Charles University in Prague

Faculty of Social Sciences
Institute of Economic Studies

MASTER'S THESIS

Trade and Politics: Political Determinants of International Trade Flows

Author: **Jan Sosnovec**

Supervisor: **Ing. Vilém Semerák, M.A., Ph.D.**

Academic Year: **2017/2018**

Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

The author hereby declares that all the sources and literature used have been properly cited.

The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Prague, January 3, 2018

_____
Signature

Acknowledgments

I would like to express my gratitude to Ing. Vilém Semerák, M.A., Ph.D. for providing all the support I asked for.

Abstract

This thesis takes a comprehensive look at the relationship between international trade and politics.

The first part of this thesis is theoretical. Besides providing a useful overview of this highly complex subject, it makes a contribution to the contemporary theory by proposing two simple models. The first of these models explains how because of complementarity of institutions, countries end up stuck with inefficient institutions and consequently high trade costs; countries can break out of this inefficient equilibrium only by coordinating their actions. The second proposed model shows how governments set trade barriers in order to pursue their political aims, while at the same time staying popular in order to remain in power. This model is consistent with a wide variety of regime types and ideologies, and takes into account voter heterogeneity.

The second part of this thesis is empirical. It uses the gravity model of trade, with multilateral resistance terms represented either by fixed effects or by the Baier-Bergstrand linear approximation of the theoretically derived resistances. The model is estimated by the PPML estimator. The findings are broadly consistent with the conclusions of the theoretical chapters as well as with the previous literature. However, the results regarding the role of market institutions and governance quality are inconsistent and somewhat puzzling.

JEL Classification	C23, D02, D72, F13, F14
Keywords	international trade, politics, political economy, institutions, gravity model of trade

Author's e-mail	jan.sosnovec@email.cz
Supervisor's e-mail	vilem.semerak@fsv.cuni.cz

Abstrakt

Tato práce nabízí ucelenