distortion is not limited to Comecon-USSR trade flows, even trade within the USSR between Russia and the eastern republics was distorted for strategic reasons.(Pelzman, 1980) Trade was used as a tool of planning for the Soviet Union first and Comecon states second. As such much of the trade moved between the Comecon countries and Russia. Therefore, the trade links would be best established between Russia and these other states rather than between the states in general. Utilizing this theoretical strategy results in substantial differences between our results and those of De Sousa and Lamotte (2007).

The second contribution of this paper is that most of the literature finds that even though the trade impact of former institutions dissipate over time, overall trade patterns between former members of various trading and political institutions remain significant for long periods after the dissolution of the institutions. This paper expand on this literature by considering the development and break up of institutions that were developed independently from any trade-related rationale. The exogenous development of state borders and trade agreement provides a natural experiment from which to address the legacy question. Moreover, we add to the literature on the Soviet Union and its satellites by increasing the length of time in the study and using all ex-Soviet states and all Comecon member countries allowing for a comparison of borders effects and the effects of a trading union. This allows for an exam-

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[3]Note that CMEA stands for the Council for Mutual Economic Assistance also known as Comecon.

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ination of the institutional legacy of trade flows free of the question of the endogeneity of institutional development and allows us to estimate the half-life of the legacy effect.

Moreover, with the exception of De Sousa and Lamotte (2007), the above studies that focus on the breakup of the Soviet Union were conducted without controlling for multilateral resistance as well as utilizing a log-log specification of the gravity trade model. Anderson and van Wincoop (2003) demonstrates that significant bias is possible in estimates of border effects from traditional gravity models due to omitted variable bias and Silva and Tenreyro (2006) illustrate that not using a PPML specification injects bias into the coefficients of estimators. Our estimates are relatively consistence across regressions with and without controls. Our institutional decay measures, with controls, demonstrate somewhat more persistence than the improperly specified gravity model due to controlling for these potential model biasing errors.

1.3 The Soviet Union and Comecon as Natural Experiments

Can the Soviet Union and Comecon be considered as natural experiments for tests of the legacy effects of previous trading institutions? We argue in the affirmative since these institutions were founded for non-trade related reasons, and there is no evidence of strong trading relations between Russia and the other countries studied prior to the development of the Soviet Union or Comecon. Thus, from the point of view of the determinants of current trade flows they can be considered exogenous shocks.

1.3.1 Motivation to the Formation of the Soviet Union

The literature suggests that there were many reasons for the formation of the Soviet Union that began in 1922 with the unification of the Russian, Transcaucasian, Ukrainian, and Byelorussian republics, and by 1940 included 15 sub-national Soviet republics existing until 1991 (see Table 2.2 for a list of countries). In looking at maps of the former Czarist Russian Empire, one can see that no significant portion of USSR was not part of the Russian Czar regime. One could think of the unification of these nations with the Russian state is as if California broke off from the United States then was readmitted.

A fundamental factor driving the unification was ideology (Sherman, 1994). During the rule of Joseph Stalin, the most widely disseminated book known as "the Short Course" (C.P.S.U., ed, 1939), claims that the main goal of the formation of the USSR was the consolidation of the Soviet power and a victory for the working class. To construct socialism required "welding the Soviet republics closer together in a single federal state". (ibid) This rationale for the development of the Soviet Union is also supported in the work of Sakwa (1999). Furthermore, this ideology followed the idea that the removal of all the political differences and further consolidation of the members into the entirely cohesive Socialist state and society was meant as a strong counter balance to Western capitalism. The foundation of this effort was the elimination of nationalistic sentiments that could block the full development of worker solidarity. The communist ideology driving national decisions was prevalent well before Joseph Stalin.

In 1921, the Tenth Congress of the Revolutionary Communist Party (Bolsheviks) was held with the charge of determining "The Immediate Tasks of the Party in the National Question". The Commission was led by Vladimir Lenin and the report from the commission was developed by Joseph Stalin (Stalin, 1953). The report gives specificity to the ideology behind the planned development of the Soviet Union. It states, "history tells us that the only way to abolish national inequality, the only way to establish a regime of fraternal co-

operation between the laboring masses of the oppressed and non-oppressed nations, is to abolish capitalism and establish the Soviet system." (ibid, 38) Those in power in Soviet Russia believed that the state, if managed properly could be a vehicle to united the working masses. Further, in an effort for the state to manifest unification of the workers, leaders believed it needed to be a transnational mission.

In an interview with the Russian newspaper *Pravda*, number 261, on November 18, 1922, Stalin made this clear when he stated that, "the union of the Soviet republics in a single union state will undoubtedly create a form of all-round military and economic co-operation that will greatly facilitate the economic progress of the Soviet republics and convert them into a citadel against attacks by international capitalism." (ibid, 141) Thus by welding states together the Soviet government was strengthening the bonds between workers as a complete union of the proletariat via abolishing nationalist ties. "The state union of the individual Soviet republics was considered as the only way of salvation from imperialist bondage and national oppression" (Grosul, 2007, translation from Russian by S. Kuznetcova).

It goes without saying that the past cultural, economic, military, and historic linkages as well as external political reasons also played a role in the formation of the Union of Soviet Socialist Republics, but there is no evidence that direct trade-related rationales existed for the development of the Soviet Union. Trade statistics from the period leading to the Soviet Union back up this claim. From 1899 to 1913, no countries that would become part of the Union with Russia were listed among the top 18 import or export partners of Russia (Vyacheslav, 2011, 30).[4]

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[4]The original tables from 1915 are available as "Overview of Russia's Foreign Trade with European and Asian Borders in 1914," Tables 5 and 6 at http://istmat.info/node/213. Translation from Russian by S. Kuznetcova.

1.3.2 Formation of Comecon

The Council for Mutual Economic Assistance (CMEA) also referred to as Comecon, was the main trading bloc of the Soviet Union. Comecon was an economic organization that existed from 1949 to 1991 under the leadership of the Soviet Union and comprised the countries of the Eastern Block along with a number of socialist states elsewhere in the world (former members of Comecon are listed in Table 2.2). The official purpose of Comecon was to coordinate planning, promote country and regional specialization, increase trade among member states (Korbonski, 1970), and "to improve economic and military cooperation" (New York Times, 1988). Increased trade flows was among the motivations for the formation of Comecon, but this was not based on any pre-existing strong or rapidly increasing trade relations.

From 1926 to 1928, for example, Czechoslovakia (which in our listing of countries includes the Slovak Republic and the Czech Republic) accounted for only 4% of Soviet trade. No other Comecon country had large enough trade with the Soviet Union to be listed in the Soviet's own publication of economic statistics (Soviet Union Information Bureau, 1929). Moreover, between 1928 and 1938, Holzman (1976, 1985) reports that overall imports from Eastern Europe to the Soviet Union fell by about half, while exports from the Soviet Union to Eastern Europe fell by about one-quarter. As we move back in time to the period from 1899 to 1913, no Comecon country was a major exporter or importer of Russia. In 1913, for example, Austria-Hungary represented 4.3% of exports and 2.6% of imports with no significant trend from 1899. This was the largest representative of what would partly (as Hungary without Austria) become part of Comecon (Vyacheslav, 2011 and details from footnote 2).

The most direct reason for Comecon's development was ideological. Comecon was founded in response to the Marshall Plan "to reinforce the bonds between the Soviet Union and the "people's democracies" of Eastern Europe" Brine (1992). So, it can be considered as the so-

cialist alternative and reply to the formation of the Organization for European Cooperation in Western Europe. After World War II Comecon was seen as an effective instrument to spread communism to the countries of the Eastern European block with the USSR being the dominant member. (ibid.) Therefore, Comecon was formed mainly for reasons unconnected to previously strong or growing ties to trade. Even by 1956, six years after its formation in 1949, there was insignificant intra-Comecon trade (Korbonski, 1970, 957). The literature on the development and operation of Comecon demonstrates that it was a poorly designed and managed trading institution that resulted in little true trade creation and was mostly trade diverting (Zickel, ed, 1989; Pelzman, 1977; Holzman, 1985; Biessen, 1991). Additionally, and most importantly, Comecon was meant mainly as a control devise for the Soviet Union over Comecon members (Pelzman, 1977).

While Comecon had no initial economic advantages motivating its existence, it did succeed in dramatically increasing trade flows between members, creating new trade patterns (Hewett, 1976; Holzman, 1985; Pelzman, 1977). It was, therefore, successful in its efforts to promote trade and specialization through central planning (Biessen, 1991). For example, Hewett (1976), using a gravity approach finds that within Comecon trade was 20-times larger than it was predicted to be without the trading bloc. Additionally, (Zickel, ed, 1989, 601) reports that "in 1960 the Soviet Union sent 56% of its exports to and received 58% of its imports from Comecon members. From that time, the volume of this trade has steadily increased..."

Because both the Soviet Union and the Comecon were constructed for non-trade related reasons, they are good candidates to be considered as natural experiments for the determination of institutional legacy effects in trade flows. Since no evidence exists suggesting that pre-institutional trade flows were greater than would be expected by a gravity analysis, any lingering effects of these institutions on current trade flows can be attributed to legacy effects with a high degree of confidence.

1.4 Data

The data set developed in this paper is a panel of Post-USSR Russian imports from and exports to 108 countries for the 19-year period from 1998 to 2016. The choice of the countries for the empirical analysis (listed in the appendix Table 2.2) is based on the data availability for all variables and for all years.

The variables and data sources used to build the variables are listed in Table 2.1. The dependent variable is bilateral imports plus exports to and from Russia. To measure the trade flows between Russia and its trading partners, import and export figures were taken from the World Bank's World Tables at market prices in U.S. dollars. The trade data is then converted into constant chained 2005 dollars. Country-pairs are used to reflect the bilateral relationship between Russia and its trading partners. To estimate the volume of trade flows between Russia and its trading partners we use three "groups" of independent variables.

First, to predict bilateral trade flows we use the traditional gravity variables of economic size of the countries and distance the between them. To investigate the influence of an economy's size on trade, GDP measurements at market prices in U.S. dollars are also obtained from the World Bank database. Nominal GDP data is then converted into constant chained 2005 dollars. The distance variable is the distance between Moscow and the capital city of Russia's trading partner measured in kilometers, and was generated using online maps. All standard gravity variables are estimated in terms of natural logarithms. Based on the theoretical foundation of the gravity equation, it is expected that greater distance between trading partners reduces the volume of trade and that countries with higher levels of income tend to trade more with Russia.

Second, to follow the historical patterns of trade between Russia and its trading partners we include two indicator variables. The first variable indicates if the country was a member of the Soviet Union (1 for former members and 0 otherwise). The second variable defines if

the country was a non-Soviet part of a trading block Comecon (1 for former members and 0 otherwise).[5] This variable excludes countries of the Soviet Union to avoid strong collinearity with the USSR indicator variable. Given the discussion in the previous section we expect these variables to be exogenous. Both the Soviet Union and Comecon were constructed for ideological rather trade-related reasons. The inclusion of these two indicator variables in the gravity model, enables us to compare two effects of disintegration: the border effect (the absence of borders in the USSR) and the effect of a trading agreement (Comecon membership). The long-term nature of the data also allows us to observe the change in these effects over time.

Another variable often used in this type of study is a measure of linguistic distance (Fidrmuc and Fidrmuc, 2003; Hutchinson, 2005). In our case, however, there is a high correlation between linguistic similarity and the makeup of the ex-Soviet states. Therefore, for completeness, we chose another widely utilized variable in these studies, that of economic/political freedom (e.g. Depken and Sonora, 2005; Sonora, 2014; Wall, 1999). Our measure is the Index of Economic Freedom provided by the Heritage Foundation. This index combines ten measures of economic freedom into a single composite index. Measures of freedom represent various quantitative and qualitative factors in business, labor, monetary, trade, investment, and financial freedoms, as well as legislative factors such as freedom from corruption, fiscal freedom, property rights enforcement, and government spending. The index rates countries on a scale of one to five, where numerical scores correspond respectively to the level of economic freedom of a country represented as repressed; mostly unfree; moderately free; mostly free; and free. Lower index numbers represent lower levels of economic freedom of a country. This index allows for the examination of not only trade freedom of countries but to determine

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[5]Although Comecon is treated as a uniform organization, in truth there was some heterogeneity even in active members. For example, Albania was an official member, but it stopped active participation in the Comecon starting in 1961, while Cuba and Vietnam only joined in 1970. This paper has altered the indicator variable, to reflect this non-uniformity and found it does not change the results in significant ways.

the overall degree of countries' openness for trade flows. While potentially of interest in its own right, for our present purposes, the variable is used as an additional control and is not highlighted. The results are similar when the variable is excluded from the analysis.

1.5 Methodology and Empirical Analysis

In order to examine the effects of hysteresis on bilateral trade flows between Russia and its trading partners, a traditional gravity model is employed. As stated earlier, the basic gravity trade model relates trade flows to GDP and distance between trading partners. We are arguing that a well-specified gravity trade model needs to take historical institutions into account, and must be altered to include variables that account for hysteresis, border effects, and a PPML estimation method. In order to achieve this goal, this paper employs three functional forms of estimation. Before discussing the three different model specifications it is worth while to discuss why a PPML estimation was chosen.

The reason for the employment of the PPML model specification is that it solves two innate problems of the gravity trade model. First, the PPML solves the problem of zero values in trade flows, as the natural log of zero is undefined. The literature has traditionally solved this by either dropping zero observations, or by adding some extremely small value to the non-existent trade flows to allow for estimation. By using a PPML specification we can include zero values without injecting bias into the results. The second reason for employing a PPML is that it solves a much more pressing issue, heteroskedasticity in trade data. As Silva and Tenreyro (2006) makes clear, when the data is heteroskedastic a log-linearization of the model will result in biased and inconsistent results. This is true irrespective of the application of MLR terms. The authors demonstrate that heteroskedasticity results as a function of Jensen's inequality and "the expected value of the logarithm of random variable depends on higher-order moments of its distribution. Therefore, if the errors are heteroskedastic,

the transformed errors will be generally correlated with the covariates." (ibid, p. 653) Given their findings, Silva and Tenreyro advocate for the use of PPML model specification to solve both the zero trade-flows and heteroskedasticity in trade data.

Following Silva and Tenreyro's advice,[6] we employ a PPML specification with a panel of total trade volume over all the years of the data set, taking the functional form of:

$$T_{iR,t} = exp\big[\beta_1 lnGDP_{i,t} + \beta2lnDist_{iR} + \beta_3 USSR \cdot t + \beta_4 Comecon \cdot t + \beta_5 F_{i,t} +$$
$$\beta_6 CNTG + \beta_7 lnMLR_{exp,t} + \beta_8 lnMLR_{imp,t}\big] * \varepsilon_{iR,t} \quad (1.1)$$

The dependent variable $T_{iR,t}$ is the total volume of trade that combines exports and imports between country i and Russia at each year interval. The standard gravity predictor variables are each ith country's real GDP (GDP_i) and the distance between Moscow and the capital of Russia's trading partner ($Dist_{iR}$). There are two hysteresis variables which are interacted with a year indicator variable, *USSR* and *Comecon.* The reason for this interacted variable is that the indicator variables of *USSR* and *Comecon* are constant over time, but performing cross-sectional analysis reveals the effects of these variables are changing over time. Therefore, the interacted variables will allow for the change of the effects over time. The $F_{i,t}$ variable is the Index of Economic Freedom of trading partners of Russia. The variable *CNTG* is also an indicator variable to control for countries that have a contiguous border with Russia. Lastly *MLR* terms are reduced form multilateral resistance terms and ε_i is the error term. The purpose of the first regression is to test out the validity of the impact of the hysteresis and robustness of using a gravity specification in this manner. The results are reported in Table 2.6 and will be discussed below.

Before moving to the second functional form, it is worth discussing the empirical con-

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[6]In addition to the case made in their paper, Xiong and Chen (2014) show that PPML and not other proposed models such as a Tobit or Heckman model result in the best possible estimations of the gravity model.

struction of the *MLR* variables throughout all the of the estimations. As was discussed in the boarder puzzle section, multilateral resistance terms are a theoretical construct, and as such must be generated. The original MRT's described in Anderson and van Wincoop (2003) were a custom non-linear least squares program that generated values of the MRT after repeated simulations until convergence. Luckily the broader literature has developed two easily deployable empirical solutions to construct MRT for researchers (Yotov et al., 2016).

The first empirical solution is referred to as a "remoteness index," and is what is employed under the both specifications. The remoteness index is a reduced form of the custom built MRT's that Anderson and van Winkoop introduced. These remoteness indexes are output and expenditure weighted averages of bilateral distance. They are constructed via the following two equations:

$$REM\ EXP_{i,t} = \left[\Sigma_j Dist_{ij} / \frac{E_{j,t}}{Y_t} \right] \tag{1.2}$$

$$REM\ IMP_{j,t} = \left[\Sigma_i Dist_{ij} / \frac{Y_{i,t}}{Y_t} \right] \tag{1.3}$$

Where $E_{j,t}$ is the value of importer expenditure, obtained by summing up the value of all trade exported by country j in year t. Similarly, $Y_{i,t}$ is the value of exporter output by country i in year t. In equation (2.3), the variable Y_t is sum of all $E_{j,t}$ in a year then utilizing the max value of that year. Conversely, in equation (2.4), Y_t represents sum of all $Y_{j,t}$ in a year then utilizing the max value of that year.

The second empirical way to obtain *MLR* terms is via exporter(and importer) paired-time fixed effects variables, where an indicator variable is created for when country i trades with country j in time t. These fixed effects capture the "special" underlying factors that resulted in these two countries trading in this particular time. The problem with deploying this solution with our data is that all trade is to and from Russia, thus creating indicator

variables that are multicollinear and will absorb all variation in the data.

Given our interest in the time-trend effect of the *USSR* and *Comecon* variables, we employed the PPML specification with a year-by-year regression, which takes the functional form of:

$$T_{iR,t} = exp\big[\beta_1 lnGDP_{i,t} + \beta_2 lnDist_{iR} + \beta_3 USSR + \beta_4 Comecon + \beta_5 F_{i,t} +$$

$$\beta_6 CNTG + \beta_7 lnMLR_{exp,t} + \beta_8 lnMLR_{imp,t}\big] * \varepsilon_{iR,t} \quad (1.4)$$

This model is similar to specification (2.6), with one notable difference, our hysteresis dummies are no longer interacted with time. Under specification (2.7), a regression is run for each year, as such, interacting the indicator variables with a time variable would not have an econometric impact. The results from this specification can be found on Table 2.7 in the appendix.

Finally, we altered specification (2.7) and experimented with regressions at multiple year intervals (i.e. 5 year, 4 year, 3 year, etc.). Multiple year interval regressions were also performed to overcome a common issue in the gravity trade literature, specifically how to adjust to trade policy changes over the time of the data. If there is dramatic changes to a trade policy from year 1 to year 2, then it will likely generate influential outlier data points depending the total span of the data. A simple solution to the policy change issue is to use panel data over multiple year intervals (Yotov et al., 2016). Since the regressions are over multiple years the hysteresis dummies are again interacted with a time indicator variable. Reproduced below, in Table 2.8, are the results from a 3-year interval specification. The results are consistent whether looking at 2, 3, 4, or 5 year intervals. Three years was chosen because it showed the smoothest paths of our variables of interest.

1.6 Results

Beginning first with the panel of all the years (Table 2.6), we note that the coefficients represent the average impact of each variable on Russia's trade volume. Looking at the results we see that GDP, distance, and contiguous borders all have the expected signs and are statistically significant at the highest levels, while economic freedom is negative and insignificant. Excluding the statistical significance, the negative coefficient is somewhat unexpected given that economic freedoms increase as the variable increases, indicating more economic openness which should result in more increased trade. The indicator variable for USSR and Comecon in the aggregated data are time interacted indicators, meaning that the coefficients need to be interpreted with care as they represent an average effect of the previous institution on trade for 1/19 of the overall panel, given that there are 19 years in the data. The difficulties associated with interpreting an indicator variable that is mostly decreasing over time means that we will comment only on the variables in the year-by-year results. The important take away from this model with regards to our historical institution variables is that they are positive and statistically significant, meaning that it is clear these historical institutions are impacting current day trade flows to and from Russia.

Table 2.7 breaks the data by year and reports results from the yearly regressions. Note that the coefficients on *GDP* are stable and consistent with expectations, while distance is negative it oscillates being statistically significant. The variable for economic freedom displays a lot of "noise" due to it oscillating signs and not being statistically significant. In contrast to economic freedom, contiguous boarders are constantly positive with only a few years retaining any statistical significance.

The coefficient on our main variables of interest (*USSR* and *Comecon*) are also stable and declining over time as expected from the general literature on the legacy effects of trading institutions. However, the coefficients on distance and economic freedom vary widely from

year to year indicating a substantial amount of noise in the yearly data. This is common in the trade gravity literature (Yotov et al., 2016). To diminish the impact of these year-to-year variations, a standard practice is to create multi-year panels (ibid). We did multi-year panels with 2, 3, 4, and 5 year periods. The results are consistent across all panels. We chose to report the 3-year panel estimates given that it allows for the use of all years except for 2016 and the coefficients on distance are more stable than with the 2-year panel. In these panels, we utilize a time control that allows for the stacking of the data when utilizing an indicator variable.

Turning to the 3-year panel in Table 2.8, it shows that Russia trades more with larger countries and less with countries that are geographically further away, as expected. Further contiguous borders are positive and statistically significant, at varying levels, throughout all of the 3-year intervals. Interestingly, the economic freedom variable is negative and not statistically different from zero in all the panels. While no evidence of collinearity problems with the multilateral resistance variables exists, the result should be interpreted with caution since trade freedom makes up part of each county's score on the index.

Our main variables of interest are the indicator variables for the USSR and Comecon. The coefficients demonstrate strong and significant positive effects on Russia's trade with former members of the USSR and Comecon across all specifications and models. To interpret the importance of these variables, we must look to the yearly regressions under the PPML specification. Referring to Table 2.7, the coefficients on *USSR* and *Comecon* respectively for 1998 are 2.263 and 0.843. These coefficients indicate that Russia traded approximately 8.611 times ($e^{\beta} - 1$) more than expectation based on country GDPs and distance from Russia with former Soviet countries and approximately 1.32 times more with ex-Comecon countries than expected.[7]

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[7]Note that this Comecon estimate is in line with the result found by Hewett (1976) in 1970. He found that membership in Comecon increased trade compared with gravity expectations by 200% in gravity estimates that did not utilize proper controls thus biasing his results.

Looking across the Table 2.7 from 1998 to 2016, a consistent pattern occurs on the relative magnitude of the legacy impacts of membership in the Soviet Union versus Comecon. The effect is about twice as large for ex-Soviet countries. To help aid in examining the pattern, a plot of the coefficients and confidence intervals of both of the variables can be found in Figure 1.1. The coefficients have been put into percentage impact upon total trade form. Looking at this figure it is clear that there is a monotonically decreasing to zero patter, in both variables though, it is much stronger in the *USSR* variable. Further, we can see that *Comecon* is much more impacted by the statistical "noise" that comes from doing a year-by-year specification. Irrespective, it is clear that impact of the institutions are decreasing as we move away from the initial dissolution of the USSR and Comecon.

Turning to the 3-year panel results (Table 2.8), we see that our institution indicators are a lot more stable. Specifically, the coefficients on the *USSR* are still statistical significant at the highest levels and *Comecon* stays statistically significant for longer. Further in looking at the plot for the coefficients (Figure 1.2) the pattern of monotonically decreasing is much more evident. It is clear from the 3-year panel that the noise present from the previous specifications is smoothed out, showing that the impact of previous institutions decays and trends towards zero as we move forward in time.

The pattern of results on our institutional variables is consistent with existing literature and the estimation of the border effect by Anderson and van Wincoop (2003) and others. Borders significantly impede trade. While intra-Soviet trade statistics are not available, it is reasonable to assume that intra-Soviet regional trade was stronger (controlling for gravity variables) than it would have been for trade between the Soviet Union and Comecon member states(Pelzman, 1980). Given that stronger trade ties would have been created for regions within the Soviet Union, the legacy impact is expected to be stronger.

As figure 1.2 illustrates, institutional legacy effects ex-USSR and ex-Comecon states differently. Although both *USSR* and *Comecon* are positive and decaying monotonically, the

institutional legacy of being a former member of the USSR is decaying much more rapidly. Utilizing the coefficients in 1998 and 2016 and the 19 year time period, we can estimate a "back of the envelope" figure which describes the "decay" of these historical institutions. We find that the institutional impact of being a member of the ex-Soviet Union to decay by half in 18.07 years while the impact of the institution of being a Comecon member state decays by half in 11.31 years. This measure takes into account only the magnitude of the coefficient and the rate of decline. Analyzing the magnitude of the institutional impact over time we find that over the 19 year period the impact of being a former member-state of the Soviet Union resulted in Russia trading with its other member-states, 8.611 times more in 1998 and 1.98 times more in 2016. For ex-Comecon, Russia traded 1.32 times more than expected by trade gravity in 1998 and 0.3 times more by 2016. Of course the exact numbers change depending on the end year selected, but the main pattern is consistent for the institutional decay calculations across years.[8]

The main result from the empirical work is that trade patterns developed during previous institutions impact the volume of trade in a manner that demonstrates strong persistence. Twenty-six years after the collapse of the Soviet Union and Comecon trade flows between former members remain significantly greater than gravity alone predicts because of the historical patterns established in the past. Our results show substantially longer persistence than is found by De Sousa and Lamotte (2007). By 1998, the beginning year of our study, they find that ex-Soviet states trade about 7.5 times more with each other than expected, while we show that Russia traded about 8.611 times more than expected based on trade gravity. This difference is most likely explained by the difference of our empirical strategy. Sousa and Lamotte ask, how much more are ex-Soviet countries trading with each other. But during the Soviet era, a large share of trade moved thorough Russia. Russia was the

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[8]For example, utilizing the same initial year of 1998, the USSR (Comecon) institutional decay estimates are 16.05 (11.16), 16.56 (9.41) for the years 1998 to 2013 and 1998 to 2014 respectively.

trade center of gravity around which the bulk of trade flowed. This is true for the satellite states in Comecon as well. Thus, the expectation is that the legacy effects are larger for trade between Russian and ex-Soviet and ex-Comecon states than between those states in general.

1.7 Conclusion

This paper examines the effect of historical legacy of previous institutions on the volume of Russia's bilateral trade using the gravity model approach. The effects of historical legacy are represented by the former membership of the Soviet Union and trading agreement Comecon. We reach the following conclusions.

First, the results indicate that we cannot fully understand bilateral trade flows without considering the impact of past institutional trading arrangements. The effects of historical legacy of the Soviet Union and Comecon are still impacting Russia's bilateral trade flows even 26 years after their respective collapse. In other words this finding suggests that former networks persist, overlap new borders and encourage trade between successor states.

Second, consistent with expectations and all other studies of the legacy effects of trading institutions, we find declining trends in trade intensity between Russia and the former members of the USSR and Comecon. These findings are consistent with the results of Fidrmuc and Fidrmuc (2003); De Sousa and Lamotte (2007). Institutional disintegration does not lead to an immediate trade disintegration.

We also find that the effect of the membership of the Soviet Union is stronger than the effect of Comecon, most likely because of the impacts of borders on trade. The absence of borders in the past between former members of the Soviet Union established strong trade patterns that hold even today. The strength of this conclusion is demonstrated by both the steeper slope of a plot of the coefficients for *USSR* and *Comecon*, as well as a back of the

envelope "decay" calculation. We find that the legacy decay for the impact of the previous institution on trade is 18 years for the USSR and 11 years for Comecon.

This paper provides the first estimates of the persistence of the legacy effect on trade flows generated by former trading institutions. We demonstrate this both via our figures of the coefficients and our institutional decay measure. Our institutional decay measure estimates indicate that former trading arrangements cast a long shadow on current trade relations. Much as (Krugman, 1987, 47) described, trade patterns are like rivers; once established, even if by purely institutional arrangements, the path becomes self-reinforcing as the flows dig their path deeper and deeper.

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1.9 Tables & Figures

Table 1.1: List of Countries

Albania**	Denmark	Kazakhstan*	Romania**
Algeria	Dominican Republic	Kenya	Rwanda
Argentina	Ecuador	Korea Rep.	Saudi Arabia
Armenia*	Egypt, Arab Rep.	Kyrgyz Republic*	Senegal
Austria	El Salvador	Lao PDR	Singapore
Azerbaijan*	Estonia*	Latvia*	Slovak Republic**
Bangladesh	Ethiopia	Lebanon	Slovenia
Belarus*	Finland	Lithuania*	Spain
Belgium-Luxembourg	France	Malaysia	Sri Lanka
Belize	Georgia*	Malta	Sweden
Bolivia	Germany	Mexico	Switzerland
Bosnia and Herzegovina	Ghana	Moldova*	Tajikistan*
Brazil	Greece	Mongolia**	Tanzania
Bulgaria**	Guatemala	Morocco	Thailand
Cambodia	Guinea	Nepal	Tunisia
Cameroon	Honduras	Netherlands	Turkey
Canada	Hong Kong, China	New Zealand	Turkmenistan*
Chile	Hungary**	Nicaragua	Uganda
China	Iceland	Nigeria	Ukraine*
Colombia	India	Norway	United Arab Emirates
Congo, Rep.	Indonesia	Oman	United Kingdom
Costa Rica	Iran, Islamic Rep.	Pakistan	United States
Cote d'Ivoire	Ireland	Panama	Uruguay
Croatia	Israel	Peru	Uzbekistan*
Cuba**	Italy	Philippines	Venezuela
Cyprus	Japan	Poland**	Vietnam**
Czech Republic**	Jordan	Portugal	Zambia

Note: * indicates former members of the Soviet Union, ** indicates former members of Comecon

Table 1.2: Measurement and Data Sources

	Description	Measurement	The Source
$T_{R,i}$	The bilateral trade flows: Exports (X) & Imports (M) between Russia & country i	Chained 2005 thousand dollars	The World Bank
GDP_i	Country i's real GDP	Chained 2005 dollars	The World Bank
$Dist_{R,i}$	The distance between Moscow & the capital city of the trading partner	Kilometers	Online maps
F_i	The Index of Economic Freedom 1–Repressed 2–Mostly unfree 3-Moderately free 4-Mostly free 5-Free	Scale of 1 to 5	The Heritage Foundation
$USSR$	Indicator variable: former members of the Soviet Union. These members are: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan	1–if former member of the Soviet Union 0-otherwise	
$Comecon$	Indicator variable:former members of Comecon. They are: Albania, Bulgaria, Cuba, Czech Republic, Hungary, Mongolia, Poland, Romania, Slovak Republic, Vietna*	1-if former member of Comecon 0-otherwise	

*Soviet Union countries are excluded from because of the existence of USSR indicator.

Table 1.3: PPML Panel Results Covering 1998 to 2016

	All Years
Log of GDP	0.804***
	(0.0164)
USSR Membership	0.0794***
	(0.00567)
Comecon Membership	0.0247***
	(0.00556)
Log of Distance	-0.861***
	(0.0427)
Economic Freedom Index	-0.00106
	(0.0291)
Contiguous Borders	0.595***
	(0.0762)
Exporter Remoteness Index	-0.0279
	(0.0200)
Importer Remoteness Index	-0.0546**
	(0.0172)
Constant	1.199
	(0.685)
Observations	4104
R^2	0.473

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.4: PPML Results by Year

	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Log of GDP	0.833***	0.811***	0.785***	0.806***	0.769***	0.751***	0.764***	0.773***	0.817***	0.816***	0.887***	0.874***	0.838***	0.848***	0.834***	0.806***	0.810***	0.810***	0.822***
	(0.0394)	(0.0364)	(0.0551)	(0.0505)	(0.0477)	(0.0715)	(0.0707)	(0.0632)	(0.0628)	(0.0666)	(0.0615)	(0.0543)	(0.0567)	(0.0543)	(0.0581)	(0.0589)	(0.0585)	(0.0555)	(0.0493)
USSR Indicator Variable	2.263***	2.035***	1.923***	1.749***	1.532***	1.309***	1.337***	1.247***	1.202***	1.253***	1.229***	1.187***	1.139***	1.205***	1.151***	1.134***	1.111***	1.137***	1.092***
	(0.285)	(0.295)	(0.352)	(0.309)	(0.319)	(0.321)	(0.316)	(0.324)	(0.323)	(0.322)	(0.323)	(0.296)	(0.324)	(0.297)	(0.322)	(0.318)	(0.325)	(0.319)	(0.301)
Comecon Indicator Varible	0.843***	0.738**	0.752***	0.696**	0.508*	0.366	0.276	0.428	0.405	0.334	0.513*	0.359	0.327	0.375	0.334	0.312	0.214	0.198	0.263
	(0.223)	(0.246)	(0.240)	(0.241)	(0.241)	(0.245)	(0.235)	(0.221)	(0.256)	(0.234)	(0.244)	(0.218)	(0.256)	(0.246)	(0.270)	(0.248)	(0.262)	(0.267)	(0.250)
Log of Distance	-0.897	-0.490	-0.187	-0.914	-12.29	-1.112	-1.133*	-6.226	-3.567	-24.43*	-4.765**	-8.513**	-2.182*	-4.621	-1.965*	-6.049	-3.543	-1.464*	-1.690**
	(0.731)	(0.806)	(1.131)	(1.414)	(21.85)	(0.843)	(0.547)	(4.563)	(29.01)	(11.64)	(1.450)	(2.987)	(0.923)	(3.109)	(0.865)	(4.698)	(2.269)	(0.584)	(0.542)
Economic Freedom Index	-0.00481	0.0556	0.0164	-0.0240	0.00974	-0.0489	-0.0397	0.0535	-0.0307	-0.0469	-0.112	-0.106	-0.0216	-0.0504	0.00503	0.0493	0.0599	0.00167	-0.0593
	(0.0749)	(0.0944)	(0.0991)	(0.0808)	(0.0848)	(0.106)	(0.116)	(0.136)	(0.0904)	(0.102)	(0.0987)	(0.0807)	(0.0902)	(0.0831)	(0.100)	(0.0878)	(0.0913)	(0.0869)	(0.0779)
Contiguous Borders	0.182	0.267	0.245	0.304	0.373	0.390	0.337	0.286	0.248	0.311	0.220	0.242	0.468	0.517*	0.481*	0.538*	0.566*	0.593**	0.528*
	(0.224)	(0.260)	(0.284)	(0.258)	(0.258)	(0.250)	(0.234)	(0.245)	(0.234)	(0.227)	(0.227)	(0.206)	(0.263)	(0.214)	(0.232)	(0.239)	(0.240)	(0.222)	(0.209)
Exporter Remoteness Index	0.0517	-0.447	-0.802	0.00838	11.32	0.200	0.197	5.390	2.552	23.70*	4.019**	7.749*	1.457	3.900	1.261	5.382	2.919	0.937	1.143
	(0.848)	(0.929)	(1.239)	(1.509)	(21.76)	(0.930)	(0.640)	(4.666)	(28.96)	(11.74)	(1.554)	(3.062)	(1.033)	(3.206)	(0.953)	(4.788)	(2.344)	(0.655)	(0.641)
Importer Remoteness Index	0.0149	-0.404	-0.734	-0.0404	11.37	0.122	0.105	5.122	2.513	23.33*	3.547*	7.334*	1.158	3.660	0.994	5.151	2.653	0.635	0.777
	(0.661)	(0.741)	(1.041)	(1.324)	(21.93)	(0.753)	(0.458)	(4.479)	(29.03)	(11.57)	(1.385)	(2.911)	(0.838)	(3.027)	(0.768)	(4.604)	(2.152)	(0.463)	(0.448)
Constant	-2.712	9.344	19.43	-0.137	-298.4	-2.821	-2.642	-132.9	-64.53	-585.7*	-94.58*	-185.4*	-34.09	-99.49	-28.62	-127.6	-68.00	-21.39	-26.43
	(19.11)	(21.15)	(29.22)	(35.49)	(575.8)	(22.77)	(15.91)	(116.6)	(750.0)	(290.7)	(36.87)	(73.23)	(24.33)	(81.39)	(21.36)	(113.0)	(53.59)	(13.65)	(14.23)
Observations	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216	216
R^2	0.791	0.795	0.763	0.772	0.710	0.714	0.681	0.637	0.612	0.559	0.614	0.627	0.517	0.592	0.515	0.536	0.523	0.568	0.683

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.5: PPML Three Year Panel Results

	98-00	01-03	04-06	07-09	10-12	13-15
Log of GDP	0.735***	0.765***	0.785***	0.864***	0.844***	0.804***
	(0.0315)	(0.0355)	(0.0382)	(0.0374)	(0.0328)	(0.0356)
USSR Membership	0.554***	0.269***	0.153***	0.108***	0.0837***	0.0632***
	(0.0829)	(0.0345)	(0.0220)	(0.0177)	(0.0131)	(0.0117)
Comecon Membership	0.175*	0.0874**	0.0493**	0.0339*	0.0250*	0.0120
	(0.0701)	(0.0273)	(0.0172)	(0.0142)	(0.0110)	(0.00990)
Log of Distance	-0.988***	-0.955***	-0.994***	-1.017***	-0.868***	-0.737***
	(0.152)	(0.0871)	(0.0908)	(0.159)	(0.106)	(0.101)
Economic Freedom Index	-0.0568	-0.0374	0.0176	-0.0807	-0.0252	0.0362
	(0.0596)	(0.0541)	(0.0640)	(0.0601)	(0.0540)	(0.0548)
Contiguous Borders	0.483***	0.399**	0.313*	0.294	0.495***	0.581***
	(0.135)	(0.147)	(0.146)	(0.156)	(0.147)	(0.155)
Exporter Remoteness Index	0.0776	0.0293	0.00585	0.0294	0.00850	-0.0308
	(0.144)	(0.0386)	(0.0256)	(0.160)	(0.0861)	(0.0527)
Importer Remoteness Index	0.0200	-0.0175	-0.0389	-0.00371	-0.0149	-0.0525
	(0.116)	(0.0344)	(0.0215)	(0.152)	(0.0743)	(0.0421)
Constant	0.316	0.759	1.783	-0.460	-0.645	0.283
	(3.460)	(1.373)	(1.237)	(4.316)	(2.408)	(1.370)
Observations	648	648	648	648	648	648
R^2	0.705	0.717	0.610	0.560	0.531	0.499

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1.1: Coefficients & Confidence Intervals for Year-by-Year Panel Regressions
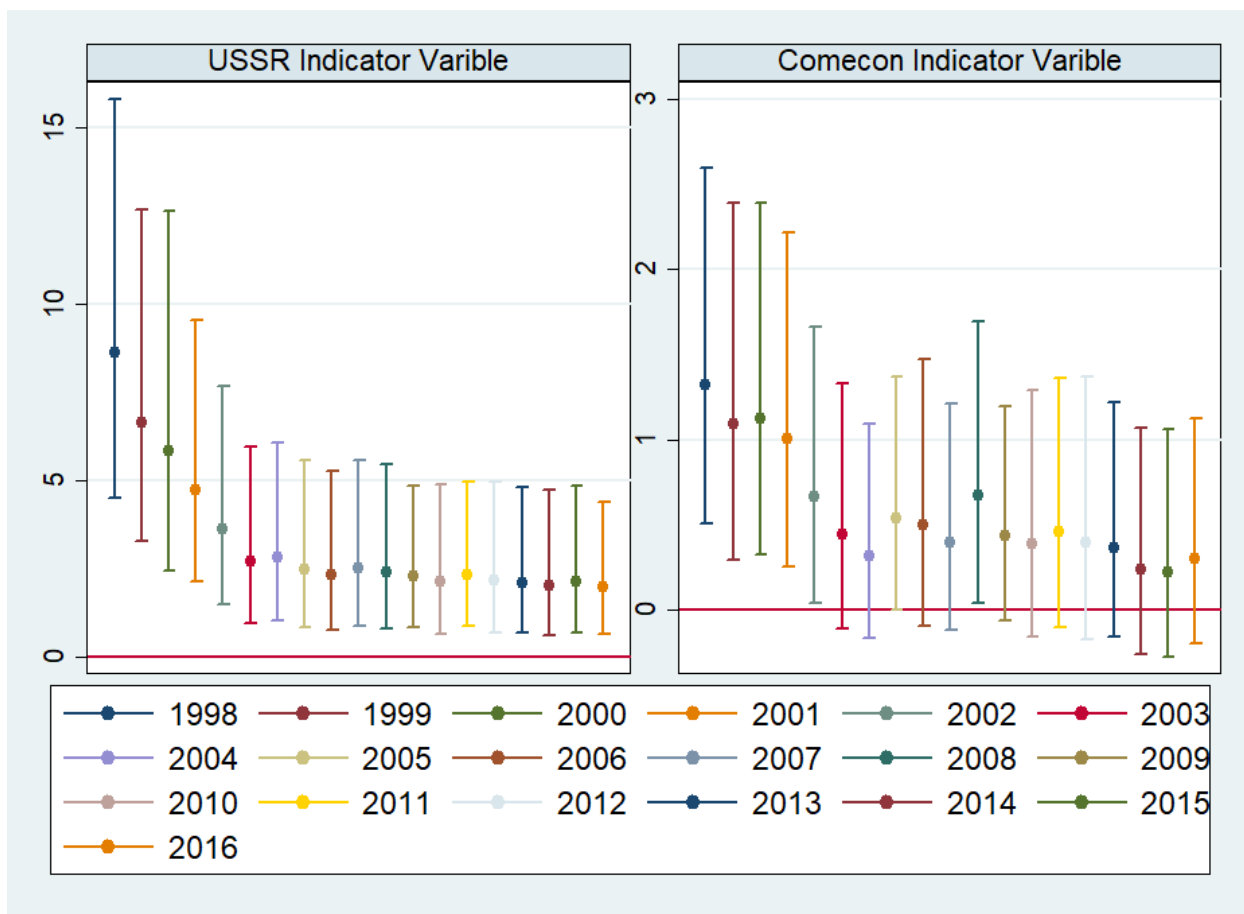
Figure 1.2: Coefficients & Confidence Intervals for Three-Year Panel Regressions
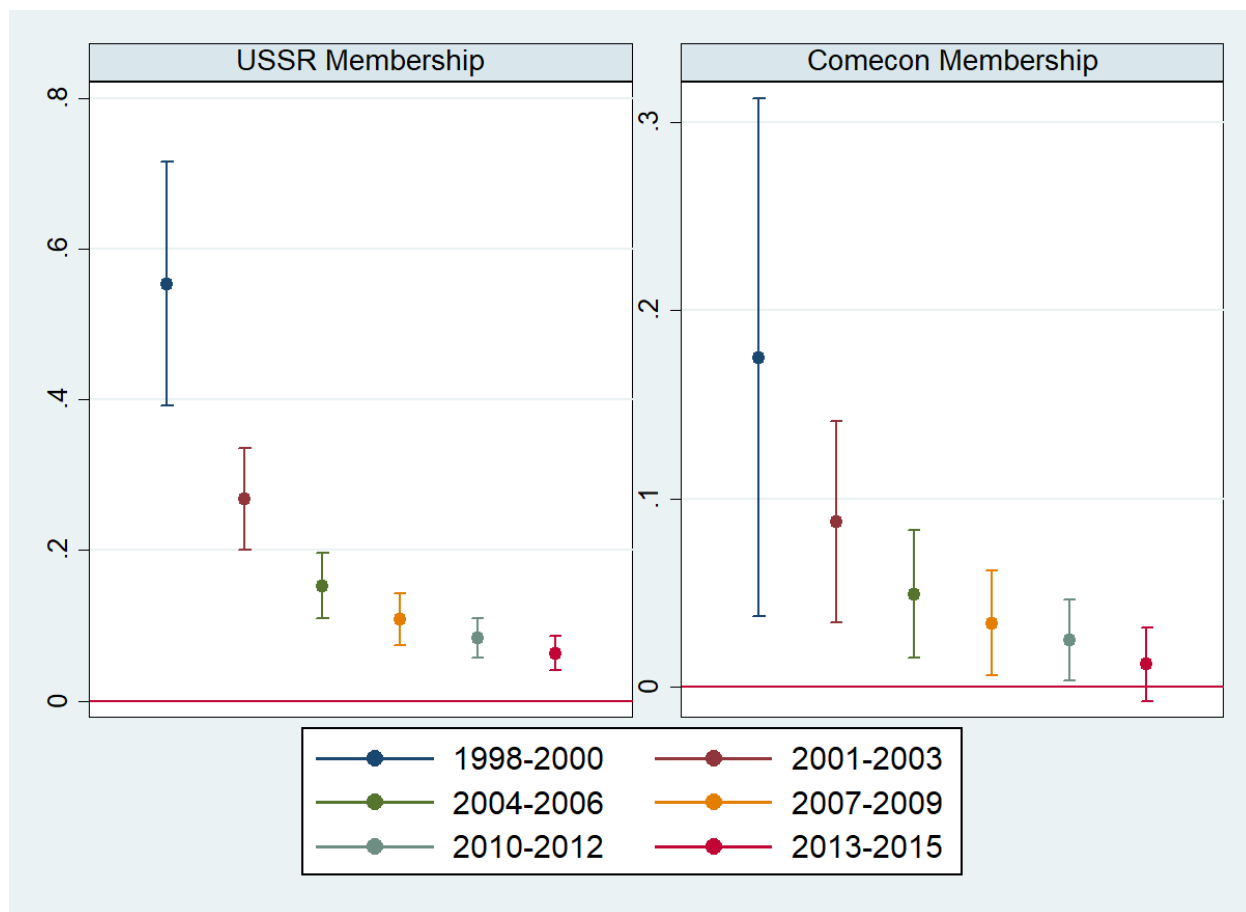
Chapter 2

Russia, Intra-Industry Trade, and Historical Institutions

by

Travis Freidman

Abstract:

This paper is the first of it's kind to examine how components of Intra-Industry Trade (IIT) are impacted by historical trading institutions. *Utilizing* a Kandogan decomposition system of equations of IIT and a Poisson Pseudo-Maximum Likelihood (PPML) gravity trade model to show the decay path of historical institutions of trade flows between Russia and 183 countries from 1996-2018. In understanding the long reaching effects of the historical USSR border and Comecon trading bloc, this paper finds that all components of IIT are positively impacted by the historical trading institutions. In particular this paper find that Vertical Intra-Industry Trade (VIIT) shows signs of the impact of these institutions decaying in a monotonic fashion, while Horizontal Intra-Industry Trade (HIIT) indicates that the effect of historical institutions is much longer.

2.1 Introduction

Institutions have been shown to be important in understanding economic growth outcomes (Acemoglu et al., 2005). Further, there has been much agreement in the literature that international trade also generates institutions worth studying, notably formalized by Eichengreen and Irwin (1995). This paper in particular is interested in studying the impact of previous trade institutions and international borders on past institutional trade patterns. The specific focus is not only on historical trade institutions' creation, but also on their dissolving, and how those impacts ripple out through time. This paper has chosen to look at current day Russia trade flows to understand the impact of the dissolving of the USSR border and Comecon Trading bloc.

Besides having two trading institutions originate and dissolve in less than 100 year period, studying Russia allows this paper to avoid the endogeneity issues innate to historical trading institutions research (Barro and Tenreyro, 2007; Wolf and Ritschl, 2011). The creation of the USSR and Comecon were, as Freidman et al. (2020) and others have argued, created exogenous to trade flows. The result of USSR and Comecon's exogeneity allows for the study of the impact of historical trade institutions without fear of endogeneity of the dependent and variables measuring historical institutions.

Although previous studies such as Djankov and Freund (2002a,b), Fidrmuc and Fidrmuc (2003), and De Sousa and Lamotte (2007) have utilized Russia to study and demonstrate the impact of USSR border and/or Comecon on modern day trade flow, these authors were never able to demonstrate exactly at how these institutions decayed over time. Freidman et al. (2020) built off this previous literature by examining more countries over a longer time frame with a well-specified gravity trade model. Freidman et al. was able to show two important results. First, that the historical institutions of the USSR border and Comecon were still impacting current day trade flows. Second, they were able to visualize how these historical

institutions decay over time. Their work showed both historical institutions decayed in a monotonic fashion, and that historical borders exert a stronger and longer lasting impact on modern day trade flows.

While Freidman et al. showed how historical institutions decay over time, a limitation of that study was that it only focused on total trade. Thus, the central question of this paper is to ask, are there heterogeneous effects of previous trade institutions? That is to say, is inter or intra-industry trade more (or less) impacted by old institutions? Further are the components of Intra-Industry trade (i.e. Horizontal and Vertical Intra-Industry Trade) uniformly impacted by historical trade institutions? This paper's main contribution is to examine if the past trading institutions of USSR borders and Comecon affect all the of the components of total trade, (i.e. Inter-Industry Trade, Intra-Industry Trade, Horizontal Intra-Industry Trade and Vertical Intra-Industry Trade) and how those institutions may uniquely decay over time. This paper is able to show that the historical borders and trading unions are most binding in Inter-Industry Trade and Vertical Intra-Industry Trade.

Intra-Industry Trade (IIT) has been an important area of study for international trade economists since it's characterization by Balassa (1966). It would take nearly a decade before the literature truly exploded post Grubel and Lloyd (1975). This was due in no small part to the creation of the Grubel-Llyod index to explicitly measure IIT flows from Inter-Industry Trade (INT) flows. Numerous theoretical models (e.g. Krugman 1979; Lancaster 1980; Falvey 1981; Helpman 1981; Helpman and Krugman 1985) have allowed for the understanding, and empirical prediction of IIT. The growth of the theoretical literature has also pointed to the need to understand that IIT is actually composed of two different components Horizontal Intra-Industry Trade (HIIT) and Vertical Intra-Industry Trade (VIIT) (Greenaway et al., 1994).

The importance of examining HIIT and VIIT is more than just a theoretical consideration. Numerous studies have sought to understand the empirical determinants of IIT.

Importantly Greenaway et al. (1994, 1995) illustrate that empirical studies that don't distinguish between HIIT and VIIT are likely to have extremely biased coefficients for product differentiation and scale economies. The bias due to the fact that HIIT and VIIT are driven by different forces and adjustment costs. Broadly HIIT occurs between countries of similar factor endowments trading similar goods of different varieties. Conversely, VIIT is done between nations of different factor endowments at different points in the global production process Falvey and Kierzkowski (1987); Jambor (2014).

Further, and more importantly to the work in this paper, identifying what factors empirically move IIT, HIIT and VIIT at the country level is still a major debate in the empirical literature (Lloyd and Grubel, eds 2003; Thorpe and Zhang 2005; Zhang and Clark 2009). This paper argues that given the long reach of historical trading institutions, there is merit to including them in empirical studies that look to measure these total trade components. Including variables that empirically measure previous trading institutions may provide more robust empirical measurements and help to overcome modeling fit issues.

Although the literature is resolute in the importance of decomposing IIT (Lloyd and Grubel, eds, 2003), the agreement of how to define both HIIT and VIIT has been elusive (Fontagné and Freudenberg, 1997). The heterogeneity in the definition of both HIIT and VIIT has resulted in a plethora of methods to empirical characterize the horizontal and vertical components of IIT. This paper employs a method that still is underutilized in the literature.[1] Kandogan (2003b) demonstrates a way to decompose IIT, INT, HIIT, and VIIT from Total Trade (TT). This method is both empirically free from researcher bias as to how to define HIIT from VIIT as well as being theoretically consistent with the wider literature.

Of the papers that have utilized the Kandogan decomposition system of equations, only a handful have employed it via a gravity model specification (Al-Mawali, 2005; Turkcan and

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[1] At the time of writing this paper fewer than 150 papers employ this methodology despite being nearly two decades old.

Ates, 2009; Leitão et al., 2014). Importantly, in surveying the literature none of these papers control for 2 important empirical specifications needed to make a theoretically consistent gravity trade model: (i) multi-lateral resistance terms and (ii) a Poisson Pseudo-Maximum Likelihood (PPML) estimation method. Drawing from the seminal works of Anderson and van Wincoop (2003) and Silva and Tenreyro (2006, 2011), shows researchers that ignoring i and ii produces empirically biased estimations. This paper's first contribution to the literature is that it is the first to estimate all the components of trade via the Kandogan methodology and, with a properly specified gravity trade model. It is important to note that this paper differs from a similar study Yotov et al. (2016), in that although Yotov does also utilize both Kandogan method and a gravity trade model, they do not account for the aforementioned proper gravity specification. Another point of similarity between this paper and Yotov, is that although both papers look at Russian trade flows, this paper is interested in the impact of historical trading institutions on current day trade.

The remainder of the paper is organized as first a background discussion on the theory of IIT, literature on empirical modeling of IIT, and why USSR and Comecon can be considered exogenous to trade. Next will be a description of the data, discussion of the explicit model used in this paper, followed by a discussion of the results.

2.2 Background

In order to properly contextualize the work presented, the focus of this section will be in answering the following questions: (i) what factors drive country-wide horizontal and vertical IIT, (ii) what advantages does a gravity trade model specification brings to empirically understanding IIT, and (iii) how the legacy of historical trade institutions can impact current-day trade flows. In endeavoring to answer question i, a discussion of the theory of IIT, as well as it's horizontal and vertical components is necessary to understand the empirical

determinants of IIT.[2]

2.2.1   Intra-Industry & It's Components

Mounting data evidence beginning in the early 1960s showed the existence of IIT. Although they did not provide the theoretical foundation, much of the groundwork and popularization of how to identify IIT can be traced to Grubel and Lloyd (1975). In their work Grubel and Lloyd defined IIT as "the simultaeous export and import of goods from the same industry" (ibid, p. xii). Grubel and Lloyd illustrated that international trade theory, dominated by Heckscher-Ohlin (H-O), needed to be adapted and modernized. Specifically, a relaxation of the restrictions of perfect competition, constant returns to scale, constant technology, and perfectly substitutable goods was needed in order to explain the mounting empirical evidence of IIT.

As a response to the need for a framework to understand IIT, three theoretical explanations emerged. The literature posited that IIT arises due to increasing returns to scale (Krugman 1979, Lancaster 1980, Krugman 1980, Krugman 1981, & Helpman 1981), imperfect markets (Dixit and Grossman 1982, Eaton and Kierzkowski 1984, & Helpman and Krugman 1985), or product varieties (Falvey 1981, Falvey and Kierzkowski 1987, & Flam and Helpman 1987). Due to the complexity of IIT, there is no single class of model that can explain the entire phenomenon. Since each model explains only part of IIT, each model is considered a partial equilibrium model (Al-Mawali, 2005). Irrespective of the underlying market assumption, each of these class of models provided a theoretically consistent way to understand why trade within the same industry between similarly factor endowed nations takes place.

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[2]Since it's discovery, the literature on new (and new-new) trade theory has grown nearly exponentially. In an effort to keep the background section focused on the prime question, this paper suggest looking at several outstanding surveys of the literature. Specifically, Lloyd and Grubel, eds (2003) for an overview of seminal papers and Greenaway and Milner (2005, 2006) on how the literature has evolved.

As a result of the growth of the theoretical models in the 1980s, a body of empirical literature emerged demonstrating the need for a distinction between horizontal and vertical IIT (Lloyd and Grubel, eds, 2003, p. xiii). The first empirical studies to draw attention to the need to disaggregate IIT were Greenaway et al. (1994), Greenaway et al. (1995), and Torstensson (1996). Although Grubel and Lloyd (1975) did identify and gave an initial definition of horizontal and vertical IIT, the aforementioned studies were the first to propose and employ an empirical methodology to decompose IIT into HIIT and VIIT. Often it is easy to paint a narrative about theory and empirical literature evolving in a sequential order. In the case of IIT it would be incorrect to believe that the recognition of decomposition evolved independently from the theoretical literature.

As the understanding of HIIT and VIIT has progressed, so has the definitions and the theoretical foundations of the components of IIT. Most of the theoretical literature has focused on understanding and predicting the horizontal component of IIT (Al-Mawali, 2005). The focus on HIIT arises from empirical studies which did not disaggregate the horizontal and vertical components of IIT, and chose the more common theoretical models of IIT based off monopolistic competition (Thorpe and Leitão, 2013). The theoretical underpinning of HIIT comes from arguments from which monopolistic competition is arises.

The first theoretical basis for HIIT comes from "neo-Chamberlinian models" formalized by Dixit and Stiglitz (1977) and Krugman (1979, 1980, 1981). These models assume that consumers are motivated to consume as many different varieties of the same good (i.e. a "love of variety"), which in turn drives IIT. The other theoretical foundation for HIIT comes from "neo-Hotelling" models formalized by Lancaster (1979, 1980). In these models consumers prefer a specific variety (i.e. a "diversity of taste") and as result, promotes IIT between countries. Irrespective of which theoretical grounding an author adheres to, the literature generally defines HIIT as trade in different varieties of the same good.[3]

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[3]For example Greenaway et al. (1994), Al-Mawali (2005), Thorpe and Zhang (2005), Thorpe and Leitão

In contrast to HITT, there is less uniformity on both the motivation and theoretical grounding for the vertical component of IIT. The diversity of both theoretical and definition of VIIT is due in no small part to the fact that HIIT best explains trade between developed nations and VIIT characterizes trade between developed and developing nations (Al-Mawali, 2005). To put it another way, why would two nations of radically different factor endowments trade in goods of the same industry? Much like a matryoshka doll, in trying to understand IIT the literature had arrived at the same questions that had given birth to New Trade Theory. The literature has come up with two theoretical foundations to explain the phenomenon of VIIT, the result of which is two different definitions.

The first theoretical foundation for VIIT is to assume a H-O model with perfect competition. Utilizing this market structure results in defining VIIT as trade in goods of the same industry but of different quality.[4] The differences in individual countries skill intensity results in different production functions which, in turn, drives countries to organize via comparative advantage. Countries thus specialize in producing the same good but of different quality as dictated by their factor endowments (Falvey 1981, Falvey and Kierzkowski 1987, & Flam and Helpman 1987). Thus the differences in prices of the good across countries are indication of the differences in quality.

The second theoretical foundation returns to an oligopolistic market structure to explain VIIT. Under this specification the theory argues that VIIT is defined by trade of goods in the same industry, but at different stages of production.[5] Here differences in factor endowments are important at the sub-industry level as fixed costs in R & D result in specialization. Different nations specialize in production of the final homogeneous good at either the intermediate or final stage given their factor endowments (Jaskold-Gabszewicz and Thisse 1980,

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(2013), and Aggarwal and Chakraborty (2017) use this definition.

[4]For example, this definition is used by Greenaway et al. (1994, 1995), Aturupane et al. (1999), Ekanayake et al. (2009), Turkcan and Ates (2009), and Jambor (2014).

[5]For example Grubel and Lloyd (1975), Al-Mawali (2005), & Thorpe and Zhang (2005) use this definition.

Dixit and Grossman 1982, and Shaked and Sutton 1984). Thus, IIT involves vertical specialization as the intermediate and final good are part of the same industry and therefore traded to complete production. Given the preponderance of definitions (as well as theoretical foundations) of HIIT and VIIT, the following diagram is produced to help in keep the "family tree" of IIT organized for the rest of this section.[6]

Intra-Industry Trade

Horizontal Intra-Industry Trade   Vertical Intra-Industry Trade

Monopolistic   Perfect   Fixed Costs

Competition   Competition   in R & D

"Love of   "Diversity of   Comparative   Globalization

Varieties"   Taste"   Advantage

                                        Gabszewicz Thisse;

Krugman   Lancaster   Falvey   Dixit Grossman;

                            Kierzkowski   Shaked Sutton

Different varieties   Quality differentiated   Stages of production

While the theoretical literature has focused on explaining the foundation for and the existence of IIT, empirical studies have turned their attention to testing the determinants of IIT (Ekanayake et al., 2009). The majority of the empirical studies do break out HIIT and VIIT from IIT, but are often focused on a particular industry[7] or set of industries

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[6]This diagram is adapted from both Fontagné and Freudenberg (1997) and Al-Mawali (2005).

[7]See for example Turkcan and Ates (2009), Leitão and Shahbaz (2012), Jambor (2014), Leitão et al. (2014), Konno (2016), Jambor and Leitão (2016), or Lee (2018).

(ibid). A further complication is that due to the varied theoretical models, and the diverse market assumptions that each model makes, results in a plethora of variables used (Lloyd and Grubel, eds, 2003; Thorpe and Zhang, 2005). Despite the large volume of empirical studies, there are some consistent factors that affect IIT and it's components.

It is important to note that when considering the determinants of IIT, HIIT, and VIIT the literature has identified that empirical variables can be further segregated into country and industry-level factors. This paper is chiefly concerned with country-level factors and thus, focus will be on those determinants. For an outstanding list of country and industry-level factors see Zhang and Clark (2009) or Ekanayake et al. (2009) for a good discussion of only industry factors.

Across the literature there are six country-wide variables that are consistently used as metrics for the determinants of IIT and it's components. In no particular order, the first factor is the *size*, and specifically the size of the market created by the bilateral trade between nations. Lancaster (1980) argues that as the size of the domestic economy grows so will the number of different products supplied by the home market thanks to scales economies. On the demand side, as the economy grows so will the demand for foreign varieties of goods. Thus, the combined size of the two bilateral trading partners is important and is proxied by *GDP*. In studies that examine multiple trading partners size is measured by the average of the GDPs of the two nations (Thorpe and Zhang, 2005; Al-Mawali, 2005) or if the study is focusing on one country's trade then it is proxied by the trading partner's GDP (Zhang and Clark, 2009; Thorpe and Leitão, 2013; Łapińska, 2016). Given the theoretical grounding for this variable, the literature asserts that HIIT, VIIT will be positively correlated with economic size.

The second determinant from the empirical literature is *factor endowments*. As articulated by Helpman and Krugman (1985), factor endowments are important due to the nature of international trade. As countries with dissimilar factor endowments trade more, the trad-

ing partners become more similar. According to Helpman and Krugman, this increase in country similarity will result in an increase in demand for foreign varieties of the same good. Similarities in factor endowments are positively correlated to HIIT and IIT. Conversely if the two countries are dissimilar in their endowments then they are likely representing countries in different stages of development, leading to increased VIIT between the partners. Drawing from Helpman (1987), the literature proxies factor endowment via the difference in per capita GDP between the trading partners.[8] Smaller differences equate to more similar factor endowments between trading partners, thus more HIIT and IIT.

Importantly there exists a debate on whether per capita GDP proxies for factor endowments or consumer tastes and preferences (Thorpe and Leitão, 2013). Other authors have argued that the difference in per capita GDP is a metric for similarity in per capita income (Al-Mawali, 2005; Thorpe and Zhang, 2005; Thorpe and Leitão, 2013). Thankfully, in the context of effect on the components of IIT, per capita income has similar effects as factor endowments. The argument being that increased similarity results in overlapping of consumer tastes and preferences, as well as levels of development. Meaning that a negative relationship exists between per capita GDP differences between countries and HIIT & IIT, while a positive relationship exists with VIIT.

The third determinant of country wide IIT is *distance.* Krugman (1979, 1980) argues that distance not only proxies for transportation cost of goods, but also for cultural similarity between bilateral trading partners. Zhang and Clark (2009) additionally argue that larger cultural divides make it more costly to import foreign goods, thus compounding distance's effects. Unlike the other factors, distance is easily measured between the two bilateral trading partner's capitals and is negatively correlated with IIT, HIIT, and VIIT.

A number of studies have been an interested in disentangling some of the cultural divides captured by distance. Studies have looked at similar language (Kandogan, 2003b; Łapińska,

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[8]I.E. Difference in Per Capita GDP= $abs|\frac{GDP_i}{Pop_i} - \frac{GDP_j}{Pop_j}|$

2016; Aggarwal and Chakraborty, 2017), but most have focused on common borders as a way to disentangle distance effects. In the studies that look at the effect of a common border find they exert a positive effect on IIT, HIIT, and VIIT (Balassa and Bauwens, 1988; Ekanayake, 2001; Łapińska, 2016; Konno, 2016; Aggarwal and Chakraborty, 2017). The aforementioned authors argue that common borders reduces the cost captured in geographic distance, but don't provide a theoretical justification as to why.

A fourth standard empirical determinant is *openness of the economy* to international trade. Although increased trade orientation of a country would lead to an increase in both inter and intra-industry trade, Falvey (1981) argues that openness also corresponds to reduction in protectionist measures and thus increases all three IIT variables. Following Stone and Lee (1995), most of the literature proxies this via the residuals from a per capita trade on per capita income and population regression.

The penultimate determinant of IIT is *trade imbalance*. Due to the way that the Grubel-Llyod index is constructed, as trade imbalance rises, the index reflects lower IIT (Grubel and Lloyd, 1975). As a nation develops a trade deficit (excess), the lower the amount of similar products exported (imported) can make up of total trade. Therefore trade imbalance is seen to be negatively correlated with all three components of IIT, and as such a number of studies create a varible to measure trade imbalance (Stone and Lee, 1995; Clark and Stanley, 1999; Thorpe and Zhang, 2005; Zhang and Clark, 2009). In this paper the issue of bias from trade imbalance will not be an issue. As enumerated on in the next section, the way in which this paper makes account of IIT from INT does not rely upon defining a threshold to which to designate an industry as IIT. Given the methodology utilized there is no need to include a control for trade imbalance in order to control for omitted variable biasing.

The final determinant of IIT is *Foreign Direct Investment* (FDI). FDI has an ambiguous affect on IIT in the literature (Gray 1988, Leitão and Shahbaz 2012, & Thorpe and Leitão 2013). Gray (1988) considered FDI as a substitute to trade, while Markusen (1984) and

Helpman (1987) see FDI inflows of a nation's trading partner to be positively affecting their bilateral IIT. To further complicate matters, FDI can be viewed as technology transfer from one nation to another via capital goods thus leading to increases in IIT (Zhang and Clark, 2009). Alternatively, FDI could also reflect increased VIIT as increased FDI could reflect the increase in multinational corporations expanding supply chains.

In reviewing the literature is it clear that there is a multitude of theoretical models to inform how you define HIIT and VIIT. Due to the lack of uniformity of a generalizable theoretical model, there is a plethora of empirical variables utilized. From looking at the literature there is six consistent factors size, factor endowments, distance, openness, trade imbalance, and FDI. A discussion of which empirical variables are used and how they connect to the aforementioned theoretical framework will be done in the empirical mode section.

2.2.2 Decomposing & Modeling Intra-Industry Trade

Due to the various theoretical groundings for IIT and it's components, there are no uniform government statistics delineating what is and isn't IIT. Therefore any empirical work must first decompose IIT, as well as HIIT and VIIT, from available trade data. The Grubel-Lloyd index, developed in Grubel and Lloyd (1975), is uniformly employed in delineating inter from intra-industry trade.

The general form of the index takes can be expressed by the equation

$$GL_i = 1 - \frac{|(X_i - M_i)|}{X_i + M_i} \tag{2.1}$$

where home's IIT for any industry i is measured in terms of their exports of that industry (X_i) and imports of that industry (M_i). The measure takes a value between one and zero, where values closer to one signify higher degree of IIT within said industry.

While there is much agreement on the utilization of the Grubel-Lloyd index, there is

less agreement when it comes to disentangling HIIT and VIIT from IIT. Empirical studies decomposing HIIT and VIIT have employed two general methods, the first method was introduced by Greenaway et al. (1994). Greenaway et al. decompose the Grubel-Llyod index results into HIIT and VIIT by stating vertically differentiated goods are ones in which the unit values at the SITC 5-digit level differ more than ±15 per cent. The second method comes from Abd-el-Rahman (1991) and is expanded upon by Fontagné and Freudenberg (1997) and Fontagné et al. (2006). The methodology introduced by the aforementioned papers meticulously categorizes each trade flow as either horizontal (based off *different varieties* definition) or vertical (based off *quality differentiated* definition), and computes the share of total trade by each category.

The major concern and criticism of this methodology, called the unit value dispersion method, is in how it establishes a link between observed unit values and uses that to determine the quality ranking of each good. The unit value dispersion method assumes products are vertically differentiated when the differential between export and import value is larger than a certain threshold. The criticism is that the value threshold is "arbitrary" (Lloyd and Grubel, eds, 2003; Kien and Thao, 2016) and could lead to inflating measurements of VIIT (Kandogan, 2003a; Zhang and Clark, 2009; Thorpe and Leitão, 2013). The over measurement of VIIT is argued to occur via conflating true VIIT with IIT in quality vertically differentiated products (Schuler, 1995). In short utilizing a definition of *quality differentiated* products leads to possibly over-counting a component of IIT.

A method that has gained traction in the literature comes from Kandogan (2003b).[9] Here the author begins by utilizing the *stages of production* definition for VIIT. Kandogan utilizes two different levels of aggregation from the SITC, where higher levels of aggregation define industries(2-digit SITC) and lower levels (4-digit SITC) designate products within

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[9]It is important to note that the methodology and system of equations is first proposed in Kandogan (2003a). In this he uses a slightly altered formula but the concept and overall structure is consistent when he publishes the second paper.

that industry. The method allows Kandogan to look at the values of exports and imports without needing data on quantity nor setting any value based threshold to delineate HIIT from VIIT. With this methodology the author outlines a system of equations to empirical decompose international trade.

Kandogan begins with the following equation to define what an industry is

$$X_i = \sum_p X_{ip} \; M_i = \sum_p M_{ip} \tag{2.2}$$

where X is exports, M is imports, i denotes a particular industry, and p is a specific product in said industry. Given equation 2.2, the total amount of trade in each industry (TT_i) can be found summing up exports and imports in each industry via equation 2.3. Intra-industry trade for each industry (IIT_i) is found by matching exports and imports at higher levels of aggregation for each industry and subtracting from total industry trade, illustrated by equation 2.4. The amount of trade of similar products, horizontal intra-industry trade $(HIIT_i)$, is calculated via the amount of matched trade in each product of an industry at lower levels of aggregation, thus giving us equation 2.6. Finally, vertical intra-industry trade $(VIIT_i)$, is found from trade of different products/products at different stage of production in an industry, by subtracting equation 2.4 from equation 2.6 to get equation 2.7.

$$TT_i = \sum_p X_{ip} + M_{ip} = X_i + M_i \tag{2.3}$$

$$IIT_i = TT_i - |X_i - M_i| \tag{2.4}$$

$$INT_i = TT_i - IIT_i \tag{2.5}$$

$$HIIT_i = \sum_p X_{ip} + M_{ip} - |X_{ip} - M_{ip}| \tag{2.6}$$

$$VIIT_i = IIT_i - HIIT_i \tag{2.7}$$

The Kandogan system of equations creates a uniform way to decompose all the components of trade and avoids over-biasing any of the measures. Further this system of equations can be used to describe the heterogeneous effects of trade by industry or can be summed by category (i.e. $IIT = \sum_i IIT_i$ or $HIIT = \sum_i HIIT_i$, etc.) to get country trade.

Interestingly, Kandogan shows the efficacy of his system of equations via a gravity trade model. Kandogan argues that the beauty of a gravity trade model is that you can add variables to account for empirical factors predicted by both H-O and the Increasing Returns models. He goes on to show that even including both sets of variables, total trade can not be accounted for as the factors affecting each model move counter to each other. He then re-runs his models with only his INT and IIT variables constructed from his index and find that INT is better predicted by the H-O theory variables while IIT is better predicted by the Increasing Returns theory variables. What is important to point out is that Kandogan doesn't make a claim as to why the gravity model was an ideal empirical specification for employing his decomposition method.

Kandogan's agnostic stance to model specification has resulted in a plethora of different model employed with his index. In the few papers that utilize his index, only one uses a gravity model, specifically Konno (2016). The remainder of the papers employ a plethora of methods such as a Tobit with random effects (Zhang and Clark, 2009), a pooled OLS models with random effects (Thorpe and Leitão, 2013), and a GLS (Kien and Thao, 2016).[10] Even expanding the survey of literature to non-Kandogan decomposition methods we find that only a handful of papers utilize a gravity model specification (Al-Mawali 2005, Sohn 2005, Turkcan and Ates 2009, Leitão and Shahbaz 2012, and Leitão et al. 2014). Interestingly all of the aforementioned studies which do employ a gravity specification don't necessarily make

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[10]There is a great heterogeneity in empirical models used to examine IIT and it's components. A brief literature survey of non-Kandogan decomposition methods results in empirical models specified as OLS (Thorpe and Zhang, 2005; Łapińska, 2016), Logit (Ekanayake et al., 2009), log-normal hurdle model (Lee, 2018), dynamic GMM pannel (Jambor and Leitão, 2016), and panel corrected standard error model (Jambor, 2014).

a case for why it might be an ideal model.

Given the volume of theoretical models and empirical variables that have been ascribed to IIT and it's components, the gravity trade model offers a flexible framework to specify and test the components of IIT. The basic gravity framework draws a parallel to Newton's Law of Gravity to explain trade flows. Specifically, the theoretical argument states that trade flows between any two locations are positively correlated with the combined *GDP* (analogous to size in the Newtonian model), and negatively correlated to distance between the two countries (which mirrors the distance between two physical particle in Newtons law). When it was originally formulated the gravity trade model lacked a theoretical foundation as well as plagued by a particular methodological issue called "the border puzzle".[11] After Anderson and van Wincoop (2003) gravity models were shown to be theoretically consistent, able to predict general equilibrium effects, and could solve the border puzzle if properly specified (Yotov et al., 2016). Given Anderson and Van Wincoop's result, the utilization of gravity exploded in the empirical literature, though to the question of how generalizable the results were took another important contribution.

Arkolakis et al. (2012) argue that the gravity model is unique in that it is able to estimate the the welfare gains from trade across a large class of models. Arkolakis et al. makes four micro assumptions (i) one factor of production, (ii) Dixit-Stiglitz preferences, (iii) linear cost functions, and (iv) perfect or monopolistic competition. The authors further restrict their model with three macro-level restrictions of (a) balanced trade, (b) aggregate profits are constant share of aggregate revenue, and (c) import demand is CES. These assumptions allow the authors to be consistent with several micro founded models, specifically Armington-CES, H-O, Monopolistic Competition, Heterogeneous Firms, Ricardian, Sectoral Ricardian, Sectoral Armington-CES, and Dynamic Factor Accumulation models.

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[11]Briefly, the border puzzle refers to the empirical result of after controlling for distance, regions within countries trade much more with each other than do regions across countries (McCallum, 1995; Anderson and van Wincoop, 2003; Ishise and Matsuo, 2015).

The result of Arkolakis et al's assumptions is that the authors are able to show that despite their micro-welfare results, all of the aforementioned models welfare predictions can be simplified into a single equation asking what are the changes to real income as a function of foreign shock from trade costs. In developing an equation to express their overarching welfare effects of trade, the authors show that the gravity equation model is a common estimator for all of the aforementioned models since "by its very nature, it captures by how much aggregate trade flows, and therefore consumption, reacts to changes in trade costs" (ibid, p. 119). The assertion of gravity being a consistent estimator for a whole class of models is bolstered by Allen et al. (2020).[12] Allen et al. illustrates sufficient conditions for the existence and uniqueness of the trade equilibrium for the same group of trade models utilizing the standard gravity constraints.

There is clear theoretical evidence for the gravity trade model being a consistent and theoretically justified model choice for IIT. The gravity model is able to be isometrically equivalent to a number of micro-founded trade models as well as provide a general equilibrium framework for them. The result of this equivalences is that gravity is able to ask the same big "gains from trade" question that each of the various IIT models do. Furthermore, the gravity model has a flexible empirical framework such that variables can be added which help to explain various theoretical models without conflict. Anecdotally, in looking at the previous section, two well documented empirical movers of IIT, size and distance, are also two of the core theoretical and empirical factors of the gravity trade model. Thus given the evidence presented, a gravity model with a Kandogan system of equations would be an optimal choice to both theoretically and empirically model Russian trade flows.

The one caveat to this endorsement is the assumption that the gravity trade model needs to be specified correctly. Correct specification in the context of a gravity trade model

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[12]Note that the conclusions of Allen et al. (2020) first appear in Allen et al. (2014) and have only recently been formalized in the aforementioned publication. Ergo, their results are usually cited by the latter, not the former paper.

requires, at the very least, that a model contains Multi-Lateral Resistance variables as articulated in Anderson and van Wincoop (2003). In looking across the papers that utilize a gravity trade model to explain IIT, none of them control for border effects in a theoretically consistent way. The empirical process of how to control for the boarder effect will be further enumerated on in the empirical model section. The work presented in this paper represents the first time a Kandogan decomposition is applied with a correctly specified gravity model. Yet, a well specified gravity model is not just a function of multilateral resistance terms. To put it another way, controlling for border effects are a *necessary* not a *sufficient* condition for a well specified gravity model. As argued in Freidman et al. (2020), in order to achieve a well specified gravity model, the importance of historic institutions and their impact on future trade flows of the country of interest must be taken into account.

2.2.3   History's Effect on Trade Flows

Institutions have been studied widely in economics for a long time, and have been found important in the determination of trade flows by several authors. Despite economics' long fascination with institutions, Acemoglu et al. (2005) was the pivotal work in providing a framework and argument for why institutions matter. In short, Acemoglu et al. argue that institutions shape and incentivize market actors, this in turn organizes productivity and results in the observed differences in economic growth between countries. Since it's publication, Acemoglu et al. has inspired interest in the impact history and institutions have on trade (Estevadeordal et al., 2003; Mitchener and Weidenmier, 2008; Karnups, 2008; Brodzicki and Uminski, 2018) and economic growth (North, 1995; Zukowski, 2004; Campos et al., 2016). In looking specifically at trade, the literature has found strong legacy effects of institutional trading arrangements in virtually all cases that have been studied(Eichengreen and Irwin, 1995; Anderson and Smith, 2007; Stack et al., 2019; Freidman et al., 2020).

Institutions, in the economic context, are generally thought of as property rights, rule

of law, competitive markets. Yet, upon reflection one realizes that international trade also generates institutions that have impacts on how society organizes itself. Eichengreen and Irwin (1995), the seminal paper on the matter, makes the argument that historical trading institutions impacts current trade flows. Utilizing a gravity trade model with a lagged trade variable, Eichengreen and Irwin investigate the influence of pre-WWII trade (1928 and 1938) on post-war trade flows. The authors find strong, but diminishing, effects for 1949 and 1954. With specific reference to countries that had once been part of the British Empire, they find that "Former British colonies traded disproportionately more with one another in 1949...because of the effects of history" (ibid, p. 55). In general, Eichengreen and Irwin persuasively argue that history is fundamental for the determination of trade flows in any gravity approach leading to the literature of investigating historical trading institutions.

Anderson and Smith (2007) attempt to validate the results of seminal papers historical trading institutions' impact on current day trade flows. The authors use a panel data set and a lagged trade variable specification from Eichengreen and Irwin (1998) and find strong evidence that historical patterns do matter in the estimation of trade flows in Canadian trade. Using a fixed effects approach to estimate the gravity equation, they show that importer and exporter time fixed effects can capture the effects of history without the use of a lagged dependent variable approach. Making the case that researchers need to put time and effort into ensuring that the gravity trade model is correctly specified.

Since the above-mentioned papers, the application of history's effect in empirical models has been deployed in a more nuanced way. Newer research into historical institutions from Gowa and Hicks (2013), Brodzicki and Uminski (2018), and Stack et al. (2019) seek to appropriately calibrate the gravity trade model to take important historical factors that still affect current (and future) trade volumes into account. Gowa and Hicks (2013) look at trade volume and the effects of trade blocs on trade during the intervening years between World War I and World War II. They take into consideration that the trade blocs that were formed

Post World War I, had different political aims(all of which shared the goal of trying to curb intense global economic downturn) depending upon which major power formulated them when specifying their gravity model. They find that, contrary to recent literature, none of the great power trading blocs affected trade in positively or negatively.

Brodzicki and Uminski (2018) include variables that account for the historical metropolis of Poland to understand foreign trade persistence and development. Using a PPML gravity model they find that there is evidence of trade flows being a function of the historical partitions and metropolises of Poland. Similarly, Stack et al. (2019) look at global trade flows of sugar and accounts for colonization's part in developing this market. In demonstrating that colonial ties dictate current global sugar trade, Stack et al. show that the geographical direction those colonial ties originate from can have either positive or negative effects on growth and trade broadly.

Clearly the channels in which historical trade institutions affect current day trade are broad. Arguably, some of the most interesting institutions are ones which exist for a short period allowing for study of their limited effects. In the context of international trade, institutions such as trade agreements, currency unions, and international borders represent opportunities to explore the effects of intuitions which arise and potentially decay. What is of particular interest for this paper is the effects of borders, both creation and dissolution.

The border effects literature seeks to exploit natural experiments of impact that the generation and disbandment of national borders have on trade flows. Border effects have been studied in a wide variety of settings that include cultural identity (Falck et al., 2012), war (Che et al., 2015), and the reintegration of economies (Felbermayr and Gröschl, 2014; Nitsch and Wolf, 2013). Each study finds evidence of long-term persistence. Regarding the elimination of borders, Felbermayr and Gröschl (2014) find that by 1993, the historical border between the Confederate South and the North (the Mason-Dixon Line) reduced trade by 13% to 14%. However, some of this could be the result of endogeneity issues.

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The question of the exogenous development of trade, customs, and monetary unions permeates the historical trade institutions literature. The channels in which endogeneity becomes an issue for the empirical models is twofold. First, by an *a priori* assumption about formation of these international agreements. As (Barro and Tenreyro, 2007, p. 3) state "The implicit assumption in various empirical studies is that currency unions (or, more generally exchange rate arrangements) are randomly formed among countries" or second, because of reverse causality issues. Specifically Wolf and Ritschl (2011), Baldwin and Jaimovich (2012), and Keller and Shiue (2014) give different examples of how the application of national arrangements may either increase trade flows or high trade flows depending on what politically stimulated the formation of these agreements. Given the questions of endogeneity surrounding hysteresis literature, the literature has gone to great lengths to find natural experiments to prove trade intuitions are exogenous (Nitsch and Wolf, 2013).

This paper and others[13] argue that the Soviet Union (USSR) and Comecon can be considered as natural experiments for tests of the legacy effects of previous trading institutions. Not only are these institutions founded for non-trade related reasons, there is no evidence of strong trading relations between Russia and the other countries studied prior to the development of the USSR or Comecon.

There were many reasons for the formation of the Soviet Union that began in 1922 with the unification of the Russia, Transcaucasia, Ukraine, and Byelorussia. By 1940 included 15 sub-national Soviet republics existing until 1991 (see Table 2.2 for a list of countries). A fundamental factor driving the unification was ideology (Sherman, 1994). Specifically, the Bolsheviks believed that in order to have socialist utopia the ideas of personal property, national identity, and individuality needed to be abolished. By uniting all the soviet nations under one communist government they could progress their people towards socialism

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[13]See discussion in the introduction on papers Djankov and Freund (2002a,b), Fidrmuc and Fidrmuc (2003), De Sousa and Lamotte (2007), and previous work by Freidman et al. (2020).

(C.P.S.U., ed, 1939; Stalin, 1953; Sakwa, 1999). Further, there is no evidence that direct trade-related rationales motivated the formation of USSR as prior to USSR formation, no future member states were listed among the top 18 import or export partners of Russia (Vyacheslav, 2011). It is easy to be persuaded that the USSR wasn't created for trade purposes, but Comecon presents a more difficult case to be made.

The Council for Mutual Economic Assistance(CMEA) also referred to as Comecon, was the main trading bloc of the Soviet Union from 1949 to 1991. Although all members were equal, the organization was under the leadership and control of the Soviet Union. Comecon comprised the countries of the Eastern Block along with satellite states.[14] The official purpose of Comecon was to coordinate planning, promote country and regional specialization, increase trade among member states (Korbonski, 1970), and "to improve economic and military cooperation" (New York Times, 1988). Increased trade flows was among the motivations for the formation of Comecon, but like the USSR's foundation, this was not based on any pre-existing strong or rapidly increasing trade relations (Freidman et al., 2020).

The most direct reason for Comecon's development was, similar to the USSR, ideology. Comecon was founded in response to the Marshall Plan and to counter the OECD (Brine, 1992). Comecon was seen as an effective instrument to spread communism to the countries of the Eastern European block with the USSR being the dominant member (ibid). The political value of Comecon outweighed any economic desires as evidenced by the fact that in 1956, six years after its formation, there was insignificant intra-Comecon trade (Korbonski, 1970, p. 957). The literature on the development and operation of Comecon demonstrates that it was a poorly designed and managed trading institution that resulted in little true trade creation and was mostly trade diverting (Pelzman, 1977; Holzman, 1985; Zickel, ed, 1989; Biessen, 1991). Additionally, and most importantly, Comecon was meant mainly as a control device for the Soviet Union over Comecon members (Pelzman, 1977). Thus, it can

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[14]Former members of Comecon are listed in Table 2.2

be concluded that the dissolving of the USSR borders and Comecon trading bloc presents a unique, and exploitable natural experiment from which to interrogate the importance of historical intuitions on current day trade flows.

This paper is not unique in arguing for utilizing USSR and Comecon as natural experiments. Other studies that investigate the effects of USSR on bilateral trade are Djankov and Freund (2002a,b), Fidrmuc and Fidrmuc (2003), and De Sousa and Lamotte (2007). Djankov and Freund (2002a,b) use the gravity trade model to examine trade flows among and between 9 Russian regions and 14 former USSR republics during the period of 1987-1996. The authors are able to shown that Russian regions traded significantly more with each other than with former Soviet Union republics. A limitation of their analysis deals with understanding the full arc of the legacy of historical trading institutions since they only employ data from 5 years after the collapse of the Soviet Union.

Fidrmuc and Fidrmuc (2003) examine three disintegrated unions Yugoslavia, Czechoslovakia, and the Soviet Union (represented by Russia, Ukraine and Belarus). In order to capture different trade relations, they include variables for formal preferential trade areas, common border or language, and successor states of former federations in Europe. With data covering the period 1990 to 1998, their results suggest that the trade effects of former institutions decline rapidly over the 8 years, however, trade relations between former members remain significant to 1998.

De Sousa and Lamotte (2007) attempt to determine why the legacy effects found by Fidrmuc and Fidrmuc (2003) dissipate quickly relative to other findings. Utilizing controls suggested by Anderson and van Wincoop (2003) and a data set from 1993 to 2001, they were able to include all countries created by the political disintegration of the Soviet Union, Czechoslovakia and Yugoslavia, de Sousa and Lamotte find more persistence. The authors found that the results of Firdmuc and Firdmuc were biased by the limited number of former Soviet, Czechoslovakian and Yugoslavian states covered in their study, more than their lack

of multilateral resistance controls.

As discussed in the introduction, these papers primarily focused on showing the connection of historical trading institutions and Russia's current trade flow. This paper is unique in that it focuses on measuring how long these institutions last with a well specified gravity trade model.

2.3   Description of Data

The data utilized in this work is created from merging four different data sets. The data encapsulates bilateral trade flows to and from Russia in the years from 1996 to 2018. The specific data sets used are trade data from the United Nations' COMTRADE database, GDP and FDI data from the World Bank, bilaterat distance between Russia and their trading partners from the Centre d'Études Prospectives et d'Informations Internationales (CEPII), and the Index of Economic Freedom from The Heritage foundation.

The data comprises export and import trade to Russia and 183 countries as listed in Table 2.2 in the appendix. Specifically, from the COMTRADE database trade flows at both the SITC[15] 2-digit and 4-digit commodity code level. Further this data is reported in nominal USD, so the values were transformed into constant 2010 USD using CPI data from the World Bank. Performing this action also makes the trade data the same denomination as the data from the World Bank.

CEPII GeoDist database has number of distance variables constructed in differing levels of complexity. Of the available variables, CEPII's simple distance variable had the largest number of distance pairs between Russia and different country partners. The distance variable from CEPII is calculated utilizing the great circle formula, which find the distance between the most important cities (in terms of population) for each country. (Mayer and

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[15]SITC revision 3 codes are employed in this paper as the COMTRADE database does not report revision 4 codes.

Zignago, 2011)

The Heritage Foundation's Economic Freedom Index makes up the last data set that makes up the base of the data used in this paper. The foundation ranks countries based off 12 qualitative and quantitative metrics[16] which broadly fall into the categories of (i) rule of law, (ii) government size, (iii) regulatory efficiency, or (iv) open markets. Each of the twelve categories are scored from 0 to 100, where higher scores indicate more "freedom." This paper employs the overall score, which is the average of the individual scores of each of these 12 categories.

2.4   Empirical Model

Before reviewing the empirical model employed, it is worth taking a moment to discuss how this paper constructs the dependent variables utilized in the analysis. This paper is concerned with looking at the effects of historical trade institutions on the Total Trade (TT), Intra-Industry Trade (IIT), Inter-Industry (INT), Horizontal Intra-Industry Trade (HIIT), and Vertical Intra-Industry Trade (VIIT). As discussed in section 2, the methodology this paper uses to identify the different trade flows is via the Kandogan decomposition method. As identified by both Konno (2016) and Kandogan (2003b) the United Nations' Standard International Trade Classification(SITC) provides a uniform and internationally standardized way of classifying traded goods.

The SITC classifies commodity flows into varying levels of aggregation of goods, where higher aggregation numbers equate to more granular classification of commodities. The aggregation levels are 1-5 with the following descriptions of 1 denoting sections, 2 is divisions, 3 is groups, 4 is subgroups, and 5 is items. Thus given the level of aggregation employed each good traded will be assigned a commodity code with digits corresponding to the level

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[16]The twelve individual categories are: property rights, government integrity, judicial effectiveness, government spending, tax burden, fiscal health, trade freedom, investment freedom, and financial freedom.

of aggregation i.e. if you were looking at aggregation level 3 commodities would be classified with 3-digit codes.

Provided in Table 2.1 below, is a sample of SITC codes at all five levels of aggregation. All nine basic 1-digit categories are provided for reference, the rest of the table goes into deeper levels of aggregation of commodity groups zero and seven. From the table it is easy to see that either 5 or the 4-digit SITC code commodities would be good candidates for defining products. The 4-digit code was selected as difference between each commodity can be thought of as a distinct good. Looking between 1, 2, and 3-digit commodity codes, the 2-digit level of aggregation is selected as it aggregates goods into reasonable approximations of industries.

Using the SITC codes to define industries and products, the equations of 2.3-2.7 are constructed from the trade data. Since the equations return inter and intra-industry trade by industry, summing up all the terms by varible and industry gives us our dependent variables of TT, IIT, INT, HIIT, and VIIT. The base empirical model specification takes the form of

$$Trade_{iR,t} = exp\big[\beta_1 lnGDP_{i,t} + \beta_2 lnDist_{iR} + \beta_3 CNTG + \beta_4 F_{i,t} +$$

$$\beta_5 lnDGDPPC_{i,t} + \beta_6 lnFDI_{i,t} + \beta_7 USSR \cdot t +$$

$$\beta_8 Comecon \cdot t + \beta_7 lnMLR_{exp,t} + \beta_8 lnMLR_{imp,t}\big] * \varepsilon_{iR,t} \quad (2.8)$$

Where trade takes on the form of one of the dependent variables, indicating the type of trade between Russia and some country i in year t.

Before discussing the independent variables, it's important to note that all of the models are estimated with a Poisson pseudo-maximum likelihood (PPML) specification. A PPML model specification solves two problems of the gravity trade model. First, the PPML solves the problem of zero values in trade flows. The traditional specification of gravity models

is to put the dependent variable in logarithmic form, thus resulting in zero trade flows as undefined. Using the PPML specification allows researchers to include zero values. Second, the PPML solves a much more pressing issue, heteroskedasticity in trade data.

As Silva and Tenreyro (2006) makes clear, when the data is heteroskedstic a log-linearization of the model will result in biased and inconsistent results. The authors demonstrate this result as a function of Jensen's inequality and "the expected value of the logarithm of a random variable depends on higher-order moments of its distribution. Therefore if the errors are heteroskedastic, the transformed errors will be generally correlated with the covariates." (p. 653, ibid) Given their findings in both Silva and Tenreyro (2006, 2011), the authors advocate for the use of PPML model specification as the industry standard for gravity trade models.[17]

Turning to the dependent variables of equation 2.8, the variables of $lnGDP_{i,t}$ and $lnDist$ correspond to the the standard gravity variables of the natural log of GDP of country i in year t, and the natural log distance(as described in section 3) between Russia and some country i. As described in section two, these also correspond to standard empirical IIT variables. Since we are only concerned with looking at Russia trade we will only use the trading partners GDP to proxy the size of the combined market. *A priori*, it is expected that all trade will be positively correlated GDP while distance will be will be negatively correlated with trade.

The variables of $CNTG$ and $F_{i,t}$ are variables for an indicator variable if a country shares a contiguous border with Russia and the overall score from the Index of Economic Freedom (discussed above). The 14 countries whom Russia shares a border with are North Korea, China, Norway, Finland, Ukraine, Kazakhstan, Poland, Georgia, Mongolia, Latvia, Estonia, Azerbaijan, Belarus, and Lithuania. Of the 16 countries only North Korea, China, Norway,

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[17]Additionally Xiong and Chen (2014) provides further evidence that a PPML specification, and not other proposed models such as a Tobit or Heckman model, result in the best possible estimations of the gravity model given the above outlined pervasive issues.

and Finland were not part of either the USSR or Comecon.

The Index of Economic Freedoms will be this papers measurement of economic openness, where all measures of trade should be positively correlated with the index. The indicator of continuous borders is a standard gravity variable that has also been used in several empirical IIT studies mentioned in section 2. Drawing from the gravity and IIT literature, the common borders indicator should also be positively correlated with all forms of trade.

As discussed in section 2, controlling for differences in factor endowments and investment are key to well crafted models. The variable of $lnDGDPPC_{i,t}$ is the log of the absolute difference in GDP per capita between Russia and some country i in time t. While the variable $lnFDI_{i,t}$ is the log of the net inflows of Foreign direct investment to some country i in time t. As asserted by the background section we can expect the absolute difference in GDP between Russian and it's trading partners to be negatively correlated with HIIT and IIT, while positively correlated with VIIT. Given the multiple interpretations of FDI from the empirical literature, there is no *a priori* assumption of the correlation between FDI and any of trade variables.

The variables of $USSR$ and $Comecon$ are the primary variables of interest for this paper. These variables are constructed indicator variables articulating if a trading partner is a former member of the USSR or Comecon respectively. In Table 2.2 you can find a list of which countries were label as ex-USSR and ex-Comecon. These indicator variables are the proxy for the historical institutional effects of dissolving borders and dissolving currency unions respectively. In Freidman et al. (2020), a positive correlation between total trade and these indicator variables were shown. Yet, to the best of this papers knowledge, there are very few paper which look at the effects of historical borders or trade unions on different components of trade, as discussed in the background section most focus on total trade. In looking to the empirical literature on IIT, HIIT, and VIIT there is also a lack of investigation into nuanced effects that current day borders and trade unions have on IIT. Because of this

lack of discussion in the literature, this paper must make some inferences to predict *a priori* behavior of these indicator variables.

To begin with our measure for border effects, there are three papers which give some indication on what to expect from the $USSR$ variable. First, Chen (2004) investigates the border effects within the European Union, investigating net exports at the "pooled", country, and industry level. The author is able to show that technical barriers to trade and product-specific information costs increases border effects. The second paper comes from Wolf (2009) who examines German economic unification from 1855 to 1933 using a well specified gravity trade model. Wolf is able to show via the geography of trade costs that it took till the end of the Weimar Republic in 1933 for economic unification to happen, even though Germany officially unified in 1871. Although the country showed signs of integration as early as prior to the outbreak of WWI, integration wasn't uniform. Wolf argues that the results are driven by cultural heterogeneity saying that it took at least one generation to break these barriers down. The final paper is Jambor (2014), where the author investigates what drives HIIT and VIIT in the agri-food trade of new members states of the European Union. Jambor argues that economic integration of countries fosters the growth of IIT in agricultural products.[18] The author goes on to argue and show that integration should have positive effects on HIIT and VIIT. Interestingly, they note that the growth of IIT because of integration is primarily driven by increases in VIIT.

Taken together,these three paper paint a picture of what can be expected of the $USSR$ variable. Wolf (2009) demonstrates that the process to integrate new territories into a nation takes at least a generation. Given the length of time the member states were incorporated to the USSR we should expect this effect to be strong and take at least the same amount of time to dissipate. Secondly, Jambor (2014) shows that when new territories are integrated

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[18]Jambor (2014) makes the argument that IIT agri-trade is boosted by economic integration of new member states based off the well know empirical work of McCorriston and Sheldon (1991) and Qasmi and Fausti (2001).

that those territories see an increase in IIT primarily driven by VIIT. Although Jambor was looking at agricultural trade, the author's result might be more generalization as work done by Aturupane et al. (1999) investigates reintegrating eight former Central and Eastern Bloc states to the European community. Aturupane et al. also found that IIT increases between the European Union and these states, which is also driven by VIIT. Taken together this indicates that we should see strong postive effects on VIIT from historical borders, which may tend to dissipate over time as these states become disintegrated. Finally, the result from Chen (2004) indicates that as states integrate that borders produce higher costs of importing different foreign varieties of goods. Given this result, $USSR$ is expected to be positively related to HIIT because as these states reemerge as independent they'll have a stronger affinity to the varieties of their former home state. Unlike VIIT there seems to be no evidence that this effect will taper off.

Turning to the *Comecon* variable, there is also two paper which help inform the prediction of it's effects on HIIT and VIIT. The first paper comes from De Sousa (2012), in which the author examines net exports using a PPLM gravity trade model for 203 countries over a 60 year period. In De Sousa's paper, he finds that the currency union effect[19] dissipates over time. Specifically after an initial positive effect, currency unions decline in impact to zero after 35, and then oscillating between negative and positive, and finally after 50 years the currency union effect becomes statistically equal to zero. Although Comecon was not a currency union, the particular point to take from this is the fragility of these institutions, meaning we should expect a weaker effect of *Comecon* on all the types of trade and that its effects should decay faster.

The final paper to help predict the direction and effect of *Comecon* is Ekanayake et al. (2009). In their paper the authors investigate HIIT and VIIT of US-NAFTA trade from

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[19]First documented by Rose (2000), any two countries that share a currency trade three times as much as they would if they had differing currencies.

1990 to 2007. The authors find that IIT increases over their data period and that it is driven by VIIT. They argue that increased specialization via division of labor between parties resulting in a range of quality within the same industry, the authors call this "qualitative division of labor." From Ekanayake et al.'s results we can argue that *Comecon* will be positively correlated with all the IIT, VIIT, and HIIT. This paper expects that the strongest correlation between VIIT and our measure of trading bloc, but given the results of De Sousa (2012), these effects will be weaker than border effects and will dissipate faster.

Lastly, the final two terms of $lnMLR_{exp,t}$ and $lnMLR_{imp,t}$ are multilateral resistance (MLR) terms used to overcome the "border effects" implicit in every gravity trade model. As described by Anderson and van Wincoop (2003), trade resistance between any two countries (i and j) can be decomposed into three specific effects: (i) bilateral trade barriers between region i & j, (ii) i's resistance to trade with all regions in the world, and (iii) j's resistance to trade with all regions in the world. Simple remoteness variables, Anderson and van Wincoop argue, only captures distance from bilateral trading partners (effect (i) from above), while the MRT capture all three affects. Although extremely important, MLR's are a theoretical construct, and as such must be generated. The border literature has developed two easily deployable empirical solutions to construct MLR for researchers (Yotov et al., 2016).

The easiest and by far simplest MLR terms are the exporter (and importer) paired-time fixed effects variables, where an indicator variable is created for when country i trades with country j in time t. These fixed effects capture the "special" underlying factors that resulted in these two countries trading in this particular time. As one can see this lines up nicely with the three effects described by Anderson and van Wincoop (2003). The problem with deploying this solution with the current model specification is that of all trade is to and from Russia, thus creating indicator variables that are multicollinear. The colinearity problem is compounded with the total of 183 countries, resulting in indicator variables absorb all variation in the data; making this an untenable solution.

The second empirical solution is referred to as a "remoteness index," and is what is utilized in equation 2.8. The remoteness index is a reduced form version of the custom built MLRs that Anderson and van Wincoop introduced. These remoteness indexes are output and expenditure weighted averages of bilateral distance. They are constructed via the following two equations:

$$REM\ EXP_{i,t} = \left[\Sigma_j Dist_{ij} / \frac{E_{j,t}}{Y_t} \right] \tag{2.9}$$

$$REM\ IMP_{j,t} = \left[\Sigma_i Dist_{ij} / \frac{Y_{i,t}}{Y_t} \right] \tag{2.10}$$

Where $E_{j,t}$ is the value of importer expenditure, obtained by summing up the value of all trade exported by country j in year t. Similarly, $Y_{i,t}$ is the value of exporter output by country i in year t. In equation (2.9), the variable Y_t is sum of all $E_{j,t}$ in a year then utilizing the max value of that year. Conversely, in equation (2.10), Y_t represents sum of all $Y_{j,t}$ in a year then utilizing the max value of that year.

This empirical model is applied three different specifications. The first is a regression with all the available years in the data set, which can be used to test the basic assumption of our historical institutions validity on modern trade. The second specification is regressing the model with only a year's worth of data at a time (i.e. t=1996 or 1997, etc.) Using the second specification will make the full time trend of our indicator variables visible, but with the cost of picking up a lot of "noise" from the data. Thus the final, and most important, specification is in 3-year intervals(ie regression over years 1996-1998 then 1999-2001 etc). As was shown in Freidman et al. (2020), using a multi-year regression allows for the time trend to be made visible but filters out the noise found in the second specification.[20]

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[20]Multiple year interval regressions are also a best practice suggestion from the literature (Yotov et al., 2016). Specifically to overcome trade policy changes over the time of the data. If there is dramatic changes to a trade policy from year 1 to year 2, then it will likely generate influential outlier data points depending the total span of the data. A simple solution the policy change issue is to use panel data over multiple year intervals.

Finally it is important to note that this paper doesn't included a variable outlined as one of the standard empirical IIT variables, namely *trade imbalance*. The reason for this choice is that the motivation for that particular variable is a direct result in how the Grubel-Llyod index is created. Without controlling for trade imbalance an empirical study is subject to over-inflating IIT. Utilizing the Kandogan system of equations, this particular issue will not affect the measures of TT, IIT, INT, HIIT, or VIIT. Thus trade imbalance has been omitted from the list of empirical variables for this paper.

2.5 Results

2.5.1 All Years Panel Results

Looking at Table 2.3 will show all the regression results for each of the 5 dependent variable under the "all years" specification. Generally speaking it seems that overall the data is well explained by the empirical model.

Looking across the variables at GDP we find that it is positive and statistically consistent across all of the models at the highest levels. Interestingly, distance is the correct sign in all the models but is not statistically significant with the same strength as GDP. Distance is not statistically significant for INT, but is at the 95% level for TT and at the highest levels for the remaining models. The coefficients across all the models shows that these two characteristics have large impacts on trade, which is consistent with the literature.

Turning to contiguous border, we see that it is positive, with a large magnitude and statistically significant at the highest level across all the models. By contrast, economic freedom seems to varying effects. In the models of TT, INT, and HIIT, it has a positive effect and only statistically significant in the former two. While economic freedoms is negative in the IIT and VIIT models, with it only being statistically significant in the latter.

A counter point could be made a more persuasive variable would be one for political

freedom, not economic freedom, given the political history of Russia. To answer this potential counter claim, the Freedom House's *Freedom in the World* index was also employed in place of the economic index in all the possible regressions. Political freedom was found to not impact the statistical significance of any of the other independent variables across all the specifications and dependent variable. Further, political freedom seemed to only inflate the coefficients of the other independent variables, while decreasing the goodness of fit measure. As such economic freedom is what is reported in this paper.[21]

Examining the results on differences in per capita GDP, Table 2.3 shows that all the different measure of trade are positively correlated with this measure. Further, the table reports that $DGDPPC$ is significant at the highest levels for TT and INT, 5% level for HIIT while not significant for IIT and VIIT. This finding is somewhat counter-intuitive given that a positive correlation would be most associated with VIIT, the reason for this result could be driven by the aggregation of all the years in the data set. Also interesting is that the measure for FDI is both consistently positive and significant at the highest levels for all the different trade flow measures. Given that the literature has a mixed opinion of what *a priori* expectations to have, it seems more prudent to focus on the 1 and 3-year results.

Turning to the variables of interest on Table 2.3 we see that both the variables across all 5 models are positive and statistically significant. It is worth noting that the Comecon indicator variable is weakly statistically significant in all but the VIIt model, while the ex-USSR indicator variable is statistically significant at the highest level in all but the INT Model. The results form the variables of interest echos the broad findings of Freidman et al. (2020), where historical impact of borders is stronger and longer than that of trade unions.

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[21]Tables of all the regressions utilizing the political freedom variable are available upon request to the author.

2.5.2 Yearly Panel Results

In looking at the yearly results (Tables 2.4-2.8), the first thing that is clear is that there is a substantial amount of "noise" present. Specifically, focusing on GDP, we find that only in the models regressing HIIT (Table 2.7) and VIIT (Table 2.8) show GDP to be both always positive, and statistically significant in all years. Distance does not stay negative for all years in any model and is never consistently statistically significant in any model. In the models not mentioned explicitly, the aforementioned coefficients osculate from their proper signs with varying, often on the lower-end, levels of statistical significance.

The coefficients on contiguous borders and economic freedom show even more volatility. In all but the model using IIT as the dependent variable (Table 2.5), contiguous border is not consistently positive over all years. Further, contiguous borders is overall statistically significant in only the IIT model, while to lesser degrees in the other yearly models. In the model using VIIT (Table 2.8), contiguous borders starts off negative then moves positive to then end negative. Across all models, the coefficient for economic freedom has no consistent sign nor truly ever becomes consistently statistically significant. The most indicative examples of this sign oscillation is the models using IIT (Table 2.5) and HIIT (Table 2.7).

Similar the other variables, GDP per capita also shows high volatility. On the regressions for TT and IIT we see that $DGDPPC$ is negative and has only a few years that are statistically significant, while the coefficients on INT, HIIT, and VIIT starts negative and oscillates to positive with very few years being statistically significant. Although IIT has the right sign, the lack of both similar signs for HIIT/VIIT as well as the lack of statistical significance across all models gives more weight to the argument that the 3-year intervals are going to present a more stable story. Interestingly the coefficients on FDI show much more stability. Across all of the models FDI is consistently positive, though it's statistical significance is present at mainly the 5% level in a minority of years in no clear pattern.

Lastly, turning to the variables of interest, it can be seen that USSR and Comecon have

not been immune to picking of the statistical noise by moving to the by year regression specification. Turning first to the TT model (Table 2.4), USSR oscillates between positive and negative with only four particular years being statistically significant. Comecon in the TT model also begins positive then oscillates between negative and positive with few years showing it being statistically significant.

Turning to the disaggregated total trade variables, we see that in the model looking at IIT (Table 2.5) the USSR variable is always statistically significant and every year has a positive coefficient. Conversely, the coefficient for Comecon starts positive then moves negative with none of the years being statistically significant. Moving to the yearly model of INT (Table 2.6) we find that both USSR and Comecon coefficients start off positive than become negative with only a few years showing any level of statistical significance. Looking at HIIT and VIIT models (Tables 2.7 and 2.8), the coefficients on the USSR variable is positive and statistically significant across both models. Similarly, the Comecon variable is also mainly positive but only exhibiting a few years of statistical significance.

Despite the large amount of variation in the yearly data, there is still some value to be gleamed. Specifically, by looking at all the coefficients on USSR and Comecon we can see an overall time trend emerge. Since looking at these coefficients on the tables can be cumbersome, plots of both variables' coefficients and confidence interval are provided in Figures 2.1-2.5. In the TT (Figure 2.1), IIT (Figure 2.3) , and VIIT (Figure 2.5) show a relatively smooth monotonically decreasing to zero trend for the USSR indicator variable. Conversely, the models for INT and HIIT (Figures 2.2 and 2.4) demonstrate an oscillating and inverted "v" pattern respectively. For the Comecon variable only the VIIT (Figure 2.5) shows a monotonically decreasing to zero pattern, the remaining figures simply exhibit a lot of noise.

2.5.3   3-Year Panel Results

Given the large amount of noise in the yearly regressions, the 3-year panel models (Tables 2.9-2.13) are employed to understand the underlying effects of historical trading institutions with more precision. In all of the models GDP is positive a statistically significant in all the models. Interestingly, the distance coefficient is only consistently negative in the TT (Table 2.9) and IIT (Table 2.10) models. In the remaining the coefficient for distance, it starts off negative and in the last 3-year intervals becomes positive. Further, in no model is distance statistically consistent across all the 3-year intervals.

Similar to distance, the coefficients for contiguous borders and economic freedom display non-uniform behavior. Contiguous borders in all but the VIIT model (Table 2.13), exhibits positive coefficients of varying levels of statistical significance. Economic freedom is much more spurious, with only the model of INT (Table 2.11) exhibiting coefficients with the same sign over all the 3-year sets.

Unlike the previous variables, $DGDPPC$ and FDI both exhibit some general pattern. First, differences in GDP is overall negative in all the models, with the exception of HIIT in which it oscillates between negative and positive. Further all but HIIT exhibit varying degrees of statistical significance. Given theory, one would expect that IIT and HIIT to have a negative correlation to $DGDPPC$, but VIIT should be positively correlated. It is unclear what might be driving this result, but the coefficients are not consistently statistically significant making the result suspect. FDI, on the other hand, is consistently positive across all the models, maintaining the same sign across all specifications. Further across all the specifications it is generally statistically significant to varying degrees.

Lastly, this section concludes by looking at the variables of interest for this paper. Starting with the USSR indicator variable across all models the coefficients are positive, save for the TT (Table 2.9) and INT (Table 2.11). In the aforementioned exceptions, the USSR coefficient becomes negative after starting positive. Looking to statistical significance, the

tables illustrate that overall USSR is strongly statistically significant. In the cases of IIT (Table 2.10), HIIT (Table 2.12), and VIIT (Table 2.13) USSR is statically significant at the highest levels, while in the other models it starts off strongly significant and tapers off to not statistically different from zero by end end of the time period.

Comecon also exhibits an overall positive effect, with the exception of both TT (Table 2.9) where it starts positive and turns negative and IIT (Table 2.10) where it oscillates positive to negative. On the question of statistical significance there are three general patterns that emerge. The first pattern is statistical significance which decays into non-significance by the end of the period (models of TT and INT), no statistical significance (models IIT and HIIT), and strong and consistent statistical significance (model VIIT).

Similar to the yearly models, figures containing the coefficients and the confidence intervals for both of the indicator variables (Figures 2.6-2.10) can be found in the appendix. In looking first at USSR, we find that TT (Figure 2.6) and VIIT (Figure 2.10) exhibit a monotonically decreasing pattern. IIT (Figure 2.7) and HIIT (Figure 2.9) exhibit a somewhat increasing pattern, while INT (Figure 2.8) exhibits an oscillating convergence pattern. Comecon also exhibits signs of an oscillating convergence pattern for the models of TT, IIT, and INT(Figures 2.6-2.8). Interestingly, when decomposing IIT into it's horizontal and vertical components, it can be seen that both HIIT (Figure 2.9) and VIIT (Figure 2.10) seem to be both on slower and much longer convergence paths, with VITT exhibiting more of a monotonic convergence pattern.

2.6 Conclusion

In parsing through the results of this empirical work two broad important conclusions can be made. First, this paper has built a much more robust and theoretically consistent modeling specification than either previous IIT studies employing gravity and Yotov et al.

(2016). Reflecting this robust specification, is more nuanced and complex results. It can be observed that variables controlling for historical trading institutions are generally positive both when aggregating for all years as well as disaggreaging the data into 3-year chunks. Further the standard empirical variables for IIT and it's components were shown to be broadly consistent with their *a priori* assumptions.

Given the robust and consistent results of this well-specified gravity trade model, an argument is made for utilizing a similar specification for the handful of IIT papers which employ a gravity trade model since their results will undoubtedly be biased. An important caveat on the non-historical institutions variables must be given. This paper was not focused on interrogating the determinants of IIT, HIIT, and VIIT. Instead it is much more interested in understanding history's impact on trade and as such this paper must be seen as an illustration of how to properly specify IIT gravity models but not definitive argument. In short this paper only included the variables that literature as deemed absolutely necessary.

Secondly, turning to the prime question of this paper "how long does the impact of previous institutions last?" there emerges two distinct narratives, one about borders and one about trade union's historical impact on trade. Building off the general results of Freidman et al. (2020), historical borders (as proxied by USSR) presents a much stronger and lasting impact. TT demonstrates a general monotonic convergence path. When separating out the different types of trade we see that the convergence in TT is mainly driven by INT and thus the comparative advantages of different nations. Numerous papers have argued the importance of disaggregating IIT, in this study it proves pivotal to see that the historical border effect in VIIT is converging to statistical zero while the HIIT seems to be a much longer convergence path. The latter observation of the two paths is more strongly illustrated by the yearly regressions. The result of the VIIT shows that even in the context of IIT, states will tend back to their comparative advantage, but it is the historical borders which impedes this process. Further, these historical ties seem to strengthen the interest in importing, now

foreign, varieties of goods once restricted by national borders.

The story of trade unions is much less clear. When aggregating all the years the historical impact of a trade union (proxied by Comecon) is positive, and even when put in 3-year intervals Comecon is still positive and arguably converging to statistical zero in a monotonic patter. Yet when disagregating TT the data argues that most of that story is driven by the monotonic convergences of INT and possible oscillating convergence of IIT, again mirroring the story of historical borders. These results make the case that the impact of historical trade unions is much weaker than historical borders, something echoed by the sparse literature on the subject. Investigating further into IIT shows that while VIIT is always positive and slowly converging to statistical zero, HIIT is driving the result of the Comecon's harmonic effect on IIT by presenting a much more aggressive harmonic pattern. Again these results both are weaker, but mirror the impacts seen by historical borders.

What the data seems to be arguing is that as countries of different stages of development, and thus radically different factor endowments, see the strength of historical borders become less important as they regress to their factor endowed motivated specializations. This story seems to be true both for historical borders and trade unions, though is much stronger (both in magnitude and statistical significance) in historical borders. Conversely the impact of a historical border is much slower to dissipate among similarly endowed countries and thus makes a case that historical ties compound the trade of goods of different varieties, which is undoubtedly driven by past cultural connections. In the context of historical trade unions, it is unclear if these effects are dissipating at all or going through cyclical waves of importance. These results build off the previous work in historical trading institutions by showing that historical border effects are much more binding than that of trade unions.

Lastly, and importantly this paper builds on the broad results of papers looking to understand the length of the impact of previous trading institutions on current trade volume. It is not only one of a few which look to metric the length of institutions but importantly

shows that these decaying effects are exhibited at all levels of trade, from total trade to vertical intra-industry trade. Understanding how and why the impacts of historical trade institutions decay is becoming increasingly paramount given that the first decade of the 21st century has resulted in a number of international institutions dissolving. Being able to advise policy makers on the impact of such a decision helps economists to better articulate the answer questions regarding the gains from trade, and more importantly the cost of disengaging in the international community.

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2.8   Tables & Figures

Table 2.1: Examples of SITC Codes

Code	Aggregation Level	Description
0	1	Food & Live Animals
1	1	Beverages & Tobacco
2	1	Crude Materials, Inedible, Except Fuels
3	1	Minerals Fuels, Lubricants & Related Materials
4	1	Animal & Vegetable Oils, Fats & Waxes
5	1	Chemicals & Related Products, N.E.S.
6	1	Manufactured Goods Classified Chiefly by Material
7	1	Machinery & Transport Equipment
8	1	Miscellaneous Manufactured Articles
9	1	Commodities & Transaction Not Classified Elsewhere
01	2	Meat & Meat Preparations
02	2	Dairy Products & Birds' Eggs
71	2	Power Generating Machinery & Equipment
72	2	Machinery for Specialized Industries
011	3	Meat of Bovine Animals, Fresh, Chilled or Frozen
017	3	Meat & Edible Meat Offal, Prepared or Preserved N.E.S.
723	3	Civil Engineering & Contractors' Plant & Equipment
724	3	Textile & Leather Machinery, & Parts Thereof, N.E.S.
0111	4	Bovine Meat,Fresh or Chilled
0112	4	Bovine Meat,Frozen
7231	4	Bulldozers & Graders
7232	4	Excavators & Shovel-Loaders
01111	5	Meat of Bovine Animals with Bone in, Fresh or Chilled
01112	5	Meat of Bovine Animals, Boneless, Fresh or Chilled
72311	5	Bulldozers & Angledozers, Self-Propelled
72312	5	Graders & Levelers (for Earth Leveling, etc.), Self-Propelled

Table 2.2: List of Countries

Afghanistan	Albania**	Algeria	Angola
Argentina	Armenia*	Australia	Austria
Azerbaijan*	Bahamas	Bahrain	Bangladesh
Barbados	Belarus*	Belgium	Belize
Benin	Bhutan	Bolivia	Bosnia Herzegovina
Botswana	Brazil	Brunei Darussalam	Bulgaria**
Burkina Faso	Burundi	Cabo Verde	Cambodia
Cameroon	Canada	Central African Rep.	Chad
Chile	China	Colombia	Comoros
Congo	Costa Rica	Croatia	Cuba**
Cyprus	Czechia**	Côte d'Ivoire	DPKR
Dem. Rep. of Congo	Denmark	Djibouti	Dominica
Dominican Republic	Ecuador	Egypt	El Salvador
Equatorial Guinea	Eritrea	Estonia*	Eswatini
Ethiopia	Micronesia	Fiji	Finland
Former Sudan	France	Gabon	Gambia
Georgia*	Germany	Ghana	Greece
Guatemala	Guinea	Guinea-Bissau	Guyana
Haiti	Honduras	Hong Kong	Hungary**
Iceland	India	Indonesia	Iran
Iraq	Ireland	Israel	Italy
Jamaica	Japan	Jordan	Kazakhstan*
Kenya	Kiribati	Kuwait	Kyrgyzstan*
Laos	Latvia*	Lebanon	Lesotho
Liberia	Libya	Lithuania*	Luxembourg
Madagascar	Malawi	Malaysia	Maldives
Mali	Malta	Mauritania	Mauritius
Mexico	Mongolia**	Montenegro	Morocco
Mozambique	Myanmar	Namibia	Nepal
Netherlands	New Zealand	Nicaragua	Niger
Nigeria	North Macedonia	Norway	Oman
Pakistan	Panama	Papua New Guinea	Paraguay
Peru	Philippines	Poland**	Portugal
Qatar	Rep. of Korea	Rep. of Moldova*	Romania**
Rwanda	Saint Lucia	Saint Vincent & Grenadines	Samoa
Sao Tome & Principe	Saudi Arabia	Senegal	Serbia
Seychelles	Sierra Leone	Singapore	Slovakia**
Slovenia	Solomon Islands	Somalia	South Africa
Spain	Sri Lanka	Sudan	Suriname
Swaziland	Sweden	Switzerland	Syria
Tajikistan*	Thailand	Timor-Leste	Togo
Tonga	Trinidad & Tobago	Tunisia	Turkey
Turkmenistan*	USA	Uganda	Ukraine*
United Arab Emirates	United Kingdom	Tanzania	Uruguay
Uzbekistan*	Vanuatu	Venezuela	Viet Nam**
Yemen	Zambia	Zimbabwe	

Note: * indicates former members of the Soviet Union, ** indicates former members of Comecon

Table 2.3: PPML Results by Type of Trade Over All Years (1996-2017)

	Total Trade	Intra-Industry Trade	Inter-Industry Trade	Horizontal Intra-Industry Trade	Verticle Intra-Industry Trade
Log of GDP	0.478***	0.663***	0.462***	0.901***	0.865***
	(0.0397)	(0.0386)	(0.0426)	(0.0531)	(0.0422)
Log of Distance	-0.138	-0.433***	-0.0950	-0.610***	-0.625***
	(0.0735)	(0.0616)	(0.0830)	(0.0691)	(0.0816)
Contiguous Borders	0.379***	0.598***	0.379***	0.737***	0.548***
	(0.0819)	(0.0753)	(0.0898)	(0.195)	(0.0921)
Economic Freedom Index	-0.00881*	-0.0128*	-0.00631	-0.0137*	-0.0126*
	(0.00383)	(0.00505)	(0.00409)	(0.00637)	(0.00532)
Log of Difference in Per Capita GDP	0.111***	0.0729	0.120***	0.142*	0.00138
	(0.0331)	(0.0505)	(0.0354)	(0.0577)	(0.0418)
Log of Foreign Direct Investment	0.157***	0.169***	0.153***	0.115***	0.0436
	(0.0392)	(0.0314)	(0.0417)	(0.0320)	(0.0362)
Time-Interacted USSR Membership	0.000417***	0.00127***	0.000232***	0.00157***	0.000456***
	(0.0000568)	(0.0000641)	(0.0000608)	(0.0000814)	(0.0000657)
Time-Interacted Comecon Membership	0.000149***	0.000155**	0.000161***	0.000281**	0.000245***
	(0.0000415)	(0.0000541)	(0.0000424)	(0.0000878)	(0.0000542)
Exporter Remoteness Index	0.0457	-0.278***	0.0723**	-0.229***	-0.387***
	(0.0236)	(0.0272)	(0.0239)	(0.0347)	(0.0288)
Importer Remoteness Index	-0.371***	-0.0455	-0.395***	-0.0639*	0.276***
	(0.0337)	(0.0262)	(0.0359)	(0.0326)	(0.0269)
Constant	13.15***	7.323***	12.99***	2.764*	5.842***
	(0.759)	(0.837)	(0.891)	(1.107)	(0.957)
Observations	3119	3119	3119	3104	3104
R^2	0.681	0.892	0.642	0.901	0.730

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.4: Total Trade PPML Results by Year

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Log of GDP	0.482***	0.381***	0.511***	0.555***	0.422**	0.429***	0.443***	0.320***	0.295**	0.354***	0.187*	0.397***	0.428***	-0.0348	0.416***	0.385***	0.00428	-0.0114	-0.0165	-0.0388	0.0236	-0.00698	-0.00831
	(0.121)	(0.106)	(0.0731)	(0.0659)	(0.0885)	(0.0843)	(0.0781)	(0.0940)	(0.106)	(0.103)	(0.0837)	(0.108)	(0.115)	(0.0341)	(0.121)	(0.0820)	(0.0316)	(0.0303)	(0.0313)	(0.0275)	(0.0329)	(0.0243)	(0.0197)
Log of Distance	-0.480	0.0254	-0.267	-0.376*	-0.212	-0.206	-0.224	-0.128	-0.0661	0.0425	-0.0154	0.0217	-0.0799	0.985***	-0.242	-0.415	0.978***	0.896***	0.959***	1.042***	1.019***	1.028***	1.018***
	(0.294)	(0.232)	(0.173)	(0.162)	(0.171)	(0.167)	(0.162)	(0.208)	(0.241)	(0.248)	(0.240)	(0.290)	(0.270)	(0.0618)	(0.257)	(0.252)	(0.0560)	(0.0524)	(0.0522)	(0.0427)	(0.0452)	(0.0337)	(0.0325)
Contiguous Borders	-0.000999	0.0224	-0.0473	-0.00861	0.130	0.145	0.129	0.0925	0.214	0.200	0.232	0.188	0.302*	-0.0346	0.0931	0.0865	0.0000709	0.113*	-0.0481	-0.0340	0.0596	0.0383	0.0149
	(0.255)	(0.156)	(0.203)	(0.213)	(0.170)	(0.161)	(0.141)	(0.134)	(0.147)	(0.150)	(0.176)	(0.157)	(0.154)	(0.0436)	(0.184)	(0.179)	(0.0355)	(0.0492)	(0.0609)	(0.0387)	(0.0373)	(0.0329)	(0.0304)
Economic Freedom Index	0.0236	0.0213**	0.000632	0.0233*	0.00667	0.0137	0.0204*	0.0176	0.00174	0.00563	0.00143	0.00367	0.0222*	-0.00521	-0.00303	-0.00560	-0.0123***	-0.00652	-0.00451	-0.00586*	-0.00716*	-0.0102**	-0.00699*
	(0.0128)	(0.00743)	(0.0122)	(0.00966)	(0.0107)	(0.00919)	(0.00827)	(0.00983)	(0.0118)	(0.0142)	(0.0128)	(0.0116)	(0.0103)	(0.00324)	(0.0109)	(0.00984)	(0.00359)	(0.00394)	(0.00323)	(0.00242)	(0.00322)	(0.00348)	(0.00323)
Log of Difference in Per Capita GDP	-0.193	-0.122*	-0.0489	-0.188*	-0.106	-0.136	-0.188*	-0.173	-0.0464	-0.0278	-0.0656	-0.0561	-0.160	0.0510*	-0.0577	-0.0855	0.134***	0.122***	0.0706*	0.0771***	0.0636*	0.0770*	0.0583*
	(0.110)	(0.0619)	(0.103)	(0.0744)	(0.0803)	(0.0784)	(0.0827)	(0.0982)	(0.110)	(0.117)	(0.109)	(0.111)	(0.107)	(0.0239)	(0.103)	(0.108)	(0.0302)	(0.0359)	(0.0310)	(0.0221)	(0.0297)	(0.0320)	(0.0235)
Log of Foreign Direct Investment	0.0742	-0.00895	0.100*	0.0295	0.142*	0.124*	0.106*	0.198**	0.208**	0.155*	0.316***	0.167*	0.104	0.0719*	0.157	0.284**	0.0362***	0.0536***	0.0591**	0.0490***	-0.00636	0.0210	0.0219
	(0.0738)	(0.0889)	(0.0412)	(0.0387)	(0.0571)	(0.0605)	(0.0530)	(0.0661)	(0.0738)	(0.0757)	(0.0825)	(0.0805)	(0.0826)	(0.0283)	(0.0966)	(0.107)	(0.00587)	(0.0112)	(0.0205)	(0.00991)	(0.0201)	(0.0178)	(0.0127)
USSR Membership	0.823	0.391	1.225***	0.906**	1.130**	0.842*	0.600	0.468	0.518	0.470	0.253	0.346	0.190	0.0191	-0.284	0.0295	0.0710	-0.0280	0.143	0.125*	0.00123	0.0216	0.0744
	(1.504)	(0.351)	(0.325)	(0.336)	(0.360)	(0.348)	(0.309)	(0.367)	(0.378)	(0.441)	(0.402)	(0.467)	(0.433)	(0.0710)	(0.582)	(0.478)	(0.0734)	(0.0713)	(0.0742)	(0.0612)	(0.0539)	(0.0464)	(0.0647)
Comecon Membership	0.258	0.287	0.489**	0.382	0.387*	0.259	0.148	0.0810	0.00994	0.186	0.00647	0.169	0.165	-0.0391	0.0180	0.162	0.0160	0.0409	-0.0111	0.0432	-0.0101	-0.000242	-0.00522
	(0.249)	(0.169)	(0.188)	(0.232)	(0.182)	(0.172)	(0.152)	(0.163)	(0.164)	(0.173)	(0.185)	(0.179)	(0.179)	(0.0473)	(0.191)	(0.190)	(0.0464)	(0.0624)	(0.0614)	(0.0455)	(0.0529)	(0.0390)	(0.0408)
Exporter Remoteness Index	0.0226	-0.114	-0.0269	-0.0639	0.0184	-0.0402	-0.0379	0.00476	0.0222	0.00209	-0.116	-0.0354	-0.0898	-0.376***	-0.0426	-0.0351	-0.289***	-0.319***	-0.341***	-0.326***	-0.272***	-0.272***	-0.249***
	(0.0825)	(0.0769)	(0.0679)	(0.0498)	(0.0414)	(0.0453)	(0.0510)	(0.0817)	(0.0729)	(0.0652)	(0.0754)	(0.0614)	(0.0756)	(0.0248)	(0.0741)	(0.0439)	(0.0403)	(0.0382)	(0.0325)	(0.0308)	(0.0462)	(0.0374)	(0.0346)
Importer Remoteness Index	-0.378***	-0.457***	-0.301***	-0.293***	-0.357***	-0.329***	-0.346***	-0.432***	-0.426***	-0.430***	-0.325***	-0.379***	-0.332**	-0.606***	-0.359***	-0.284***	-0.672***	-0.615***	-0.641***	-0.677***	-0.712***	-0.720***	-0.738***
	(0.100)	(0.0673)	(0.0724)	(0.0700)	(0.0611)	(0.0605)	(0.0735)	(0.114)	(0.101)	(0.0854)	(0.0830)	(0.0827)	(0.111)	(0.0394)	(0.103)	(0.0661)	(0.0275)	(0.0264)	(0.0283)	(0.0189)	(0.0364)	(0.0286)	(0.0304)
Constant	18.57***	22.79***	14.63***	16.22***	15.88***	16.45***	17.02***	18.75***	18.32***	17.38***	19.40***	16.61***	18.11***	33.44***	18.82***	16.83***	33.31***	32.99***	33.74***	34.04***	33.96***	34.58***	34.71***
	(2.618)	(2.564)	(2.028)	(1.925)	(2.049)	(1.947)	(1.966)	(2.423)	(2.497)	(3.021)	(2.554)	(3.240)	(3.039)	(0.963)	(3.135)	(2.788)	(1.097)	(0.933)	(0.773)	(0.748)	(0.792)	(0.541)	(0.559)
Observations	105	113	118	122	127	126	130	134	133	132	136	133	140	142	147	147	149	143	151	146	148	151	146
R^2	0.822	0.907	0.913	0.911	0.923	0.921	0.902	0.898	0.878	0.840	0.892	0.834	0.797	0.994	0.854	0.912	0.996	0.996	0.994	0.998	0.997	0.998	0.999

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.5: Intra-Industry Trade per Country PPML Results by Year

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Log of GDP	0.653***	0.609***	0.521***	0.587***	0.386**	0.458***	0.579***	0.408***	0.368***	0.468***	0.309*	0.644***	0.443**	0.108	0.544***	0.603***	0.142	0.116	-0.00729	0.117	0.0321	0.0464	0.328**
	(0.111)	(0.0728)	(0.0865)	(0.0711)	(0.120)	(0.121)	(0.107)	(0.101)	(0.0857)	(0.0902)	(0.129)	(0.114)	(0.158)	(0.0973)	(0.0815)	(0.105)	(0.111)	(0.110)	(0.0919)	(0.0845)	(0.106)	(0.125)	(0.114)
Log of Distance	-0.699***	-0.237	0.164	-0.240	-0.156	-0.174	-0.268	-0.0949	-0.210	-0.0270	-0.204	-0.437	-0.470	0.578**	-0.695***	-0.636***	0.680*	0.713***	0.768**	0.695***	0.663***	0.738***	0.606***
	(0.187)	(0.181)	(0.159)	(0.195)	(0.202)	(0.184)	(0.173)	(0.162)	(0.139)	(0.230)	(0.256)	(0.306)	(0.294)	(0.210)	(0.114)	(0.118)	(0.216)	(0.197)	(0.288)	(0.152)	(0.155)	(0.189)	(0.151)
Contiguous Borders	0.412	0.673*	0.563*	0.825*	0.804*	0.904*	0.712**	0.641*	0.623**	0.643*	0.658*	0.585*	0.533*	0.0377	0.208	-0.149	0.0106	-0.233	-0.187	-0.0713	0.0482	0.0261	-0.212
	(0.368)	(0.296)	(0.283)	(0.369)	(0.356)	(0.407)	(0.233)	(0.250)	(0.238)	(0.256)	(0.281)	(0.272)	(0.254)	(0.155)	(0.221)	(0.156)	(0.249)	(0.162)	(0.288)	(0.172)	(0.219)	(0.183)	(0.203)
Economic Freedom Index	0.0296*	0.0277**	-0.00321	-0.00348	-0.0107	0.0120	0.00209	-0.00637	-0.0166	-0.0112	0.0139	-0.00178	0.0104	0.0165	0.0249*	0.0175	0.0397*	0.0241*	0.0197	0.0068	0.0198	0.0175	0.0252
	(0.0148)	(0.00919)	(0.0168)	(0.0179)	(0.0219)	(0.0160)	(0.0155)	(0.0152)	(0.0131)	(0.0195)	(0.0184)	(0.0181)	(0.0170)	(0.00868)	(0.0123)	(0.0111)	(0.0172)	(0.0114)	(0.0139)	(0.00989)	(0.0107)	(0.0131)	(0.0130)
Log of Difference in Per Capita GDP	-0.307***	-0.271***	-0.0396	-0.0748	-0.0990	-0.150	-0.115	-0.0498	-0.0195	-0.00492	-0.201	-0.126	-0.269	-0.298**	-0.479***	-0.469***	-0.401	-0.349*	-0.218	-0.169	-0.304	-0.282	-0.300
	(0.0887)	(0.0672)	(0.142)	(0.138)	(0.151)	(0.137)	(0.136)	(0.126)	(0.0968)	(0.162)	(0.160)	(0.182)	(0.165)	(0.0998)	(0.0984)	(0.106)	(0.220)	(0.176)	(0.192)	(0.142)	(0.157)	(0.188)	(0.186)
Log of Foreign Direct Investment	-0.00606	-0.0141	0.129	0.0693	0.288*	0.252*	0.163	0.295**	0.307***	0.237**	0.326**	0.191	0.318*	0.193*	0.247***	0.291*	0.0574	0.108	0.156	0.109*	0.127	0.115	-0.106
	(0.117)	(0.0762)	(0.0832)	(0.0769)	(0.114)	(0.117)	(0.122)	(0.0906)	(0.0721)	(0.0739)	(0.119)	(0.0981)	(0.127)	(0.0801)	(0.0644)	(0.125)	(0.0433)	(0.0597)	(0.0845)	(0.0496)	(0.0681)	(0.0873)	(0.0790)
USSR Membership	1.266**	1.187**	2.035***	1.151*	1.652**	1.727**	1.972***	2.111***	1.978***	2.195***	1.695**	2.114***	1.913***	1.400***	1.589***	2.450***	1.719***	1.974***	1.817***	1.781***	1.253***	1.351***	1.823***
	(0.387)	(0.389)	(0.359)	(0.513)	(0.580)	(0.579)	(0.467)	(0.432)	(0.349)	(0.550)	(0.555)	(0.597)	(0.536)	(0.251)	(0.348)	(0.317)	(0.363)	(0.286)	(0.350)	(0.232)	(0.372)	(0.320)	(0.445)
Comecon Membership	0.263	0.0728	0.291	-0.369	-0.106	-0.166	-0.165	0.0578	-0.278	0.141	-0.174	-0.107	-0.259	-0.104	-0.310	0.445	0.000260	0.276	-0.0570	0.326	-0.0126	0.0419	0.432
	(0.436)	(0.389)	(0.351)	(0.511)	(0.605)	(0.663)	(0.487)	(0.423)	(0.391)	(0.369)	(0.338)	(0.332)	(0.314)	(0.197)	(0.374)	(0.247)	(0.277)	(0.236)	(0.282)	(0.228)	(0.249)	(0.209)	(0.228)
Exporter Remoteness Index	-0.300**	-0.292***	-0.320**	-0.252**	-0.368***	-0.451***	-0.401***	-0.391***	-0.397***	-0.347***	-0.578***	-0.344***	-0.379***	-0.771***	-0.490***	-0.498***	-0.844***	-0.836***	-0.959***	-0.799***	-0.712***	-0.685***	-0.861***
	(0.0749)	(0.0816)	(0.109)	(0.0971)	(0.0798)	(0.0953)	(0.0854)	(0.0755)	(0.0742)	(0.0752)	(0.0886)	(0.0862)	(0.0700)	(0.0815)	(0.0572)	(0.0554)	(0.0853)	(0.0871)	(0.0934)	(0.0807)	(0.0754)	(0.0809)	(0.0879)
Importer Remoteness Index	-0.147	-0.246**	-0.158	-0.192	-0.0763	-0.0443	-0.0191	-0.0620	-0.0490	-0.0959	0.0848	-0.0270	-0.00703	-0.211**	0.0497	0.102	-0.202**	-0.209**	-0.170*	-0.240***	-0.365***	-0.400***	-0.192*
	(0.0795)	(0.0880)	(0.109)	(0.103)	(0.0686)	(0.0889)	(0.0882)	(0.0739)	(0.0692)	(0.0671)	(0.0665)	(0.0718)	(0.0586)	(0.0712)	(0.0510)	(0.0547)	(0.0667)	(0.0811)	(0.0732)	(0.0647)	(0.0920)	(0.0977)	(0.0875)
Constant	17.05***	16.39***	10.65***	13.11***	13.00***	12.04***	10.45***	11.36***	13.37***	10.45***	15.00***	9.531**	13.19***	28.20***	16.04***	12.36***	30.99***	30.68***	33.00***	29.23***	33.72**	33.36***	30.38***
	(1.740)	(1.911)	(1.885)	(2.753)	(2.675)	(2.326)	(2.413)	(2.337)	(1.783)	(3.004)	(2.912)	(3.644)	(3.546)	(3.005)	(1.965)	(2.021)	(2.392)	(3.068)	(2.190)	(2.182)	(2.694)	(2.423)	(3.179)
Observations	105	113	118	122	127	126	130	134	133	132	136	133	140	142	147	147	149	143	151	146	148	151	146
R^2	0.978	0.965	0.988	0.979	0.982	0.981	0.985	0.990	0.993	0.982	0.978	0.970	0.967	0.986	0.983	0.986	0.970	0.979	0.962	0.980	0.971	0.976	0.977

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.6: Inter-Industry Trade per Country PPML Results by Year

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Log of GDP	0.488**	0.353**	0.611***	0.640***	0.469***	0.460***	0.465***	0.345**	0.307**	0.350**	0.180	0.360**	0.409***	-0.0510	0.381**	0.369***	-0.0101	-0.0182	-0.0106	-0.0444	0.0219	0.00124	-0.0127
	(0.155)	(0.116)	(0.140)	(0.119)	(0.112)	(0.108)	(0.0989)	(0.113)	(0.118)	(0.116)	(0.0928)	(0.119)	(0.123)	(0.0391)	(0.133)	(0.0951)	(0.0346)	(0.0326)	(0.0416)	(0.0357)	(0.0383)	(0.0296)	(0.0259)
Log of Distance	-0.556	0.0534	-0.594	-0.611*	-0.339	-0.346	-0.328	-0.235	-0.136	0.0339	0.00426	0.132	0.00687	1.053***	-0.101	-0.350	1.027***	0.936***	0.978***	1.083***	1.070***	1.048**	1.029***
	(0.403)	(0.259)	(0.319)	(0.288)	(0.232)	(0.242)	(0.226)	(0.271)	(0.283)	(0.280)	(0.280)	(0.310)	(0.280)	(0.0736)	(0.288)	(0.320)	(0.0699)	(0.0580)	(0.0691)	(0.0562)	(0.0619)	(0.0532)	(0.0449)
Contiguous Borders	-0.0548	-0.0712	-0.183	-0.156	0.0611	0.0595	0.0803	0.0515	0.186	0.172	0.217	0.166	0.292	-0.0655	0.104	0.147	0.0249	0.179*	-0.0288	-0.0207	0.0635	0.0380	0.0346
	(0.263)	(0.149)	(0.240)	(0.227)	(0.169)	(0.158)	(0.156)	(0.141)	(0.156)	(0.155)	(0.182)	(0.164)	(0.172)	(0.0533)	(0.207)	(0.221)	(0.0611)	(0.0708)	(0.0820)	(0.0575)	(0.0599)	(0.0504)	(0.0500)
Economic Freedom Index	0.0256	0.0217**	0.00655	0.0334**	0.0138	0.0201*	0.0272**	0.0251*	0.00638	0.00821	0.00110	0.00554	0.0249*	-0.00673	-0.000957	-0.00230	-0.0129**	-0.00572	-0.00490	-0.00636	-0.00768*	-0.00926*	-0.00592
	(0.0145)	(0.00828)	(0.0135)	(0.0117)	(0.0106)	(0.00998)	(0.00916)	(0.0102)	(0.0122)	(0.0144)	(0.0133)	(0.0121)	(0.0107)	(0.00357)	(0.0117)	(0.0114)	(0.00396)	(0.00382)	(0.00414)	(0.00332)	(0.00371)	(0.00404)	(0.00342)
Log of Difference in Per Capita GDP	-0.188	-0.104	-0.0877	-0.242**	-0.113	-0.154	-0.216*	-0.209*	-0.0613	-0.0226	-0.0404	-0.0306	-0.143	0.0872**	-0.0287	-0.0648	0.162***	0.158***	0.0932*	0.0985**	0.0933*	0.0913*	0.0629
	(0.128)	(0.0661)	(0.113)	(0.0931)	(0.0849)	(0.0827)	(0.0872)	(0.104)	(0.114)	(0.116)	(0.115)	(0.116)	(0.111)	(0.0282)	(0.107)	(0.120)	(0.0351)	(0.0361)	(0.0428)	(0.0318)	(0.0389)	(0.0410)	(0.0321)
Log of Foreign Direct Investment	0.0932	-0.0112	0.103*	0.0218	0.128*	0.122*	0.107*	0.189*	0.211*	0.147	0.317***	0.150	0.0776	0.0653*	0.137	0.269*	0.0295***	0.0440***	0.0559*	0.0409**	-0.0182	0.0123	0.0244
	(0.0816)	(0.0384)	(0.0519)	(0.0442)	(0.0579)	(0.0615)	(0.0518)	(0.0738)	(0.0843)	(0.0817)	(0.0932)	(0.0823)	(0.0797)	(0.0303)	(0.0900)	(0.115)	(0.00710)	(0.0122)	(0.0225)	(0.0127)	(0.0256)	(0.0207)	(0.0190)
USSR Membership	0.674	0.177	1.176**	0.928*	1.015**	0.604	0.285	0.0900	0.184	0.0860	-0.0847	-0.161	-0.283	-0.205*	-0.973	-0.626	-0.214	-0.313**	-0.108	-0.134	-0.232*	-0.237**	-0.233*
	(0.629)	(0.398)	(0.456)	(0.385)	(0.376)	(0.356)	(0.322)	(0.381)	(0.415)	(0.471)	(0.429)	(0.534)	(0.478)	(0.0986)	(0.742)	(0.601)	(0.118)	(0.107)	(0.123)	(0.103)	(0.0925)	(0.0845)	(0.0949)
Comecon Membership	0.287	0.317*	0.610*	0.530*	0.515**	0.357*	0.203	0.107	0.0489	0.207	0.0518	0.211	0.205	0.0173	0.0628	0.153	0.0215	0.0231	0.0213	0.0400	0.00361	0.0155	-0.0190
	(0.259)	(0.159)	(0.239)	(0.243)	(0.179)	(0.170)	(0.152)	(0.166)	(0.176)	(0.176)	(0.187)	(0.180)	(0.183)	(0.0599)	(0.187)	(0.211)	(0.0569)	(0.0769)	(0.0688)	(0.0515)	(0.0587)	(0.0457)	(0.0474)
Exporter Remoteness Index	0.0864	-0.107	0.0412	-0.0109	0.0858	0.0227	0.0135	0.0470	0.0577	0.0271	-0.0755	-0.0161	-0.0728	-0.347***	-0.0293	-0.0106	-0.258***	-0.281***	-0.287***	-0.280***	-0.238***	-0.238***	-0.218***
	(0.101)	(0.0824)	(0.0925)	(0.0645)	(0.0489)	(0.0544)	(0.0589)	(0.0810)	(0.0712)	(0.0713)	(0.0780)	(0.0676)	(0.0779)	(0.0261)	(0.0775)	(0.0556)	(0.0380)	(0.0374)	(0.0437)	(0.0380)	(0.0444)	(0.0366)	(0.0342)
Importer Remoteness Index	-0.382**	-0.468***	-0.234*	-0.242*	-0.353***	-0.314***	-0.342***	-0.430***	-0.422***	-0.443***	-0.348***	-0.419***	-0.367**	-0.637***	-0.403***	-0.311***	-0.704***	-0.644***	-0.675***	-0.714***	-0.740***	-0.738***	-0.754***
	(0.119)	(0.0739)	(0.113)	(0.0981)	(0.0835)	(0.0823)	(0.0902)	(0.125)	(0.110)	(0.0942)	(0.0914)	(0.0868)	(0.115)	(0.0420)	(0.109)	(0.0785)	(0.0289)	(0.0279)	(0.0316)	(0.0239)	(0.0388)	(0.0299)	(0.0298)
Constant	17.20***	23.18***	11.70**	13.68***	14.07***	14.91***	15.93***	18.07***	17.51***	17.30***	18.86***	17.18***	18.55***	33.28***	19.30***	16.73***	33.25***	32.50***	32.93***	33.71***	33.47***	33.83***	34.23***
	(3.810)	(2.897)	(4.116)	(3.289)	(2.956)	(2.958)	(2.800)	(3.117)	(3.188)	(3.578)	(3.131)	(3.835)	(3.411)	(1.172)	(3.754)	(3.500)	(1.107)	(1.030)	(0.962)	(1.006)	(0.970)	(0.752)	(0.723)
Observations	105	113	118	122	127	126	130	134	133	132	136	133	140	142	147	147	149	143	151	146	148	151	146
R^2	0.757	0.894	0.834	0.857	0.876	0.875	0.850	0.850	0.817	0.808	0.878	0.818	0.779	0.992	0.847	0.900	0.994	0.995	0.991	0.995	0.993	0.996	0.997

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.7: Horizontal Intra-Industry Trade per Country PPML Results by Year

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Log of GDP	0.977***	0.858***	0.622***	0.724***	0.590***	0.563***	0.670***	0.542***	0.485***	0.711***	0.498	0.888***	0.620**	0.350**	0.789***	0.828***	0.479***	0.379*	0.249*	0.363*	0.149	0.0554	0.124
	(0.151)	(0.101)	(0.107)	(0.102)	(0.112)	(0.126)	(0.135)	(0.134)	(0.112)	(0.129)	(0.256)	(0.158)	(0.245)	(0.122)	(0.0866)	(0.108)	(0.117)	(0.149)	(0.100)	(0.115)	(0.107)	(0.110)	(0.0834)
Log of Distance	-1.263***	-0.932***	-0.0368	-0.450	-0.470**	-0.564**	-0.591*	-0.425*	-0.472***	-0.344	-0.471	-0.623	-0.615	0.161	-0.957***	-0.854***	0.120	0.225	0.407	0.221	0.968***	0.989***	1.080***
	(0.288)	(0.234)	(0.230)	(0.238)	(0.175)	(0.215)	(0.245)	(0.208)	(0.125)	(0.262)	(0.331)	(0.337)	(0.328)	(0.286)	(0.115)	(0.124)	(0.249)	(0.319)	(0.302)	(0.195)	(0.179)	(0.178)	(0.164)
Contiguous Borders	0.961**	0.364	0.454	0.340	0.688	0.784	0.721*	0.794**	0.815**	0.698*	0.719*	0.363	0.291	-0.0434	0.193	-0.318	-0.331	-0.342	-0.483	-0.300	0.279	0.112	-0.0493
	(0.324)	(0.461)	(0.298)	(0.457)	(0.483)	(0.456)	(0.289)	(0.287)	(0.258)	(0.291)	(0.366)	(0.375)	(0.312)	(0.211)	(0.321)	(0.198)	(0.225)	(0.246)	(0.254)	(0.175)	(0.184)	(0.140)	(0.179)
Economic Freedom Index	0.0531*	0.0288	-0.0136	-0.0128	-0.0108	-0.00475	0.00171	-0.0155	-0.0348**	-0.0354	-0.00228	-0.0385	-0.0168	0.0120	0.0276*	0.0284*	0.0155	0.00547	0.0134	0.00921	0.0157	0.00627	0.0290
	(0.0214)	(0.0159)	(0.0224)	(0.0208)	(0.0202)	(0.0192)	(0.0224)	(0.0193)	(0.0128)	(0.0217)	(0.0239)	(0.0234)	(0.0183)	(0.0137)	(0.0139)	(0.0134)	(0.0216)	(0.0178)	(0.0146)	(0.0149)	(0.0112)	(0.0153)	(0.0152)
Log of Difference in Per Capita GDP	-0.329*	-0.296*	0.0455	-0.0559	0.0175	-0.0404	-0.132	0.0432	0.0883	0.153	-0.0498	0.250	0.0190	-0.165	-0.440***	-0.513***	-0.0646	0.0924	-0.0213	0.00198	-0.180	-0.0910	-0.146
	(0.132)	(0.133)	(0.197)	(0.191)	(0.157)	(0.170)	(0.192)	(0.174)	(0.106)	(0.189)	(0.215)	(0.244)	(0.205)	(0.159)	(0.0943)	(0.121)	(0.284)	(0.306)	(0.240)	(0.239)	(0.171)	(0.175)	(0.163)
Log of Foreign Direct Investment	-0.0881	0.105	0.206	0.156	0.350***	0.388**	0.289	0.383**	0.423***	0.274**	0.402	0.228	0.350	0.284**	0.293***	0.340**	0.0968	0.158	0.167	0.160*	0.0818	0.158	0.0794
	(0.153)	(0.129)	(0.107)	(0.102)	(0.0927)	(0.137)	(0.151)	(0.134)	(0.0902)	(0.0930)	(0.209)	(0.140)	(0.183)	(0.0966)	(0.0658)	(0.123)	(0.0542)	(0.100)	(0.115)	(0.0702)	(0.0606)	(0.0853)	(0.0592)
USSR Membership	1.894***	2.186***	2.963***	2.355***	3.114***	2.822***	2.653***	2.840***	2.825***	3.213***	2.721***	3.614***	3.125***	2.451***	2.554***	3.603***	3.236***	3.452***	3.171***	2.923***	1.825***	1.707***	2.064***
	(0.376)	(0.601)	(0.400)	(0.650)	(0.598)	(0.629)	(0.553)	(0.523)	(0.357)	(0.610)	(0.737)	(0.732)	(0.646)	(0.317)	(0.405)	(0.322)	(0.348)	(0.344)	(0.276)	(0.221)	(0.219)	(0.220)	(0.375)
Comecon Membership	-0.182	0.363	0.513	-0.108	0.348	0.0958	0.0476	0.291	-0.0180	0.440	0.206	0.570	0.374	0.166	0.0991	1.047***	0.532	0.951*	0.431	0.786***	0.409	0.539*	0.587*
	(0.463)	(0.537)	(0.302)	(0.439)	(0.687)	(0.572)	(0.412)	(0.350)	(0.351)	(0.354)	(0.442)	(0.432)	(0.405)	(0.250)	(0.423)	(0.234)	(0.352)	(0.420)	(0.292)	(0.226)	(0.312)	(0.212)	(0.275)
Exporter Remoteness Index	-0.414***	-0.199*	-0.268*	-0.108	-0.349***	-0.386***	-0.435***	-0.389***	-0.325***	-0.162	-0.467***	-0.252**	-0.251**	-0.658***	-0.334***	-0.441***	-0.819***	-0.804***	-0.918***	-0.832***	-0.911***	-0.994***	-1.004***
	(0.0885)	(0.0924)	(0.113)	(0.118)	(0.0826)	(0.103)	(0.128)	(0.0951)	(0.0923)	(0.0894)	(0.135)	(0.0968)	(0.0895)	(0.118)	(0.0975)	(0.0843)	(0.110)	(0.153)	(0.126)	(0.114)	(0.0851)	(0.0907)	(0.0893)
Importer Remoteness Index	0.0499	-0.184*	-0.130	-0.272*	-0.0405	-0.0273	0.0510	-0.00285	-0.0491	-0.182*	0.0642	-0.0279	-0.0382	-0.216*	-0.0595	0.0663	-0.0595	-0.0907	-0.218*	-0.194*	-0.364***	-0.257*	-0.277*
	(0.0882)	(0.0929)	(0.106)	(0.123)	(0.0745)	(0.0977)	(0.123)	(0.0893)	(0.0840)	(0.0834)	(0.102)	(0.0916)	(0.0835)	(0.104)	(0.0867)	(0.0780)	(0.118)	(0.143)	(0.103)	(0.0971)	(0.0941)	(0.103)	(0.0878)
Constant	12.24***	10.10***	6.721**	8.649*	6.975**	8.451**	7.931**	7.577	8.966***	4.077	9.234*	0.755	6.328	22.54***	9.707***	6.901***	23.17***	23.08***	31.30***	27.12***	36.84***	37.29***	36.20***
	(2.156)	(2.502)	(2.511)	(3.480)	(2.488)	(2.696)	(2.855)	(3.081)	(2.233)	(3.617)	(4.590)	(4.359)	(4.397)	(3.916)	(1.790)	(1.896)	(4.005)	(4.332)	(2.750)	(3.218)	(2.722)	(2.378)	(2.578)
Observations	105	111	118	122	127	124	130	132	132	130	135	132	140	141	147	146	148	143	151	145	148	151	146
R^2	0.992	0.977	0.996	0.994	0.997	0.995	0.995	0.997	0.999	0.993	0.988	0.989	0.988	0.972	0.995	0.997	0.980	0.972	0.970	0.958	0.987	0.987	0.983

Standard errors in parentheses

$* \ p < 0.05$, $** \ p < 0.01$, $*** \ p < 0.001$

Table 2.8: Vertical Intra-Industry Trade per Country PPML Results by Year

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Log of GDP	0.896*** (0.143)	0.747*** (0.0940)	0.839*** (0.126)	0.878*** (0.120)	0.698*** (0.134)	0.823*** (0.126)	0.809*** (0.107)	0.711*** (0.120)	0.709*** (0.140)	0.829*** (0.151)	0.689*** (0.137)	0.896*** (0.157)	0.927*** (0.150)	0.264*** (0.0447)	0.897*** (0.128)	0.763*** (0.103)	0.264*** (0.0533)	0.269*** (0.0536)	0.273*** (0.0375)	0.302*** (0.0370)	0.268*** (0.0432)	0.186*** (0.0353)	0.196*** (0.0408)
Log of Distance	-1.405*** (0.331)	-0.808*** (0.185)	-0.892*** (0.259)	-1.060*** (0.274)	-0.770** (0.276)	-0.948*** (0.282)	-1.038*** (0.267)	-0.961*** (0.289)	-0.732** (0.267)	-0.739* (0.351)	-0.686* (0.336)	-0.675 (0.345)	-0.633* (0.298)	0.688*** (0.110)	-0.819** (0.250)	-0.868** (0.329)	0.713*** (0.114)	0.617*** (0.128)	0.639*** (0.1000)	0.666*** (0.0775)	0.771*** (0.0915)	0.865*** (0.0717)	0.857*** (0.0850)
Contiguous Borders	-0.127 (0.439)	-0.134 (0.350)	-0.195 (0.385)	-0.228 (0.385)	-0.0872 (0.322)	0.0248 (0.306)	0.141 (0.221)	0.106 (0.249)	0.351 (0.286)	0.254 (0.276)	0.272 (0.262)	0.332 (0.257)	0.396 (0.236)	-0.0615 (0.0905)	0.288 (0.252)	0.110 (0.257)	0.0133 (0.0753)	0.0613 (0.103)	-0.0320 (0.0782)	-0.00575 (0.0852)	-0.0227 (0.0666)	-0.0696 (0.0589)	-0.0850 (0.0832)
Economic Freedom Index	0.0324 (0.0177)	0.0209 (0.0110)	-0.00176 (0.0174)	0.00635 (0.0166)	-0.0119 (0.0172)	0.0193 (0.0161)	0.0182 (0.0136)	0.0121 (0.0166)	-0.0162 (0.0157)	-0.00185 (0.0194)	0.00152 (0.0174)	0.00117 (0.0164)	0.00630 (0.0147)	-0.0101 (0.00562)	-0.0145 (0.0145)	-0.0214 (0.0152)	-0.00371 (0.00521)	-0.00873* (0.00417)	-0.00582 (0.00400)	-0.0111* (0.00455)	-0.00752 (0.00397)	-0.00387 (0.00486)	-0.00510 (0.00429)
Log of Difference in Per Capita GDP	-0.305* (0.127)	-0.167* (0.0825)	-0.119 (0.145)	-0.289* (0.131)	-0.219 (0.130)	-0.302* (0.131)	-0.302* (0.124)	-0.266 (0.147)	-0.0279 (0.128)	-0.111 (0.154)	-0.179 (0.158)	-0.159 (0.161)	-0.192 (0.141)	0.0799 (0.0414)	-0.114 (0.134)	-0.105 (0.149)	0.0566 (0.0464)	0.109** (0.0341)	0.0721* (0.0363)	0.0952* (0.0391)	0.0828 (0.0432)	0.0639 (0.0437)	0.0577 (0.0420)
Log of Foreign Direct Investment	0.0346 (0.112)	0.00343 (0.0669)	0.107 (0.0607)	0.139* (0.0682)	0.295** (0.107)	0.128 (0.0817)	0.146* (0.0634)	0.243* (0.100)	0.188 (0.118)	0.0535 (0.0921)	0.156 (0.136)	-0.0553 (0.120)	-0.0740 (0.0949)	0.0717 (0.0392)	0.0325 (0.0881)	0.210 (0.158)	0.00495 (0.00894)	0.0198 (0.0250)	0.0295 (0.0330)	0.0000713 (0.0264)	-0.0170 (0.0290)	0.0128 (0.0285)	0.0337 (0.0269)
USSR Membership	1.643* (0.581)	1.067* (0.515)	1.968*** (0.516)	1.948*** (0.510)	2.441*** (0.545)	1.563** (0.534)	1.102** (0.425)	1.126* (0.510)	1.347** (0.476)	0.883 (0.553)	0.388 (0.534)	0.317 (0.558)	0.345 (0.553)	0.610*** (0.171)	0.133 (0.570)	0.112 (0.625)	0.465** (0.160)	0.312 (0.169)	0.497*** (0.129)	0.529*** (0.141)	0.493*** (0.136)	0.455*** (0.123)	0.546* (0.178)
Comecon Membership	0.397 (0.409)	0.472 (0.291)	0.695* (0.327)	0.502 (0.330)	0.728* (0.293)	0.453 (0.266)	0.314 (0.237)	0.363 (0.202)	0.396 (0.297)	0.416 (0.277)	0.246 (0.284)	0.324 (0.320)	0.522 (0.341)	0.256 (0.132)	0.345 (0.321)	0.468 (0.317)	0.221 (0.116)	0.236 (0.180)	0.240 (0.129)	0.308 (0.187)	0.342** (0.131)	0.256* (0.109)	0.259* (0.131)
Exporter Remoteness Index	-0.351*** (0.0961)	-0.391*** (0.0756)	-0.300** (0.103)	-0.353*** (0.0763)	-0.264** (0.0817)	-0.366*** (0.0873)	-0.383*** (0.0760)	-0.417*** (0.0796)	-0.366*** (0.0799)	-0.411*** (0.0910)	-0.474*** (0.0887)	-0.409*** (0.0972)	-0.420*** (0.0801)	-0.844*** (0.0517)	-0.384*** (0.0860)	-0.353*** (0.0887)	-0.873*** (0.0615)	-0.839*** (0.0588)	-0.863*** (0.0403)	-0.802*** (0.0412)	-0.871*** (0.0425)	-0.956*** (0.0310)	-0.851*** (0.0373)
Importer Remoteness Index	0.316*** (0.105)	0.139* (0.0708)	0.272** (0.0898)	0.360*** (0.0809)	0.269*** (0.0680)	0.308*** (0.0755)	0.326*** (0.0732)	0.333*** (0.0746)	0.327*** (0.0797)	0.299*** (0.0833)	0.297*** (0.0891)	0.241* (0.102)	0.243** (0.0877)	-0.0852* (0.0383)	0.272** (0.0903)	0.254** (0.0928)	-0.0977* (0.0401)	-0.0844* (0.0368)	-0.0777* (0.0367)	-0.124*** (0.0325)	-0.113* (0.0451)	-0.0835* (0.0333)	-0.156** (0.0475)
Constant	9.073* (3.741)	13.66*** (2.323)	4.967 (3.707)	4.323 (3.744)	3.591 (3.731)	6.251 (3.473)	7.213* (3.259)	7.901* (3.685)	5.874 (3.939)	7.628 (4.088)	10.78** (3.702)	10.04* (4.114)	9.677* (4.136)	29.49*** (2.114)	8.415* (3.654)	8.576* (3.984)	32.42*** (2.077)	31.41*** (2.014)	31.40*** (1.488)	30.42*** (1.414)	32.47*** (1.559)	34.71*** (1.384)	33.21*** (1.647)
Observations	105	111	118	122	127	124	130	132	132	130	135	132	140	141	147	146	148	143	151	145	148	151	146
R^2	0.868	0.809	0.841	0.827	0.833	0.870	0.885	0.871	0.903	0.764	0.790	0.815	0.850	0.987	0.893	0.883	0.989	0.991	0.992	0.993	0.994	0.996	0.995

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.9: PPML Three Year Total Trade Results

	96-98	99-01	02-04	05-07	08-10	11-13	14-16
Log of GDP	0.508***	0.475***	0.320***	0.308***	0.386***	0.473***	-0.0244
	(0.0691)	(0.0470)	(0.0744)	(0.0685)	(0.0690)	(0.0750)	(0.0331)
Log of Distance	-0.334*	-0.272**	-0.109	0.0472	-0.149	-0.177	1.033***
	(0.154)	(0.0969)	(0.147)	(0.165)	(0.160)	(0.169)	(0.0553)
Contiguous Borders	0.0122	0.0959	0.212	0.208	0.158	0.276*	0.0102
	(0.136)	(0.104)	(0.116)	(0.119)	(0.111)	(0.112)	(0.0620)
Economic Freedom Index	0.0166*	0.0142*	0.00503	0.000108	0.00341	-0.00561	-0.00742*
	(0.00654)	(0.00572)	(0.00718)	(0.00868)	(0.00684)	(0.00600)	(0.00304)
Log of Difference in Per Capita GDP	-0.121*	-0.140**	-0.0539	-0.0154	-0.0626	0.0471	0.0999***
	(0.0575)	(0.0441)	(0.0725)	(0.0691)	(0.0637)	(0.0512)	(0.0276)
Log of Foreign Direct Investment	0.0365	0.0931**	0.203***	0.229***	0.183**	0.0770	0.0258
	(0.0328)	(0.0290)	(0.0551)	(0.0557)	(0.0573)	(0.0516)	(0.0198)
Time-Interacted USSR Membership	0.000442***	0.000472***	0.000317**	0.000217	0.0000471	0.0000855	0.0000296
	(0.000133)	(0.0000997)	(0.000120)	(0.000135)	(0.000146)	(0.000124)	(0.0000424)
Time-Interacted Comecon Membership	0.000187**	0.000168**	0.0000613	0.0000795	0.0000432	0.0000645	0.000000315
	(0.0000691)	(0.0000564)	(0.0000590)	(0.0000606)	(0.0000644)	(0.0000724)	(0.0000306)
Exporter Remoteness Index	-0.0399	-0.0234	0.00727	-0.0567	-0.0769	-0.00224	-0.325***
	(0.0456)	(0.0281)	(0.0478)	(0.0417)	(0.0484)	(0.0456)	(0.0320)
Importer Remoteness Index	-0.331***	-0.325***	-0.391***	-0.362***	-0.334***	-0.387***	-0.677***
	(0.0555)	(0.0383)	(0.0686)	(0.0501)	(0.0610)	(0.0570)	(0.0317)
Constant	17.42***	16.06***	17.28***	17.01***	17.97***	17.76***	34.33***
	(1.660)	(1.143)	(1.584)	(1.775)	(1.917)	(2.475)	(0.997)
Observations	336	375	397	401	429	439	445
R^2	0.850	0.913	0.842	0.820	0.815	0.815	0.969
Adjusted R^2							

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.10: PPML Three Year Intra-Industry Trade Results

	96-98	99-01	02-04	05-07	08-10	11-13	14-16
Log of GDP	0.612***	0.568***	0.487***	0.507***	0.467***	0.693***	0.0667
	(0.0590)	(0.0603)	(0.0684)	(0.0705)	(0.0659)	(0.0532)	(0.0647)
Log of Distance	-0.190	-0.235	-0.169	-0.240	-0.542***	-0.504***	0.714***
	(0.164)	(0.143)	(0.102)	(0.166)	(0.121)	(0.0918)	(0.142)
Contiguous Borders	0.593**	0.842***	0.749***	0.658***	0.339*	0.154	-0.0292
	(0.222)	(0.225)	(0.148)	(0.174)	(0.151)	(0.137)	(0.140)
Economic Freedom Index	0.0131	0.00739	-0.00497	-0.00892	0.0103	0.00526	0.0180*
	(0.0117)	(0.00948)	(0.00967)	(0.0110)	(0.00975)	(0.00935)	(0.00833)
Log of Difference in Per Capita GDP	-0.155	-0.133	-0.0272	-0.0228	-0.306**	-0.238*	-0.193
	(0.101)	(0.0827)	(0.0801)	(0.0993)	(0.101)	(0.113)	(0.117)
Log of Foreign Direct Investment	0.0258	0.122*	0.215***	0.246***	0.310***	0.0988*	0.102**
	(0.0553)	(0.0517)	(0.0649)	(0.0496)	(0.0566)	(0.0408)	(0.0360)
Time-Interacted USSR Membership	0.000824***	0.000762***	0.00105***	0.00106***	0.000886***	0.00121***	0.000818***
	(0.000166)	(0.000182)	(0.000124)	(0.000169)	(0.000156)	(0.000145)	(0.000104)
Time-Interacted Comecon Membership	0.000142	-0.000108	-0.0000242	-0.00000474	-0.000128	0.000194	0.0000533
	(0.000140)	(0.000179)	(0.000126)	(0.000109)	(0.000104)	(0.000113)	(0.0000837)
Exporter Remoteness Index	-0.312***	-0.345***	-0.416***	-0.423***	-0.413***	-0.410***	-0.827***
	(0.0586)	(0.0559)	(0.0491)	(0.0539)	(0.0464)	(0.0447)	(0.0604)
Importer Remoteness Index	-0.150**	-0.106*	-0.0128	0.0181	-0.00552	0.0481	-0.242***
	(0.0578)	(0.0516)	(0.0482)	(0.0507)	(0.0380)	(0.0408)	(0.0475)
Constant	13.23***	12.02***	10.78***	10.15***	14.31***	11.57***	31.51***
	(1.744)	(1.683)	(1.547)	(1.945)	(1.980)	(2.103)	(1.469)
Observations	336	375	397	401	429	439	445
R^2	0.970	0.966	0.959	0.958	0.963	0.954	0.945
Adjusted R^2							

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.11: PPML Three Year Inter-Industry Trade Results

	96-98	99-01	02-04	05-07	08-10	11-13	14-16
Log of GDP	0.533***	0.522***	0.329***	0.291***	0.357***	0.438***	-0.0273
	(0.0954)	(0.0679)	(0.0833)	(0.0736)	(0.0743)	(0.0823)	(0.0355)
Log of Distance	-0.466*	-0.432**	-0.192	0.0914	-0.0371	-0.0778	1.071***
	(0.227)	(0.148)	(0.175)	(0.182)	(0.169)	(0.189)	(0.0603)
Contiguous Borders	-0.0757	-0.00193	0.176	0.184	0.152	0.320*	0.0217
	(0.144)	(0.105)	(0.125)	(0.123)	(0.121)	(0.129)	(0.0713)
Economic Freedom Index	0.0205**	0.0209**	0.00993	0.00182	0.00484	-0.00242	-0.00809*
	(0.00701)	(0.00673)	(0.00747)	(0.00899)	(0.00722)	(0.00659)	(0.00334)
Log of Difference in Per Capita GDP	-0.130*	-0.161**	-0.0726	-0.0000973	-0.0341	0.0651	0.125***
	(0.0618)	(0.0512)	(0.0762)	(0.0730)	(0.0660)	(0.0547)	(0.0298)
Log of Foreign Direct Investment	0.0398	0.0906**	0.211***	0.221***	0.164**	0.0640	0.0201
	(0.0359)	(0.0318)	(0.0607)	(0.0594)	(0.0564)	(0.0483)	(0.0213)
Time-Interacted USSR Membership	0.000363*	0.000414***	0.000152	0.0000125	-0.000204	-0.000155	-0.0000948
	(0.000162)	(0.000108)	(0.000129)	(0.000144)	(0.000167)	(0.000138)	(0.0000507)
Time-Interacted Comecon Membership	0.000216**	0.000228***	0.0000810	0.0000977	0.0000669	0.0000504	0.00000862
	(0.0000740)	(0.0000569)	(0.0000623)	(0.0000615)	(0.0000647)	(0.0000743)	(0.0000340)
Exporter Remoteness Index	0.00660	0.0395	0.0518	-0.0287	-0.0615	0.0138	-0.281***
	(0.0584)	(0.0326)	(0.0470)	(0.0445)	(0.0504)	(0.0488)	(0.0331)
Importer Remoteness Index	-0.315***	-0.304***	-0.389***	-0.388***	-0.371***	-0.429***	-0.711***
	(0.0719)	(0.0525)	(0.0745)	(0.0521)	(0.0637)	(0.0610)	(0.0336)
Constant	16.24***	14.17***	16.40***	17.01***	18.35***	18.33***	33.83***
	(2.582)	(1.757)	(1.936)	(2.077)	(2.199)	(2.774)	(1.082)
Observations	336	375	397	401	429	439	445
R^2	0.786	0.860	0.786	0.799	0.798	0.809	0.964
Adjusted R^2							

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.12: PPML Three Year Horizontal Intra-Industry Trade Results

	96-98	99-01	02-04	05-07	08-10	11-13	14-16
Log of GDP	0.858***	0.785***	0.652***	0.812***	0.656***	0.907***	0.298***
	(0.108)	(0.0684)	(0.0966)	(0.0879)	(0.0948)	(0.0582)	(0.0887)
Log of Distance	-0.548*	-0.539**	-0.418***	-0.539**	-0.768***	-0.720***	0.545**
	(0.278)	(0.165)	(0.124)	(0.184)	(0.138)	(0.0877)	(0.180)
Contiguous Borders	0.700*	0.592*	0.985***	0.614**	0.224	-0.0509	-0.00969
	(0.314)	(0.268)	(0.198)	(0.202)	(0.180)	(0.153)	(0.302)
Economic Freedom Index	0.0144	0.00371	-0.0111	-0.0275*	-0.000779	-0.00712	0.00742
	(0.0197)	(0.0101)	(0.0135)	(0.0128)	(0.0124)	(0.0151)	(0.0113)
Log of Difference in Per Capita GDP	-0.0975	-0.0712	0.0830	0.155	-0.125	0.0229	-0.0690
	(0.175)	(0.101)	(0.116)	(0.123)	(0.147)	(0.192)	(0.133)
Log of Foreign Direct Investment	-0.00622	0.131*	0.259*	0.202***	0.360***	0.113**	0.102
	(0.0867)	(0.0567)	(0.103)	(0.0554)	(0.0673)	(0.0400)	(0.0653)
Time-Interacted USSR Membership	0.00123***	0.00134***	0.00148***	0.00163***	0.00141***	0.00187***	0.00120***
	(0.000234)	(0.000203)	(0.000154)	(0.000195)	(0.000169)	(0.000119)	(0.000161)
Time-Interacted Comecon Membership	0.000175	0.0000416	0.000142	0.000228	0.000110	0.000491***	0.000234
	(0.000171)	(0.000172)	(0.000113)	(0.000121)	(0.000114)	(0.000100)	(0.000140)
Exporter Remoteness Index	-0.311***	-0.271***	-0.450***	-0.285***	-0.282***	-0.374***	-0.770***
	(0.0835)	(0.0585)	(0.0772)	(0.0651)	(0.0586)	(0.0669)	(0.0740)
Importer Remoteness Index	-0.0651	-0.115*	0.0793	-0.0250	-0.0632	0.0654	-0.334***
	(0.0816)	(0.0571)	(0.0711)	(0.0661)	(0.0515)	(0.0575)	(0.0725)
Constant	8.444***	7.386***	6.212**	3.495	7.935***	4.755**	30.68***
	(2.531)	(1.984)	(2.005)	(2.433)	(2.214)	(1.818)	(2.523)
Observations	334	373	394	397	428	437	444
R^2	0.978	0.986	0.967	0.981	0.984	0.983	0.808
Adjusted R^2							

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.13: PPML Three Year Vertical Intra-Industry Trade Results

	96-98	99-01	02-04	05-07	08-10	11-13	14-16
Log of GDP	0.860***	0.856***	0.741***	0.786***	0.815***	0.822***	0.287***
	(0.0799)	(0.0782)	(0.0778)	(0.105)	(0.0865)	(0.0770)	(0.0351)
Log of Distance	-1.044***	-0.952***	-0.885***	-0.650**	-0.634***	-0.577***	0.701***
	(0.171)	(0.174)	(0.169)	(0.222)	(0.172)	(0.168)	(0.0745)
Contiguous Borders	-0.148	-0.101	0.243	0.284	0.261	0.361*	0.00865
	(0.240)	(0.213)	(0.161)	(0.184)	(0.163)	(0.148)	(0.0802)
Economic Freedom Index	0.0164	0.0126	-0.000202	-0.00314	-0.00911	-0.0145	-0.00939*
	(0.00949)	(0.0109)	(0.0103)	(0.0121)	(0.00930)	(0.00804)	(0.00399)
Log of Difference in Per Capita GDP	-0.189*	-0.283***	-0.154	-0.124	-0.107	-0.0396	0.113**
	(0.0735)	(0.0810)	(0.0917)	(0.0980)	(0.0829)	(0.0759)	(0.0359)
Log of Foreign Direct Investment	0.0265	0.120*	0.191**	0.0867	0.0650	-0.00198	-0.0127
	(0.0472)	(0.0505)	(0.0662)	(0.0828)	(0.0586)	(0.0275)	(0.0286)
Time-Interacted USSR Membership	0.000825***	0.000960***	0.000616***	0.000288	0.000185	0.000203	0.000246***
	(0.000175)	(0.000168)	(0.000145)	(0.000175)	(0.000168)	(0.000134)	(0.0000604)
Time-Interacted Comecon Membership	0.000280**	0.000276**	0.000199*	0.000183	0.000209*	0.000185	0.000160**
	(0.000104)	(0.0000958)	(0.0000810)	(0.0000947)	(0.000104)	(0.0000992)	(0.0000523)
Exporter Remoteness Index	-0.347***	-0.324***	-0.383***	-0.444***	-0.425***	-0.383***	-0.851***
	(0.0598)	(0.0531)	(0.0476)	(0.0604)	(0.0575)	(0.0694)	(0.0364)
Importer Remoteness Index	0.256***	0.303***	0.332***	0.286***	0.250***	0.187***	-0.102***
	(0.0582)	(0.0453)	(0.0440)	(0.0605)	(0.0534)	(0.0490)	(0.0307)
Constant	8.555***	4.750*	6.557**	8.869***	9.410***	10.87***	31.43***
	(2.214)	(2.175)	(2.185)	(2.418)	(2.530)	(2.979)	(1.309)
Observations	334	373	394	397	428	437	444
R^2	0.844	0.815	0.823	0.732	0.831	0.867	0.967
Adjusted R^2							

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2.1: Coefficients & Confidence Intervals for Yearly Total Trade Regressions
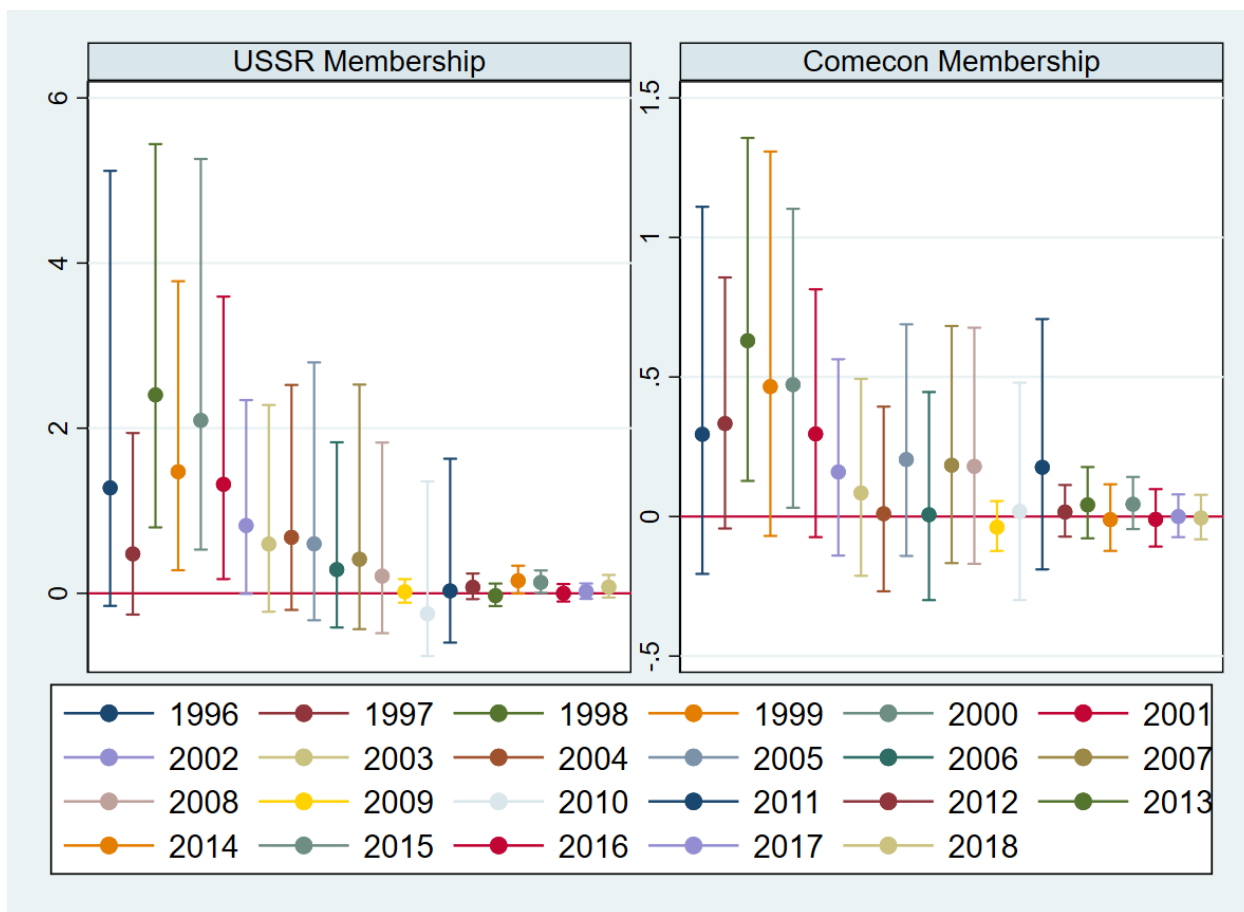
Figure 2.2: Coefficients & Confidence Intervals for Yearly Intra-Industry Trade Regressions
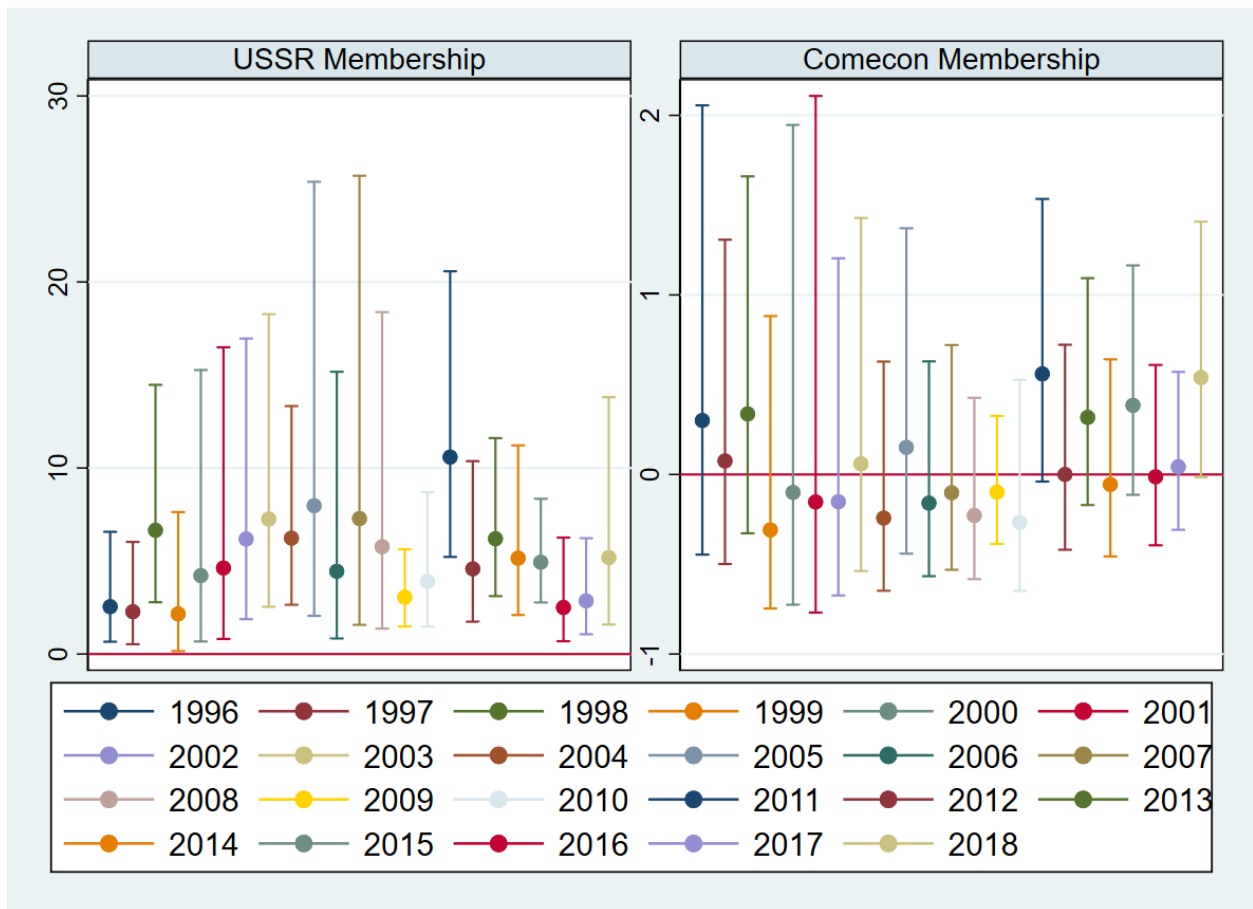
Figure 2.3: Coefficients & Confidence Intervals for Yearly Inter-Industry Trade Regressions
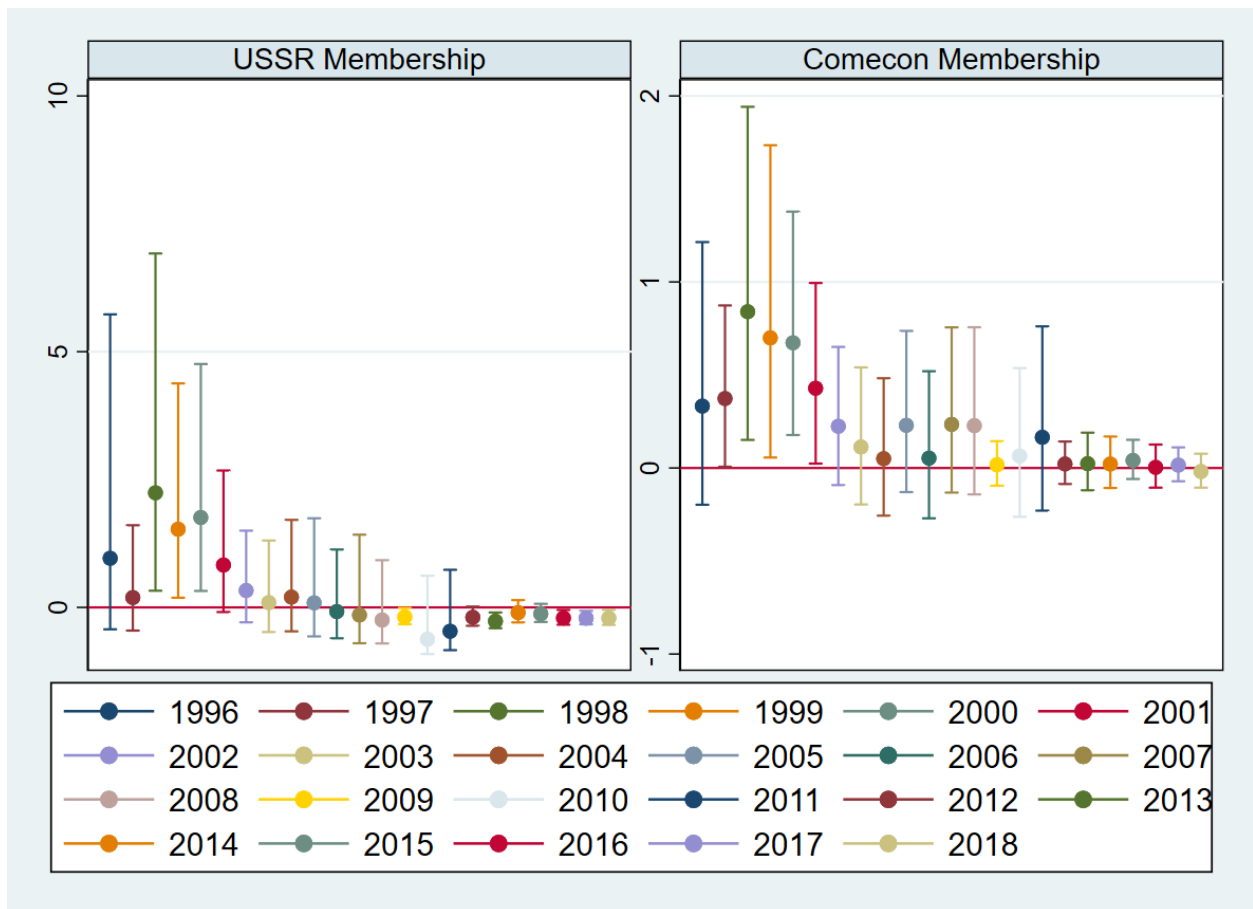
Figure 2.4: Coefficients & Confidence Intervals for Yearly Horizontal Intra-Industry Trade Regressions
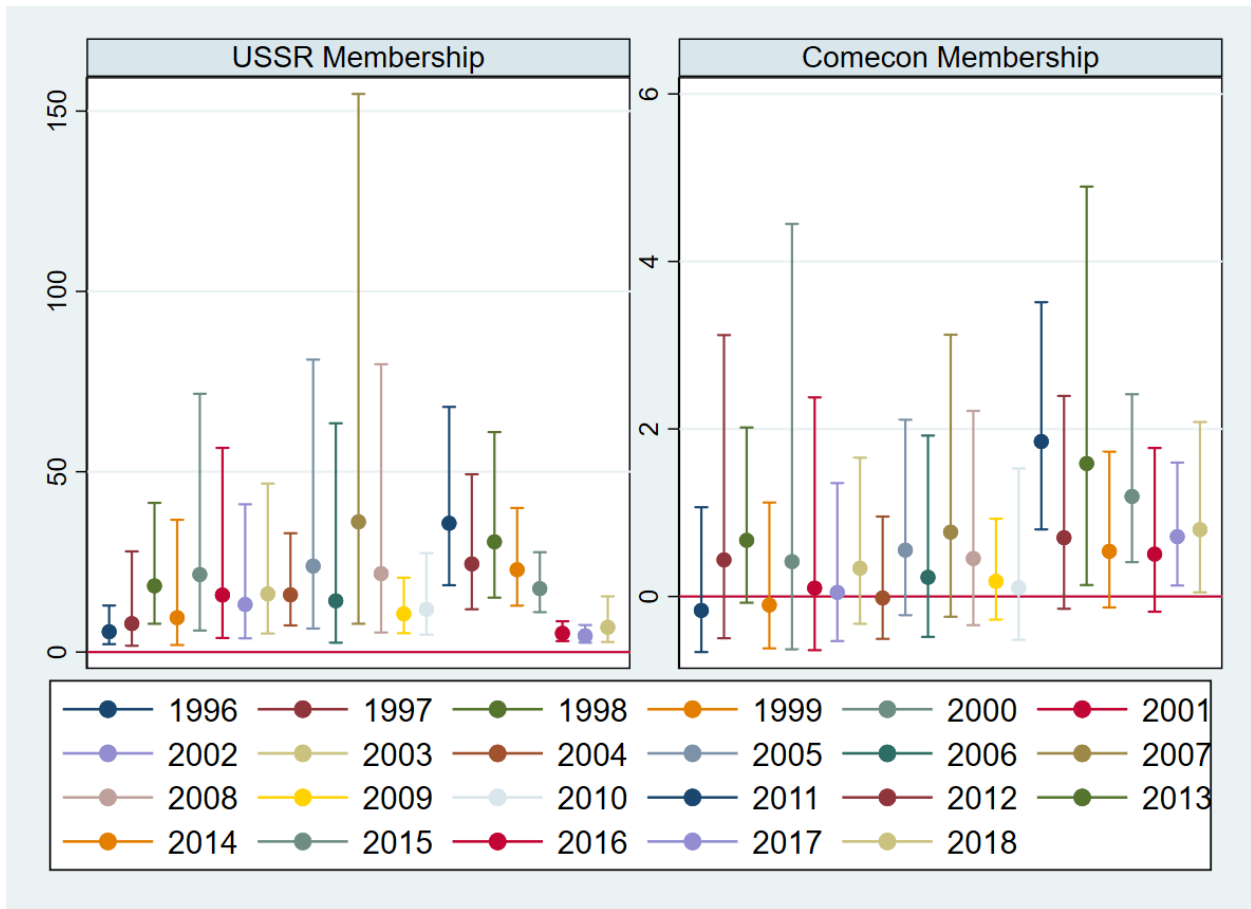
Figure 2.5: Coefficients & Confidence Intervals for Yearly Vertical Intra-Industry Trade Regressions
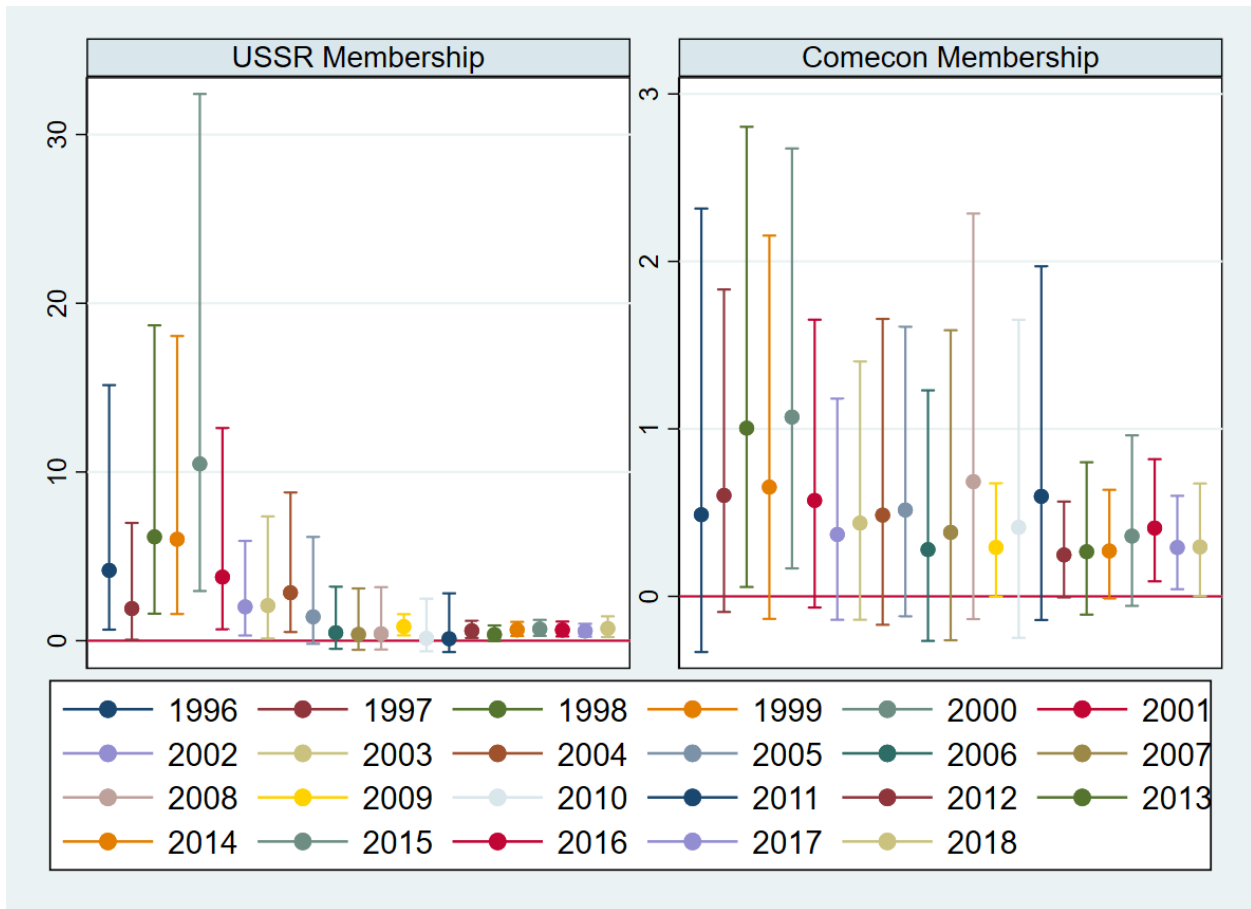
Figure 2.6: Coefficients & Confidence Intervals for Three-Year Total Trade Regressions
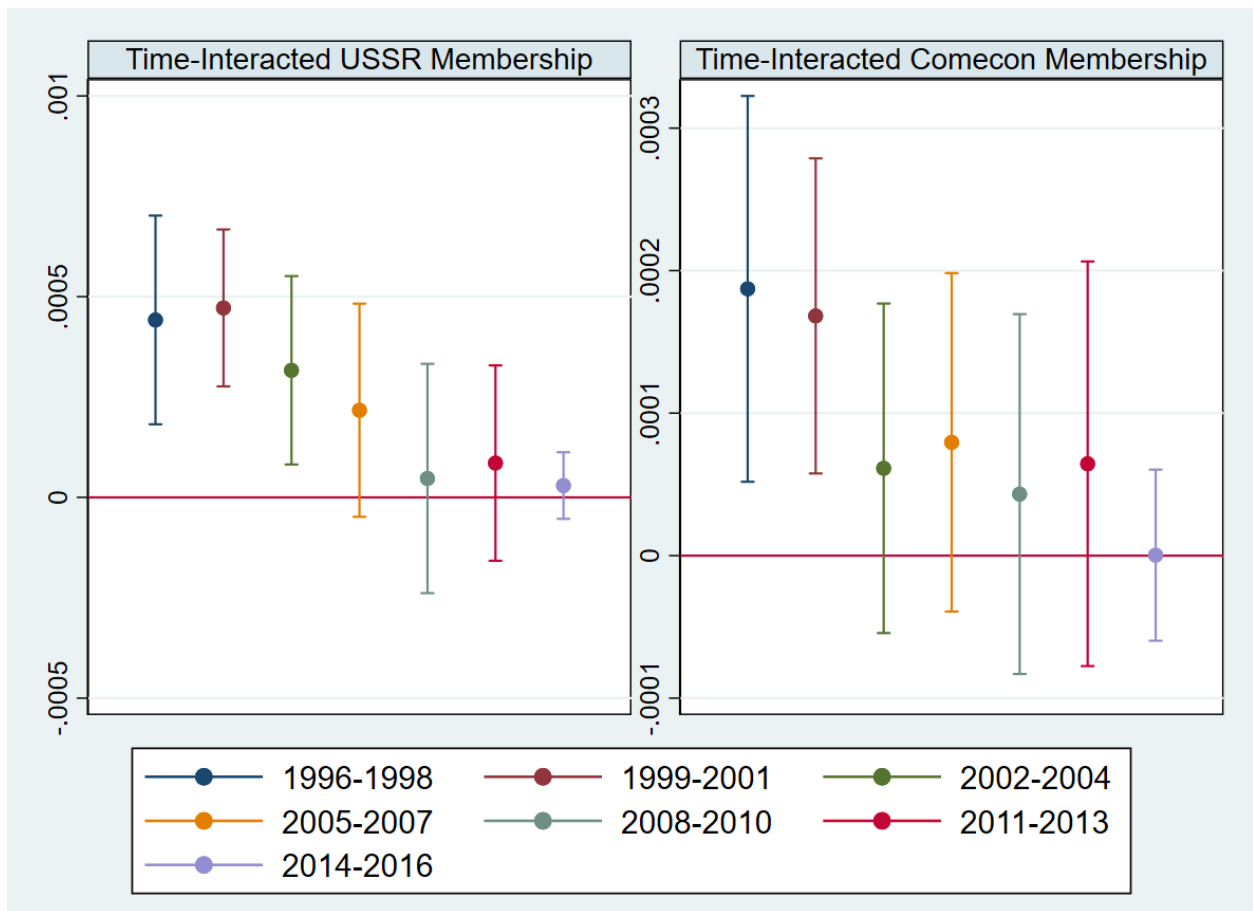
Figure 2.7: Coefficients & Confidence Intervals for Three-Year Intra-Industry Trade Regressions
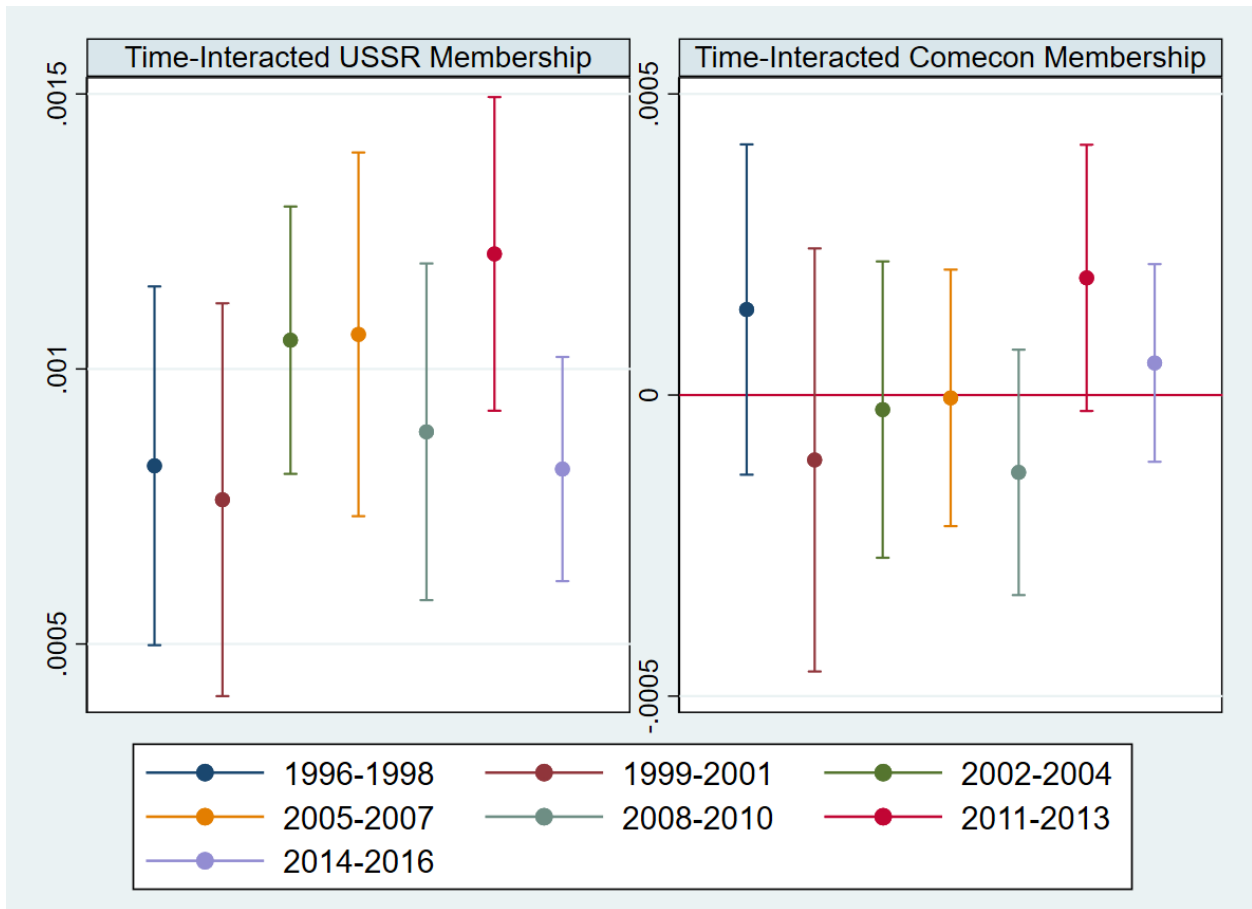
Figure 2.8: Coefficients & Confidence Intervals for Three-Year Inter-Industry Trade Regressions
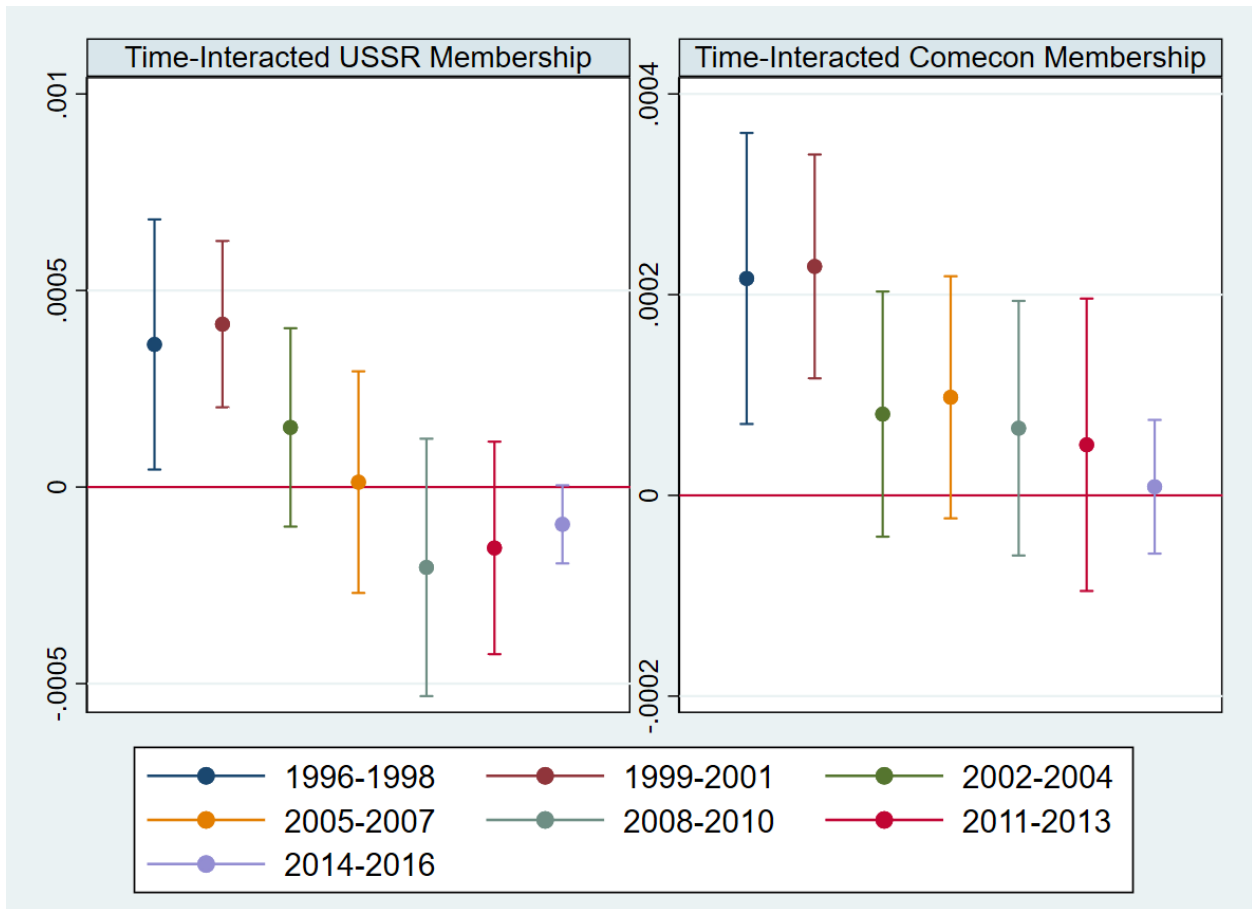
Figure 2.9: Coefficients & Confidence Intervals for Three-Year Horizontal Intra-Industry Trade Regressions
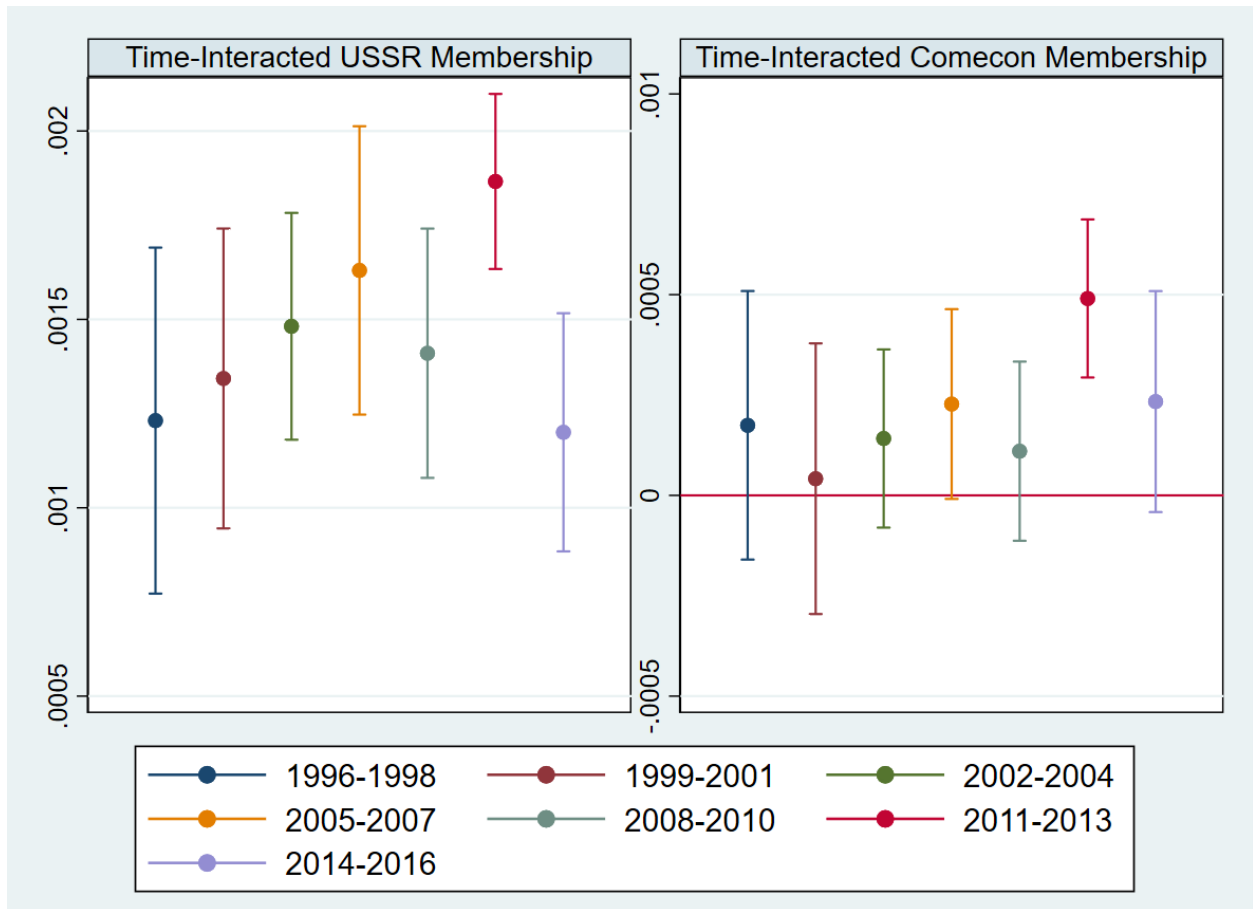
Figure 2.10: Coefficients & Confidence Intervals for Three-Year Vertical Intra-Industry Trade Regressions
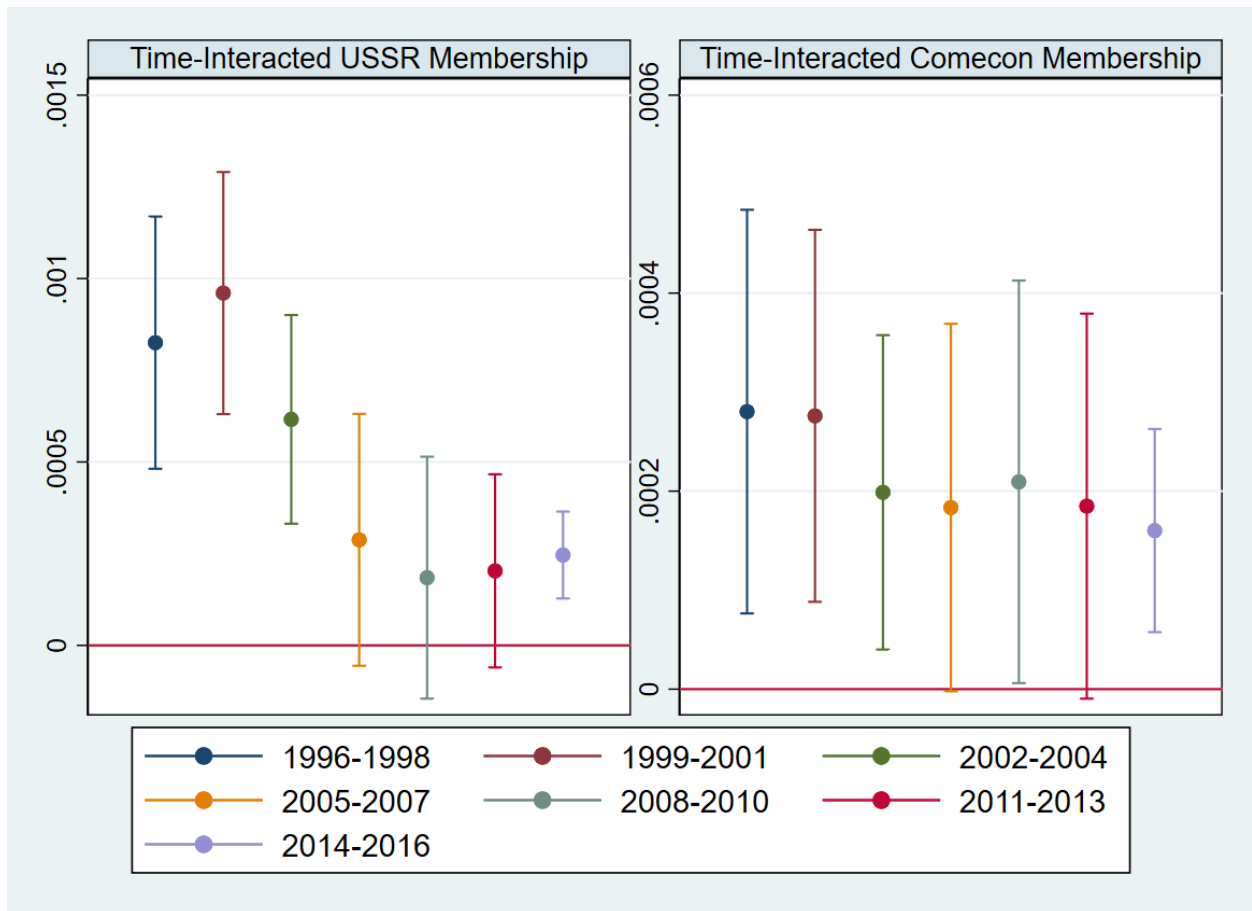
Chapter 3

Progressive Era, Free Trade, and a Biased Hard Core

by

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Abstract:

The economists who lead and shaped the first American Progressive Movement (1890-1918), reconstructed society in their image of a technocrat ran state. In their view liberalism, *laissez-faire*, and Free Trade were the antithesis of the new economic order they created. The Economic Progressives succeeded in professionalizing the economic discipline, reshaping the academic profession, creating think tanks, and even formulating the first government oversight offices. In spite of all their success, the Economic Progressives were unable to remove the assumptions and theory that underpin Free Trade from economic theory. This paper argues their failure was due to the intersection of a contradiction in their core research philosophies as well as their inherent philosophical bias. When contrasted with burgeoning Marignalist School, this made the Economic Progressives movement seem less attractive.

3.1 Introduction

There is no shortage of articles that sharply disagree with the protectionist stance that the United States has taken under President Trump (Krugman, 2019; Editorial, 2019a,b). Some individuals have gone as far as to decry this as the final heart beats of Neo-Liberalism (Watkins and Seidelman, 2019). Outrage aside, anyone who is versed in American trade policy history knows, protectionism isn't new to the American political landscape. As is abundantly clear in reading Douglas Irwin's book *Clashing Over Commerce.* Protectionism has been woven into the very fabric of American political DNA. America's history of protectionism maybe surprising given how economists advocate for free trade (Poole, 2004) and how it is one of the earliest policy propositions of the discipline. One would easily believe that American economists have always been unanimously against protectionism. Irwin succinctly describes the philosophical and disciplinary importance of free trade in the introduction to his book *Against the Tide: An Intellectual History of Free Trade.* In quoting Harry Johnson, Irwin articulates that the policy of free trade

> 'is one of the most fundamental proposition economic theory has to offer for the guidance of economic policy.' This proposition has survived repeated scrutiny from economists ever since Adam Smith made his celebrated case for free trade in the *Wealth of Nations* and continues to receive overwhelming support from professional economists today (Irwin, 1998, p. 3).

In converse to its government policy,[1] American economists, especially during the dominance of the classical school of economics, have always been deeply methodologically tied to the United Kingdom by their shared culture, language, and history. During the classical period of economics, British economists were dominated by devotion to the theory of free

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[1]Although Protectionism has been deeply rooted in American policy, for a short time in 1846 with the passage of the Walker Tariff, the United States seemed to be adopting a similar free trade stance to the United Kingdom. It was the onset of the US Civil War that caused the US to reverse course and adopt a protectionist stance with high Tariff rates which was adjusted but stayed high until the Underwood Tariff of 1913 (Brownlee, 2017).

trade[2] (ibid). Although free trade dominated classical economics, it did not go unchallenged. As Irwin states in his book, free trade faced challenges primarily by the German historical school from scholars like Friedrich List and Karl Knies (ibid). It is from this German historical school that presents the possibility of an intellectual sea of change in the study of economics in America.

During the end of the 19th century a number of American students such as: Richard T. Ely, John Bates Clark, Edmund J. James, Simon N. Patten, and Edwin R.A. Seligman all went to Germany to pursue their doctorates in economics under the tutelage of the German Historical School. These economists came back and founded both the American Economic Association (AEA) and were instrumental in leading the American Progressive Movement. The Progressive movement was instrumental in altering what it meant to be a professional economist and how the federal government interacted with its citizens. As budding economists steeped in the traditions of the German Historical School, it impregnated the progressives with beliefs of the importance of science in solving political and social problems. Central to their ideology was the rejection of classical *laissez-faire* ideology. Thus, a chief goal of Economic Progressives was to advocate against, if not remove, free trade advocacy from the discipline, and replace with scientific-protectionism.

Irrespective of their usage in both policy and academic debates, the terms of free trade and protectionism can on take on different meanings depending upon the author. The issues of a plurality of meaning in both terms is especially true in the Progressive movement. Economic Progressives, as well as the movement generally, were not a collection of individuals on particular side of the political spectrum, but multiple political ideologies bound together via illiberalism "[f]orcing the progressives to be left and their critics to be right multiplies misconceptions. . . Right progressives, no less than left progressives, were illiberal " (Leonard,

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[2]Although British economists were at the forefront of free trade research, there were some notable American economists doing free trade research during the Gilded Age, specifically David Ames Wells (Irwin, 2017).

2017, p. 38).

The result of this broader ideological tent is that the Economic Progressives contained individuals who leaned classical and neo-classical, such as Frank Taussig and John Bates Clark respectively, sitting next to institutionalist such as Richard Ely, John R. Commons, or Simon Patten. Thus there is some difficulty in a uniform definition of how Economic Progressives used the terms of free trade or protectionism. This paper will utilize the leading Economic Progressive on international trade, Frank Taussig. Taussig, as detailed in his *Principles of Economics*, saw protectionism not as permanent autarky, but more as short run solution which applied moderate tariffs to allow industries to mature (Taussig, 1916a, p. 529). Free trade would be defined as little to no protective duties and characterized the long run dynamic of a nation.

Given the broad appeal of the Economic Progressive movement, why is it that after 30 years (1890-1918) of the Progressive economists controlling all aspects of the profession, the American Economics discipline still embraced free trade and not protectionism? Progressives were a complex group of thinkers, and as stated above, often seen as more homogeneous in their beliefs than they actually were. Because of this misconception of ideological uniformity, it would be tempting to believe that there is a moment when newer methodologies, which could articulate the gains and losses of free trade, won over members. In truth, research paradigms/schools do not dissolve over night. Instead the story of the American Progressive Movement's inability to sway the academic discourse around free trade is emblematic to the inherent flaws present at the "hard core" of their research paradigm as well as their innate philosophical biases.

The core of the progressive's research paradigm was ill defined and contradictory, leading to a methodology of investigation that proved insufficient with their scientific ideals and lead to the adoption of policy positions that when implemented resulted in a loss of legitimacy. Thus, the intersection of the growing neo-classical movement and the fallout of the World

War I led to the collapse of the American Progressive Movement. In order to answer the central question of this paper, we will need to understand what the progressive movement was, the factors that led to its collapse, and finally their inability to enshrine protectionism into economic methodology all serve as a manifestation of the larger paradigmatic issues.

3.2 Background on the Progressive Movement

Although much has been written about the American Progressive Movement (henceforth "Progressives")[3] broadly, taking some time to appreciate the basic philosophical tenants is important to the discussion. Progressivism is a broad term for an even broader movement. These individuals were politically and socially active in much of the late 19th century (around 1877) to the end of the first fifth of the 20th century shortly after World War I. Progressivism sought to reform academic institutions, the state, and society as a whole to eradicate the inequality brought on by the Gilded Age. Furthermore, Progressivism was a coalition of academics, social reformers, journalists, and religious figures.

3.2.1 Impetus Behind the Movement's Founding

In order to understand what beliefs Progressives held, it is important to understand what historical factors drove both the wider Progressive movement as well as the economists who were at the core of that movement.

The fertile, or perhaps in this case toxic, ground which gave birth to the Progressive movement was the American Gilded Age. The Gilded Age roughly comprised the years of 1870-1900, during which industrialization had transformed the United States. Railroads were built and connected the United States. Through industrialization the United States

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[3]Although "Progressives" is the most popular nomenclature to describe this movement, it has been applied by historians rather than the members of the movement themselves. Scholars have provided a broad set of names from "new Liberals", "meliorism", or "democratic liberalism" to name a few (Leonard, 2009).

shifted from an agrarian society to an industrial society on par with its peers of Germany, France, Japan, and the United Kingdom (Leonard, 2017).

To understand the scale of the dynamic economic changes undertaken in America consider the proportion of agricultural works that were employed relative to total employment. According to the US census, in 1880 roughly 51% of the US labor force worked in the agricultural sector and by 1910 only 39% of Americans were employed as farm workers (Geib-Gundersen and Zahrt, 1996). Ten years later in 1920, the percentage of the American workforce employed in agriculture drops to only 25% (Lebergott, 1966). In addition to the changes in American workforce organization, the US' GDP also grew roughly 300% over this same time period (Leonard, 2017).

Although the growth of the US economy was impressive, it did not come without costs. Viewed from in the present day it is easy to forget this period saw two financial crises in 1870 and 1890, and the birth of trusts and monopolies which concentrated wealth in relatively few hands, which also resulted in the birth of organized labor (ibid). The industrialization of the US relied not only on massive shifts in domestic labor but also an influx of immigrants. In the years between 1850 to 1930 the foreign born population of the US rose from 2.2 million to 14.2 million, mainly from Europe. Further, the share of the US population that was immigrants went from 9.7% to nearly 15% at its height during the same period, with the largest years being 14.8% in 1890 and 14.7% in 1910 (Gibson and Jung, 2006).

Against the backdrop of expanding economic inequality, labor strikes, and rapid demographic changes, it is no wonder that a generation of individuals became activists for the betterment of the common good. These activists saw themselves as disinterested reformers who took a stand against wealth and privilege to make life better for the common American (Leonard, 2017). The economists who both led and were a unique manifestation of the movement felt that their formal training in economics gave them both an intellectual and moral obligation to apply their "humanitarian ideals" to the prevailing economic problems

of the day (Samuels, ed, 2008) in order to promote the common good.

3.2.2 The Movement's Goals

The notion of Progressives being a cohesive "coalition" is perhaps disingenuous for two reasons. The first reason is that it implies that there were several subgroups that actively chose to become a part of the movement. In reality individuals from sociology, ministers, alcohol prohibitionists, settlement house workers, conservationists, labor reformers, city-beautification advocates, business efficiency experts, suffragists, child-welfare advocates, muckrakers, municipal reformers, factory inspectors, lawyers, politicians, and economists who coalesced around the work of reforming society (Leonard, 2009, 2017).

The second way in which "coalition" is a deceptive word is that it implies a codex of views or ideals that are needed to be apart of this movement, something that historians have struggled with (Filene, 1970; Rodgers, 1982; Leonard, 2009, 2017). It would be more accurate to say that Progressives had a set of tenants to which they were all opposed to. In his work on trying to understand what brought about the Progressive Moment, Rodgers articulates that many individuals who called themselves Progressives held conflicting views. Given their plethora of views Rodgers argues that

> ...those who called themselves progressives did not share a common creed or a string of common values, however ingeniously or vaguely defined. Rather what they seem to have possessed was an ability to draw on three distinct clusters of ideas- three distinct social languages -to articulate their discontents and their social vision (Rodgers, 1982, p. 123).

The "discontentment", as Leonard (2017) articulates, was centered around four specific critiques of their society.

These critiques of society can be summarized as: (i) Progressives were illiberal in the sense that they disagreed with the philosophical notions of liberal individualism in favor of nationalism, (ii) Progressives sought to remove all forms of waste and injustice from society

via the use of science, (iii) they were deeply against monopoly power that was characteristic of early industrialization of the United States, and finally (iv) given the previous points, Progressives felt there was a need for a reorganization of society (ibid). In order to achieve all their goals, and primarily goal 4, the Progressives put their faith in technocrats to reform society. These technocrats had to be disinterested administrators:

> Nothing was more integral to Progressivism than its extravagant faith in administration. The visible hand of administrative government, guided by disinterested experts who were university trained and credentialed, would diagnose, treat and even cure low wages, long hours, unemployment, labor conflict, industrial accidents, financial crises, unfair trade practices, deflation, and other ailments of industrial capitalism. (ibid, p. 9)

Interestingly, the best advocates for this impartial technocrat role was the economist. As Henry Rand Hatfield states, "Neither the scheming politician, nor the unbalanced enthusiast, nor the unfortunate victim of industrial changes was the best judge of conditions, nor the wisest guide for legislation. The calm, measured, disinterested propositions of the professional economist appeared all the better." (Hatfield, 1899, p. 17-18)

Given Progressivism's broad ideological critiques and goals, many of their efforts bled into reforming the economy, though most wouldn't call themselves economists. There were individuals within the movement whom were chiefly concerned with reforming the economy to align with Progressive ideals. This paper is chiefly focused on these individuals, the Progressive economists. As mentioned above these comprised young academics who completed their dissertations in Germany and were deeply influenced by the German Historical School (Ely, 1936). The Progressive economists, as well as the movement as a whole, were also deeply motivated by the social gospel movement of the day. The social gospel movement began in the late nineteenth century as a "form of liberal Protestantism that pursued economic and social improvement through a scientifically informed mission of social redemption." (Leonard, 2017, p. 12)

Motivated by their graduate training, the social gospel movement, and the inequality of the times, the Economic Progressives were drawn into the larger movement. Economic Progressives had specific goals motivated by the larger movement's discontentment. Progressive economists believed in the twin notions that: (i) government should be guided and run by science and (ii) the economy should be run/managed by the state (Leonard, 2017, p. xi). The Economic Progressives had an additional goal that was outside the broad charter of the movement. Unique to their particular struggle, Economic Progressives desired to remake economics as a formalized and scientific discipline similar to that of Germany and the United Kingdom (Ely, 1910). In part of doing that economic progressives saw their duty was to break the "crust" that had formed around the science of economics (Ely, 1936, 142).

3.2.3 Achievements

In working towards their vision of society, the Economic Progressives helped to create many of the institutions that surround the economic profession today such as the modern conception of the higher education system, think tanks, the modern administrative state, etc (Leonard, 2017).

The first step on their path of reform was creating both a space to practice their discipline as well as to generate legitimacy. Economic Progressives realized early on that they needed to professionalize and separate economics from political economy. To understand the scale of the task these young graduate students took on, Parrish notes that in 1880 only 3 faculty members in the top 28 universities of the US were focused primarily upon studying Political-Economy. Ten years later in 1890, there were 20 chairs in those original 28 schools (Parrish, 1967).

As the economic Progressives expanded into colleges and universities, fueled by the industrialization of the US, they also separated their work as a scientific discipline from the study of politics or political-economy with the name of economics. From 1870 through 1890,

"Political-Economy" was the dominant name in college catalogs. By 1900 "Economics" had dethroned the old nomenclature (Leonard, 2017). What these positions in universities gave economists were not just employment and scholastic resources but scientific authority, something key to goals and philosophy of the economic Progressives (ibid).

Once they obtained chair positions and "scientific" authority, the economic progressives recognized their growing ranks needed to maintain their control over what was considered economics. The economic Progressives did this via the creation of the American Economic Association. The intention of using "American" and "Economic" was to show the national scope of the organization and its basis in science rather than back room filled gentlemanly discourse (Parrish, 1967). The AEA was founded with only 55 members, but by 1890 it had over 500 (ibid). The AEA was integral in helping to advocate for different permanent government organizations (i.e. US Census Bureau and Tariff Commission), reform the US Railway system, and producing articles (and eventually textbooks) which would become key to defining both the broader discipline as well as sub-fields (Ely, 1910).

Given the success of the AEA, Progressive economists began their newest venture, the American Association for Labor Legislation (AALL). Separated from the AEA in 1905, the AALL was led and staffed by the newly enthroned economic professors (Leonard, 2017). The reason for its separation from the AEA is that it sought to create a new space in the socio-political landscape. The reason for its creation was to use scholarship and intellectual rhetoric to guide legislation while still being independent from both government and higher education, what we would today call a think tank. Here leaders advocated for labor reforms claiming to be scientifically impartial experts, but also used tools of "moral outrage" to encourage governments to regulate factory safety, working hours, create a minimum wage, and protect workers who suffered from industrial accidents (ibid). The AALL allowed for economic Progressives to advocate for structural change while showcasing their scientific acumen and impartiality garnered by their placements in higher education, and thus they

turned to the final branch of society left un-concurred: government and specifically the Federal Government.

Economic Progressives did not just want to be a part of the Federal Government as some mid-level page occasionally bending the ear of a cabinet secretary, they had a much grander vision. Leonard terms their vision as the "fourth branch" of government, which is "administrative government bodies-agencies-granted broad discretionary powers to surveil, investigate and regulate areas deemed too complex or otherwise beyond ordinary government capacities of the legislative, executive and judicial branches."(ibid, p. 42) These bodies are both independent and also have the ability to make regulations and enforce them. With the ability to write regulations and to enforce them, the fourth branch the final key to the Progressive's dream for governance by technocrat.

The key to sustaining the fourth branch, and thus cementing the economic Progressive's control, was the dramatic change by which the US Federal government collected revenue. The industrial revolution in the US transformed the tax base in the country. The growth of factories and cities showed the potential for a new, non-trade source of revenue for the federal government. The transformation began with Woodrow Wilson's first term as President, was expanded with US's entrance into WWI, and made permanent with the ratification of the 16th Amendment making a federal income tax constitutional in 1913. In order to comprehend the change in the federal revenue stream Irwin notes that in 1913 trade customs accounted for 45% of Federal Revenue, in 1916 due in no small part to WWI, it accounted for only 28%, and by end of the war it was only 5% (Irwin, 2017, p. 339).

The larger tax base of citizens and corporations allowed the federal government bureaucracy to expand with the same speed as the economic Progressive's ever expanding vision of oversight. A non-exhaustive list of these regulatory arms include US Bureau of Corporations (1903), US Department of Commerce and Labor (1903), Federal Reserve Board (1913), Federal Trade Commission (1914), and Permanent Tariff Commission (1916) to name a few.

In thinking about the overall progressive movement, and the particular accomplishments of the economic Progressives, it is hard to not be impressed. From humble beginnings these individuals took advantage of a singular moment in time and recreated American society. When contemplating on their achievements Leonard best summarizes by saying "[t]he first generation of progressive economists had created, essentially *ex nihilo*, two new and influential vocations in America: the professor of economics and the expert economist in the service of the administrative state." (Leonard, 2017, p. 21)

3.3 Collapse of the Progress Research Paradigm

With a more firm understanding of the Economic Progressive movement, the central question of this paper can be addressed: Why did the economic Progressives, given their dominance, fail to overturn the discipline's advocacy for *laissez-faire* and ultimately Free Trade? The answer to that question lies in what the movement saw as the binding principles of their research program.

3.3.1 Defining a Research Program

The term of "research program" was first described by Lakatos (1970). In his work, Lakatos sought a way to marry Popperian falsification with Kuhn's observations on the history of science. In particular Lakatos was seeking for a way to provide new "objective" criteria about how to judge if research was scientific. What must be said from the onset is that there is no intention of applying Lakatos' Methodology of Scientific Research Program (MSRP) to the Economic Progressives' research program to judge the scientific acumen of the Economic Progressives. Instead, focus will be given to one aspect of the MSRP, the "hard core" of the research program. In taking a critical look at the hard core it can be shown that their research program was too rigid since it was, much like the broader

Progressive movement, too outcome focused. Before looking into the core beliefs of the research program, a quick primer of what is Lakatos' MSRP is needed. In no way is this intended to be exhaustive, but more of a refresher so that his idea of a hard core be fully utilized and understood.

Although a lot has been written about Lakatos and his MSRP, the definitive text is Hands' 2001 text *Reflection Without Rules: Economic Methodology and Contemporary Science Theory.* This book is written to explore the history of western epistemology, its impact on the science of economics, and where it appears the epistemology of economics is headed. In discussing MSRP Hands notes the most important change was moving the focus of philosophers from examining individual theories to a collection of theories inside what Lakatos calls a research program (Hands, 2001, p. 111). Each research program contains four distinctive aspects a "hard core": a "protective belt", positive heuristics, and negative heuristics. Although, what is of most interest is the hard core, understanding all of the MSRP's working parts is important to comprehending how to conceptualize the Economic Progressives' demise.

As Hands elaborates, the center of any research program is the hard core and, this is made up of assertions, assumptions, and *a priori* beliefs which cannot be rejected by individuals partaking in the MSRP. In order to protect these core beliefs from empirical/theoretical refutations, the protective belt is employed. The protective belt contains "auxiliary hypotheses, the empirical conventions, and other theoretical structures of the program;" (ibid). These particular assertions can and are tested in order to refine and change the protective belt as science continues forward. The last two components are often discussed in union as they are two sides of the same coin. The heuristics describe to the members of the research program what is and isn't acceptable questions of inquiry.

Given this structure Lakatos thus devises a way to evaluate research programs *ex post* based off how their protective belts change. Specifically Lakatos sorts the research pro-

gram into "progressive" (scientifically) or "degenerative" based off how their protective belts change. If a research program is producing what he calls "novel facts" that lead to new theoretical predictions and empirical predictions from the protective belt, then those research programs are labeled progressive, and those programs that can't produce both types of novel facts are labeled degenerative. (ibid, p. 112)

There are a number of issues with Lakatos' MSRP, most notably the one that Hands focuses on which is how Lakatos defines and relies on "novel facts". Yet, Lakatos' hard core was, even at the onset of discussing his theory, accepted widely by the scholarly community due to its reliance upon observed historical facts about the growth of science. In fact Kuhn himself agrees with the usefulness of Lakatos' hard core

> I have repeatedly insisted that it depends, in part, on the acceptance of elements which are not themselves subject to attack from within the tradition and which can be changed only by a transition to another tradition, another paradigm. Lakatos, I think, is making the same point when he speaks of the 'hard core of research programs,' the part which must be accepted in order to do research at all and which can be attacked only after embracing another research program (Kuhn, 1970, p. 138).

3.3.2   The AEA & The Progressive's Hard Core

Turning to Economic Progressives, what particular assumptions can be identify as their hard core? From Lakatos we know these must be immutable assumptions and assertions about the world. In reading over the Economic Progressives works, their hard core seems to be composed of 3 fundamental assertions: a) Given the preponderance of social ills and inequity in society the classical notion of *laissez-faire* is an old, outdated, unsuitable, and unscientific theory. Given it's failures, it no longer applies to the modern economy. b) Economics is a science and uses the tools of science to make its predictions and recommendations. c) Given the previous assertions, the economy must be managed by the states guided by the dispassionate economists wielding science. What evidence is there to support that these are

the core beliefs of their research program?

Very rarely does a research program member come together to explicitly spell out their core tenants, luckily Economic Progressives loved the written word and documenting all of their ideas. The hard core of the progressives can be found in the foundational writings of the AEA. As Leonard discusses, the AEA was more than just to promote the growing field of economics, it was "formed to exclude other claimants to economic knowledge" (Leonard, 2017, p. 20) and thus shows a self conscious coalescence around the research that economic Progressives wanted to promote. In short, one can think of the AEA as the institutional representation of the Economic Progressives.

The AEA was founded in 1885 by 50 men, most of whom were educated in the German historical school.[4] Imbued with the values of the historical school they felt

> that political economy was opposed to the recognition of any ethical element in our economic life, that it opposed all *social* reforms for social uplift as futile, that it exalted into a principle of economic righteousness the individual and unrestrained pursuit of self-interest, that it almost deified a monstrosity known as the economic man, that it looked upon *laissez-faire* as a law of beneficent providence, and held that free trade must be received as an ethical dogma, (Ely, 1910, 64)

In sum, many of these progressives having felt intellectual freedom in Germany wanted to break up the rigidity and inject what we could call progressive ideology into the discipline.

In attempting to reinvigorate[5] economics, Progressive Economists felt that they need-ed to implement a "scientific treatment of economic questions" (ibid, 67). Although the term of "scientific" is a loaded one, we can simply conclude that for progressive economists, science meant " historical, statistical study as an essential means of discovering economic truth"

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[4]As Leonard explains, foundational to this group was graduate education in Germany, "a key formative experience of the AEA's founding core: graduate education in Germany." (Leonard, 2017, p. 17).

[5]The founders of the AEA mean this both for people who study economics as well as the public perception of the discipline as a whole. As Ely puts it, "Generally speaking, the ordinary man looked upon political economy as chiefly occupied with a controversy between protection and free trade...The whole thing was reduced to comparatively few formulas and certainly did not arouse the enthusiasm of American youth (Ely, 1910, 68).

(ibid, 65). This methodology was deeply rooted in the idea of "inductive research." (Ely, 1936, 145). Meaning that one must look at the data and observations to generate their theory of economics, as Ely puts it "[h]ypotheses, observation, hypotheses tested, corrected, and then renewed observation-such procedure was fundamental to us." (Samuels, ed, 2008, p. 212). A running theme in their writings is the core Progressive belief in the power of science and data to drive observation on what form theory is to take. For the Economic Progressives, science meant no *a priori* assumptions or expectations in order to do good science.

It is clear from their foundational documents that economic Progressives had a specific vision of how economics was to be researched going forward. This is reflected in their statement of principles which was drafted over several weeks. It reads:

Statement of Principles

1. We regard the state as an agency whose positive assistance is one of the indispensable conditions of human progress.

2. We believe that political economy as a science is still in an early stage of its development. While we appreciate the work of former economists, we look not so much to speculation as to the historical and statistical study of actual conditions of economic life for the satisfactory accomplishment of that development.

3. We hold that the conflict of labor and capital has brought into prominence a vast number of social problems, whose solution requires the united efforts, each in its own sphere, of the church, of the state, and of science.

4. In the study of the industrial and commercial policy of governments we take no partisan attitude. We believe in a progressive development of economic conditions, which must be met by a corresponding development of legislative policy. (Ely, 1910, 49)

Also though no individual was forced to sign this document, it was the organization's foundational principles until it was retired five years later. Yet the purpose of it is clear, as Ely states "[t]his Statement of Principles then was a point of union to bring together those of like

aims and to keep out others at least from leadership."(ibid, p. 62) Reading the statement of principles we can see how they map to the hard core. Principles one and three map to the hard core assertions of intervention, while principle two shows the assertion that economic Progressives do real science. Yet what of the first core principle is anti-*laissez-faire*? Although it is missing in the core principles, it is not from the reflections of its most influential members like Richard T. Ely,[6] Irving Fisher,[7] or even the inaugural address of the AEA by the president Francis Walker[8].

In looking at the AEA's draft principles proposed in 1885, Ely notes that his original principles were altered such that "(1) my statement emphasized historical and statistical study rather than deductive speculation; (2) my statement laid less stress upon government intervention and was 'toned down' in the direction of conservatism on the whole" (ibid, p. 56). One particular way the tonal change manifested was in altering guiding principle number 4. Originally the principle read

> In the study of the policy of government, especially with respect to restrictions on trade and to protection of domestic manufactures, we take no partisan attitude. We are convinced that one of the chief reasons why greater harmony has not been attained, is because economists have been too ready to assert themselves as advocates. We believe in a progressive development of economic conditions which must be met by corresponding changes of policy. (Ely, 1886, p. 7)

As we can see their espousing of a rejection of the "orthodoxy", as Ely liked to call it, were not done in private musings but were intended to be on full display for the public. Yet it seems that in order to establish their preeminence, a tonal shift was made. This doesn't

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[6]Ely was fond of talking about the "crust" that had grown over economics and made it stagnant and unscientific. That crust was due to *laissez-faire* and free trade as a manifestation of it (Ely 1910, Ely 1936, and Samuels, ed 2008).

[7]In his 1907 article Fisher talks about how in the last decade economics has grown beyond the stale policy of *laissez-faire* in no small part to the work that the Progressive economists have exerted against the policy (Fisher, 1907)

[8]In his address he states that in order for the profession to continue to evolve as a science they must push back against the doctrine of *laissez-faire* (Walker, 1888)

diminish from how central the rejection of *laissez-faire* was to the research paradigm, just merely the new economists being pragmatic with trying to achieve their wider goals.

Understanding the hard core of the Economic Progressive's research program helps us understand one of the reasons why the movement failed overall. Looking at these three key assertions illustrates a research program that is both simultaneously extremely rigid and vague with what it believes. Like the overall Progressive movement, the research paradigm doesn't show so much what they want to prove, but what they don't want to be true.

Secondly, the Economic Progressives research came with additional philosophical baggage. The Economic Progressives interest in reshaping society and their innate illiberalism, lead them to be drawn into multiple philosophical camps such as social gospel-ism, eugenics, Social Darwinism, race suicide,[9] etc. Given that Economic Progressive's hard core argued that the status quo needed to be changed, each of these philosophies found their way into economic policy advocated by the progressives. In short, each policy advocacy didn't come from dispassionate observations of the world. Instead Economic Progressives asserted economics and policy advocacy that had to contort itself to prop up the aims of these exogenous philosophies.[10] At the same time Economic Progressives were doing mental gymnastics the Marginalist school began it's ascendancy.

As Phillip Mirowski details first in *Physics and the 'Marginalist Revolution'* (1984) and then expands upon in his book *More Heat than Light* (1991), the Marginalist revolution utilized physics not only as a rhetorical device but a blueprint on how to make the discipline more scientific. The Economic Progressives only ever used science as a rhetorical device;[11]

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[9]Race suicide is the false claim that the "fit race's" (i.e. white, educated, Protestant, American, etc.) lower birth rates will lead to the "unfit" races (i.e. poor, uneducated, criminals, diseased, the mentally and physically disable, racial minorities, religious minorities, etc.) out breading the fit resulting in the inevitable extinction of the racially fit.

[10]Leonard gives particular attention to the connection between eugenics and the Progressives. Leonard states that the connection to "was not just a metaphor for the superiority of administration to laissez-faire; it also referred, more narrowly, to eugenics, the social administration of human heredity." (Leonard, 2017, p. 117)

[11]In his book Leonard states that Progressives utilized scientific rhetoric to achieve their goals without

here, the Marginalists actually employed science via mathematical formalism (i.e. differentiable calculus, Lagrangian multipliers, etc). Almost as an direct attack on the Economic Progressives, the Marginalists asserted that *laissez-faire* was both not scientific and capable of providing socially optimal allocations of goods.

The Marginalists consolidated "economic theory of value under the aegis of utility" (Mirowski, 1991, p. 211) and exchange as a function of relative scarcity resulting in equilibrium. The path to reinvigorating *laissez-faire* begins with Jevons' *Theory of Political Economy* (1871) outlining marginal utility, his laws of exchange and indifference, and his equimarginal principle; and ends with Pareto's work in the *Manual of Political Economy* (1906). In bringing together the work of Walras and Edgeworth via the "Edgeworth Box", Pareto is able to demonstrate social optimal allocation of goods (i.e. Pareto optimality) between any number of individuals can occur under a voluntary exchange in a free market.

The Marginalists struck at the very heart of the Economic Progressives and like nuclear fission, split their hard core. Marginalists were able to employ the mathematical formalism that gave scientific currency to the Economic Progressives craved.[12] Marginalist called into question the basic premise of the Economic Progressive movement by disproving their fundamental assertions concerning *laissez-faire*. Yet, perhaps most importantly, the Marginalist offered economic theory that was free of ideological baggage.

Certainly, the Marginalist school didn't overtake all of economics until after WWII. Yet, the tension and the struggle innate in the Economic Progressive movement is best exemplified by the fight over free trade. The Economic Progressives saw their chief policy aim to remove free trade in favor of protectionism, and their inability to achieve this connect directly to

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actually understanding it, "The mathematical and statistical techniques that are characteristic of modern American economics did not acquire meaningful currency until the Second World War. But the progressive economist represented their program as scientific, a claim they founded, in part, on the authority of Darwinism." (Leonard, 2017, p. 105)

[12]Leonard argues in his 2017 book that part of the attraction to eugenics for Economic Progressives was that eugenics was considered the pinnacle of science.

the issues discussed above.

3.4 Free Trade as the White Whale

Dismantling Free Trade was a core agenda for the economic Progressives, yet the Economic Progressives failed in doing so. Free trade is a direct manifestation of *laissez-faire* and thus presents a microcosm of the issues that undid their overall research program. Due to the incongruities in their hard core, Economic Progressives tried and failed to upend free trade. The most energy was spent on trying to theoretically disprove it, when that failed they moved to empirically proving the power of protectionism via the US Tariff Commission. In the end the economic Progressives begrudgingly accepted the dominance of free trade.

3.4.1 Theory Failure

If the Economic Progressives were to take down free trade they needed to supply a new "scientific treatment of economic questions" (Samuels, ed, 2008, p. 93) and specifically a scientific theory of protectionism. The first organized attempt came from a special session from the AEA in 1901.

One of the main topics of discussion of a 1901 annual meeting was to investigate new theoretical justifications for protectionism, yet the theoretical justifications proposed were simply a thought experiment without a firm theoretical model. In his article, Thomas Carver argued that an import tariff will not necessarily increase the prices paid by consumers. Justifying this conclusion he states that

> Whether the home consumer pays the tariff duty or not depends upon whether or not the tariff duty raises the price, in the home market, of the article upon which it is collected. Whether it raises the price or not depends upon whether it reduces the supply of the article in the home market or not;-it being assumed that the duty will not affect the demand. (Carver, 1902, 168)

What is troubling to note in this "scientific approach" to the question of protectionism is that not only is there a lack of a sense of a theoretical model but also a failure to acknowledge that this is a non-generalizable result. Yet this lack of both theory and generalization issues didn't stop more ink being spilled trying to codify protectionism as scientific.

The two individuals most vocal on trying to provide this scientific treatment are Simon N. Patten with his book *The Economic Basis of Protection* (1890) and Frank William Taussig's book *Principles of Economics* (1911)[13].

Taussig goes to great lengths in *Principles of Economics* to distinguish between previous non-scientific arguments for protection and his scientific treatment. Where as the non-scientific protection argument simply states that governments need to set the tariff equal to the differential between home and foreign costs of production. Taussig explains that protection needs to be set as to foster domestic development, and therefore increase domestic wages. Importantly he notes that all protectionism comes with losses but they can be offset if they are scientifically applied.

Taussig states that the domestic industry doesn't arise because "of ignorance, lack of experience, and all the obstacles that impede success in unfamiliar undertakings." (Taussig, 1916a, p. 526-527). Thereby placing a protective tariff of "moderate-not to exceed say twenty-five per cent" (ibid, p. 528) which will be temporary. The tariff will foster domestic competition as firms learn "how to produce to the best advantage, and then can bring the article to market as cheaply as the foreigner, even more cheaply" (ibid, p. 527). Interestingly, the process will end as the consumer will substitute from the tariff-imposed foreign good to the domestic good[14] resulting in further investment by the home country. Taussig concludes his broad argument by saying that the only way to know if this process has ran its course is

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[13]Taussig does talk about protectionism in his book *The Tariff History of the United States* (1888) and *International Trade* (1927), though the majority and focused discussion can be found in his 1911 book.

[14]There is no indication on whether home's good is less than or equal to the foreign good with a tariff. Taussig simply assumes that when given a choice the consumer will choose to consume domestically over foreign given the product is available and the prices are similar.

"the only certain way to ascertain this is to remove the duties and let the domestic producers meet the foreigners on even terms." (ibid, p. 529). He argues that a tariff shouldn't exceed 25% and should last 20-30 years (ibid, p. 528).[15]

Taussig admits that this tariff will increase prices and pass those tariff costs onto consumers and reduce the amount imported. Surprisingly, he argues this will not result in a loss to society. Taussig sees that society gains from the tariff as the government will use the revenue to fund public works projects and/or reduce taxes that they would have levied (ibid, p. 519). The real cost for a tariff will be the intervening time as a domestic industry matures. In Taussig's eyes the firm gaining undeserved profits as it matures is the only cost to society, as this may lead to monopoly power.

At the same time progressive economists were generating their research on protectionism, scholars from the budding Marinalist school were developing models that were able to be uniformly applied in a dispassionate manner. An excellent example of this is Edgeworth (1894a,b,c), a three part series in which there is a theoretical model of the welfare effects of different types of trade barriers. In his manuscript Edgeworth ultimately concludes that a protective tariff can be generated, yet economists must advocate for free trade because (i) the condition for an optimal tariff is difficult and often unpractical to generate, (ii) when considering an import tariff consumers will always pay tariff costs, and (iii) since this will benefit producers at the expense of consumers, economists should not advocate for protectionism, because as scientists we need to be advocating for a uniform increase in welfare for all individuals.

Although Edgeworth published this seven years prior to the AEA symposium, there seems

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[15]Taussig explicitly assumed that other countries would be passive free traders when the home country imposed the tariff. In his *Principles* he states that with the imposition of tariff "Prices and incomes rise within the country, and fall in foreign countries." (ibid, p. 524). Taussig gives only a passing mention that it's possible for foreign countries to place reciprocal tariffs, but this doesn't happen because foreign nations tariffs "have been of a semi-mercantilist sort: to check imports generally" (ibid, p. 526) and wouldn't think of this policy action. His argument for protection is a partial equilibrium argument *in essentia*.

to be no mention or recognition of what modern readers would consider to be more scientific inquiry into the question of tariffs. Further Edgeworth is nowhere to be seen in Taussig's 1911 manuscript and only earning a passing statement in his 1927 book *International Trade*. In the preface Taussig claims that no real theoretical work has been done on international trade post-John Stuart Mill, only refinement of Ricardian Theory on the same basic theoretical lines. The footnote to that comment states

> See the remarkable comments on the literature of the subject, both mathematical and non-mathematical, by Edgeworth, in his essays on International Values, printed in Volume 2 of his Collected Papers. Compared with this the rounded and searching treatment of the same literature, old and new, by Professor J. W. Angell, in his book on the Theory of International Prices, a book which unfortunately did not reach me until the text of the present volume had been completed. (Taussig, 1927, p. v)

He ends the preface with two omissions, first that he won't be talking about the arguments of protectionism as he's covered that in his *Principles* textbook. Secondly that this book will focus on looking at the theory as he understands it without any addition of mathematical formalism.

Here we see the Economic Progressive's theory of protectionism not answering or refuting the knowledge of a newer research program. Instead, the tactic from the economic Progressives is going back to older fights that they believe they can win. Their commitment to "science" without understanding what that actually implies, mixed with their hard core commitment to reject anything that is connected to *laissez-faire* puts the Economic Progressives in an unwinable situation. An example of the Economic Progessive's inability to quantify what is and isn't science when it comes to international trade can be illustrated in the book reviews of Simon Patten's *The Economic Basis of Protection*. Both John Bates Clark and Henry C. Adams critique Patten for failing to actually deliver on the scientific treatment of protectionism he promised in his book. Clark states that "[i]t ought to do what no publication on that side of the question has thus far done, namely, elevate the entire

treatment of the the theme to a scientific level…The work is tantalizingly incomplete at some most important points." (Clark, 1890, p. 340-342). Adams, by comparison to Clark's review, does not pull his punches

> His treaties, instead of adding to our knowledge of the science of sociology by a discriminating application of its principles to the doctrine of protection, seeks merely to dignify the doctrine of protection by expressing its stock arguments in phrases borrowed from sociology. It does not seem to me that Professor Patten appreciates the broad and deep significance of the phrases he has borrowed…A book that is well written must be properly adjusted to the scheme of thought to which it professedly allies itself, and the premises it assumes must be logically carried out. When the great book on the protective policy shall have been written, it will be found to fit into a general theory of dynamic sociology. Professor Patten's book does not so fit. (Adams, 1890, p. 712-713)

In compounding these aforementioned issues with regards to the science of protectionism, the Economic Progressives' arguments also suffered from being chained to additional philosophical arguments. Frank Taussig and Simon Patten, were both proponents of Eugenics. Patten was a classical Progressive in that his views on biology and evolution informed his thinking on social science. Patten feared that capitalism had made it easier for less desirable members of society to survive, believed in genetic degradation from social ills, and saw the "poor as victims deserving uplift and as a threats required restraint." (Leonard, 2017, p. 119). Taussig also made no qualms about showing his eugenic bona fides, specifically his views on forced sterilization and race suicide. In his *Principles of Economics* textbook during a discussion on the costs of a minimum wage, Taussig argued that the unemployment caused by such a policy could be seen as a good thing for society. In thinking about those worker that are "unemployable" Taussig designates two categories those unemployables whose inability to work didn't harm society (i.e. the old, infirmed, disabled from an accident) and those whose inability to work were a detriment to society (i.e. the mentally and or physically disabled, those plagued with alcoholism, criminals, etc.). The latter group needed to be

simply stamped out. Neither the feeble minded, nor those saturated by alcohol or tainted with hereditary disease, nor the irretrievable criminals and tramps, should be allowed at large still less should be allowed to breed. We have not reached the state where we can proceed to chloroform them once for all; but at least they can be segregated shut up in refuges and asylums, and prevented from propagating their kind. The opinion of civilized mankind is rapidly moving to the conclusion that so far at least we may apply the principles of eugenics, and thus dispose of what is the simplest phase of the problem of the unemployable. (**?**, p. 300)

By no means is this quote an aberration, in other parts of his book when talking about population, Taussig discusses the need for eugenics to help alleviate issues attributed to race suicide.

The beliefs of eugenics and race suicide are intertwined within Taussig's arguments for protectionism. Firstly, both eugenics and protectionism hold a similar "unit of account" for policy decisions. In both protectionism and eugenics it is the nation, not the individual or the whole of global society that matters. For both the Economic Progressives and eugenicists, society was a living organism. As Leonard explains " [t]he society-as-organism discourse, whether construed metaphorically or literally, complemented progressives' historicist method and reinforced vital progressive intellectual commitment." (Leonard, 2017, p. 102) In making society as an organism, Economic Progessives and eugenicists could ignore individual outcomes, just a cells are subservient to the whole body, what mattered was society as a whole. In thinking about society a living body, eugenic offered a way to remove "uninvited parasites or microbes" which if not removed "were potential threats to its survival" (ibid). Similarly, the broad arguments in favor of protectionism seek to protect the domestic market (i.e. the organism) from the exterior threat of cheap foreign goods. Domestic markets are discussed in terms of benefiting society as a whole i.e. "an industry really advantageous for a country may be prevented from arising..." (Taussig, 1916a, p. 526). In weighing the costs of a tariff, it is not the individual that matters but how society as a whole can gain from the tariff in the short and long run, "[i]t is true that the consumers are in effect deprived of so

much of their incomes; but what they lose, the public treasury gains. Taxes are presumably levied for useful public purposes" (ibid, p. 519).

Secondly, as mentioned above, Taussig was fearful of lower wages, not out empathy for those unable to fiscally survive but because of what it meant for the "fit" (i.e. White American Protestant). Without suitable wages to keep the fit out of poverty the race's genetic material would degrade and lead to racial suicide. Thus Taussig's stances on immigration and wages all sought to help keep wages high for White Americans. Although not explicitly stated, protectionism can be seen as an extension of this goal. As Taussig states articulates in his *Principles* text, protectionism will both raise domestic wages in the short run but also provide stable work in the long run once an industry matures. Again when he envisions work, it is for those he deems worthy of employment.

Economic Progressives contributed a theory that was at best situational and plagued with additional philosophical baggage. Conversely, the Marginalist produced trade theory which used the tools and the language of scientific formalism as well as a trade theory which was ideologically neutral. In the face of Marginalist School trade theory, the Economic Progressive seem to gave up the fight over theory, and instead turned to the sphere where they felt they had an advantage: implementing policy.

3.4.2 Empirical Failure

The deck could not be stacked in more favor for the economic Progressives to take over tariff policy in 1916. In order to understand how advantageous the position was and just how close their goal of reshaping trade in America was, understanding the 16 years and the politics that led up to that point is crucial.

At the beginning of the 1900s, the intersection of the depressions in the 1870s and 1890s mixed with high inflation at the end of 1890s made the public more interested in tariff reform, not necessarily a United Kingdom style removal of all tariffs (Brownlee, 2017). Tariff

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reform for American businesses were policies such as reciprocal trade agreements, legislation allowing the executive branch to adjust tariff rates within a preset range without going back to Congress, to tariff commission/boards. Most of these policy suggestions were based off models from the German Imperial Commission and the reforms to the German trade system in 1902 (ibid). The compounding economic and political failures of the Payne-Aldrich tariff, President Taft's failed reciprocal trade agreement with Canada, and former President Teddy Roosevelt splitting the progressive Republicans off from the more conservative wings of the party left open a political opportunity for tariff reform in the next presidential election championed by Democratic candidate Woodrow Wilson.[16]

Wilson's advocacy of tariff reform helped boost him to the presidency and Democrats to take over both legislative chambers. With this clear mandate in 1913 the Wilson administration passed the Underwood Tariff. The Underwood Tariff was more than just a rate rebalancing, it was a major reform of the entire tariff system at that point. It reduced rates on the average for dutiable goods by about one third. Further, the tariff added to the list of non-duted goods: food products, leather, wool, and sugar. Unfortunately for Wilson and the Democrats it was a disaster.

The primary reason for the failure of the Underwod Tariff was how rates were set. Democratic lawmakers sought to set tariffs at "competitive" rates, but without a clear mandate on what that looked like tariffs were set in an un-scientific and ad-hoc manner (ibid). The weakness of the tariff and the Democrats' ability to respond came with the outbreak of World War I. The war disrupted international trade and finance movements, it stripped the federal government of funds, made the economic recession of 1914 more severe, and ignited domestic fears of product dumping post-war among manufacturers. Ironically while imports of manufactured goods were falling, the volume of exports nearly doubled, specifically ex-

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[16]At this time the core of the Republican party were strongly in favor of protective tariffs while the core of the Democratic party was in favor of British style free trade.

ports of manufactured goods nearly tripled. (Irwin, 2017). The growing war, increased fears of economic hardship, and Wilson's proposed higher income taxes to make up the shortfall resulted in political losses for Democrats in 1914.

These factors pushed business[17] and civic leaders to demand for tariff reform in the shape of a tariff commission, which could respond to the ever-changing political nature as well as provide "systemic understanding of the political economy of commerce" (Brownlee, 2017, p. 91). In 1915 sensing that their control of national politics was eroding by continued attacks of a newly reunited Republican party, Wilson and his administration began to be open to the political tactic of "support for the tariff commission idea could help moderate business hostilities to the tax plan and defuse the charge that Wilson was antibusiness." (ibid, p. 96). This plan was championed by Secretary of the Treasury William McAdoo, who advocated to Wilson that by establishing a non-partisan tariff board they would get politics out of tariff decisions (ibid). McAdoo was aided by several other cabinet members and a paper by Taussig (1916b), which ultimately convinced Wilson

> Taussig's moderate views, especially his deference to legislative and executive authority, may well have been important in persuading Wilson. Taussig saw the role of a tariff commission as rather circumscribed-a narrowly technocratic role, leaving fundamental policy decisions to Congress and the President (Brownlee, 2017, p. 101).

In his memo Taussig argues that a tariff commission could provide "accurate, honest, and consistent" policy advice to congressional lawmakers helping to remove politics from and inject professionalism into a very important policy decision (Taussig, 1916b, p. 5).

In September 1916 Congress and the Senate passed the Revenue Act of 1916, which impacted both revenue and trade in the United States. The act "increased taxes on personal and corporate income, canceled the transfer of sugar to the free list, hiked import duties

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[17]Small and large corporations as well as organized labor supported tariff reform due to war based fears. Some of the organizations include the Merchant Association of New York, National City Bank, U.S. Steel, and General Electric (ibid).

on chemicals and dyes to protect American producers from German dumping and created an independent Tariff Commission." (Irwin, 2017, p. 340). Wilson's proposal for the Tariff Commission had three key aspects: (i) provide dispassionate analysis of the prevailing economic climate in the US, (ii) furnishing lawmakers and the public with "useful" facts about treaties and tariffs between America and other foreign governments, and (iii) investigate the effects of tariffs on foreign competing industries and "the possibility of establishing new industries or of expanding industries already in existence through scientific and practical process" (Brownlee, 2017, p. 102). Both from his public and private writings it was clear that Wilson believed that this board would be both scientific and a-political. This is exactly what Economic Progressives wanted, and in line with their other "fourth branch" offices of government.

On April 1st 1917 the Tariff Commission began its first meeting. The board was comprised of six members, with each member serving 12 year terms which overlapped, and with the caveat that no more than three members could be of the same political party. Wilson appointed the Commission with two independents, Democrats, and Progressive Republicans respectively. In Wilson's eyes there was only one person to head the Commission, and the first member to be asked to join, Frank Taussig.[18] Unfortunately five days later, the US declared war on Germany and officially enters WWI, which alters the focus of the Commission. The first commissioned report by Congress was on financing the war effort, to which the Commission recommended income taxes rather than tariffs as the funding vehicle. Although the war may have altered some of the focus, the Commission did "produce several industry studies and reports on such issues as the competitive position of Japan, free trade zones, antidumping policy, and customs administration" within their first five years of operation (Irwin, 2017, p. 342-343).

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[18]Taussig had the longest appointment of 12 years, while the Republican members had the shortest with 2 years and 4 years.

Perhaps surprising no one but the economic Progressives, historian Karen Schnietz points out that there was a dramatic and political shift in the type of work done between the first two years of the Commission under Democratic control and post-that point under Republican control. Under Democratic control the committee "emphasized studies of consumer rather than industrial goods, a prioritization consistent with the goal of highlighting the consumer cost of tariff protection." (Schnietz, 1998, p. 39). Their focus on consumers resulted in reports focused on dumping post-war concerns, war related commerce treaties, and "studies on tariff protection's broad industrial effect." (ibid). In their reports on cotton gloves and bleaching powder, the Commission found tariff costs were passed along to consumers. When these tariffs were reduced or lifted prices ultimately fell. Yet, these reports did more than indicate how goods prices changed, they also included quotations from Republican senators and industry leaders expressing fears to American industries overrun by foreign producers juxtaposed to the reports noting of the strength of the industry. In short, this is to say that putting political fears next to retail and industry information was "clearly a political act that discredited Republican claims about tariff protection" (ibid, p. 41).

Unfortunately, with the election of 1919, this flipped congress back to the control of Republicans who muzzled the Commission by dramatically reducing their funding and refusing to allow several studies to be published. The only report in 1919 the Republican Ways and Means Committee would allow to be published was a politically favorable report titled *Tariff Information Series Miscellaneous Report: Dumping and Unfair Competition in U.S.* When Republicans took full control of the executive branch with President Harding's election in 1920, they reshaped the Commission by appointing officials who were well-known protectionists and loyal to the Republican party (ibid). The new mandate for the Tariff Commission under Republican control was to focus on "industrial good, unfair trade practices and cost-of-production studies" (ibid, p. 42). As Schnietz concludes in her article even with the best of intentions, the Tariff Commission was not above the political fray

> The Tariff Commission's information gathering and dissemination were profoundly influenced by the tariff ideologies of the commissioners, and by the nature of the requests made by the President and Congress....Clearly, the Tariff Commission was not insulated from partisan politics (ibid).

In less than two years since its founding the Tariff Commission went from an apolitical science based fourth branch to part of the political machine to fight the same tariff fights between Democrats and Republicans that had been going on since post the Civil War.

As politics became more of a central feature of the Tariff Commission Taussig and shortly thereafter the other independent member of the Commission William Kent, quit in 1919 and 1920 respectively. Undoubtedly this was a huge blow both to Taussig and the Economic Progressives in general. The Economic Progressives envisioned creating a branch that would take politics out of the tariff, "If we are really to have a useful, permanent, non-partisan board, it must be appointed in such a way, and its duties must be defined in such a way, as to make clear its purely advisory and non-political functions." (Taussig, 1916b, p. 204). In thinking about the initial intention and goals of the Tariff Commission, one can see how it aligns nicely with the core values of the Economic Progressives wished to conduct trade policy.

Firstly, the Tariff Commission allowed for a repeal of the dogma driven war of either absolutist policy of free trade or pure unrestrained protectionism. The Economic Progressives believed in targeted policy as Taussig stated in his proposal, one cannot assume there is a one size fits all policy, let alone the assumption that all businesses need to be protected based on differential in cost between domestic and foreign industries (ibid). Second it would be scientifically run, in the sense that "[t]here are no scientific laws applicable to economic problems in the same way as the laws of physics are applicable to engineering problems. If we extend the term 'science' to economics, we must remember that it can refer in this subject only to certain generalizations and to a body of useful in formation, not to a system of clear-cut principles or laws." (ibid, p. 194). Unlike other non-scientifically run organizations, the

Tariff Commission would gather data and advise using a wait and see approach.[19] Finally it would be run by economists and dispassionate experts. In Taussig's mind this was the only true reason for the Commission's creation "[t]he only possible ground-and this was the decisive ground-was that impartiality was to be guaranteed. The other agencies were subject to the vicissitudes of politics" (Taussig, 1926, p. 174).

Thus, as the Commission fell prey to politics, it represented the final failure of the economic Progressive's mission to rid the profession of dogmatic attachment to Free Trade. Driven by their hard core they fell pray to their own dogma and failed to realize that the dream of true impartiality was just that. In reflecting on how the Tariff Commission had changed with the Tariff Act of 1922, which gave the body power to adjust tariff rates, Taussig did not pull any punches. He argued that this new extra legislative power represented an end to impartiality, due to all tariff matters requiring some human judgment, something he acknowledges even he'd fall pray to (ibid). The basis of his argument is that given that some judgment must be made, political appointments would be just that political

> Still another consequence must be faced. It becomes important to the protectionists and to the free traders to have a man of proper sympathies on the Commission. If an administration represents a party pledged to the policy of high duties, it will want men on the board who will share its views, and will make the right sort of choice in doubtful cases; and the other way, if the Administration leans to low or to moderated duties. ...In other words, these new functions and duties of the Commission run counter to the very object which was sought in its establishment. The findings of the Commission are likely to be affected by the political and economic opinions of the members; and appointments to it are likely to be made with an eye to their opinions. If a Republican Administration puts a Democrat on the board, in accordance with the requirement of the law (for representation of each party), it will select a Democrat with protective leanings (ibid, p. 176-177).

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[19]This idea is core to the economic Progressive's view on how to conduct science. As Ely reflects in his book on the methodology of the new American economics he states "[w]e thought we could get new premises and new generalizations by opening our eyes and looking at the world as it was. When we began to use the 'look and see' method, we found a failure in the conclusion reached by the older economists to harmonize with the life that was unfolding about us" (Samuels, ed, 2008, p. 212)

Yet, the same problems that Taussig accuses the new commission of having, is innately the same problem nascent in Wilson's appointment. Although Taussig may have been as close to an independent board member as possible the rest were either tariff revisionist Democrats or progressive protectionist Republicans. Although he did not admit it, one could assume his swift departure in 1919 was that of a dreamer woken up from his dream. That one could impartially use policy to shake the foundation of Free Trade was too impossible of a task.

3.5   Conclusion

Although many of the institutions with respect to the science of economics as we conceptualize them today derive from the visionary approach of the Progressive Economists of the past, their paradigm could not last. Like much of the Progressive movement, economic Progressives were a contradiction, whether it was their commitment to reformation to benefit all workers in conflict with eugenicist fears of the new immigrant labor, or their commitment to be "disinterested agents of reform"(Leonard, 2017, p. 7) in direct opposition to being nationalistic in their economic advocacy.

It is this paradox that bound the Progressive movement; and, in the face of individuals like Edgeworth or Pareto[20] generating theoretical models on trade that were both scientific and devoid of ethical and dogmatic arguments, the progressives were doomed to be swept aside. Authors like Morgan and Rutherford (1998) argue that the economic historical school (a wing of and the inheritors of the economic Progressives) were overtaken because they were too pluralistic and didn't have set modes of investigation. Their argument is only partially true. The Economic Progressives' doom was not a function of the Marginalists being innately better, but to the inherent biases that formed the hard core of the economic Progressives'

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[20]Irwin states that Pareto's welfare criterion helped make utility more generalizable allowing for welfare comparisons of policies. Specifically, "Armed with the compensation principle and Pareto's welfare criterion economists were poised to establish more rigorous proposition about free trade and economic welfare." (Irwin, 1998, p. 184)

research program.

Free Trade, and the Economic Progressives' goals to replace it with "scientific protectionism" is a metaphysical manifestation of the innate problems in their hard core. Their theories lacked science although employed the rhetoric, they claimed to come from dispassionate observation but brought in external philosophical baggage, and as such were unable to budge when confronted with new information. In attempting to empirically prove the power of a scientifically informed dispassionate adviser, they fell pray to the same political dogma that they were beset against, unable to actually provide a consistent policy to promote infant industries. In reflection of the impact of WWI on the domestic industry Taussig wrote (as quoted by Irwin) that the war provided " protection more effective than any tariff legislation" would have provided (Irwin, 2017, p. 340).

In the face of a research program that not only could achieve the espoused goals and harpoon the White Whale that was Free Trade, Economic Progressives settled with Free Trade as a second best solution. Not convinced of its correctness, but that a scientific tariff was a level that they could not pull-off, Free Trade would help them in their more pertinent fight against domestic monopolies. If there is any cautionary tale to be taken from the economic Progressives it is in fact the same lesson that economics, and for that matter all science, struggles with: in any real science there is no pinnacle to summit, only a continual climb from ignorance to (hopefully) more truth.

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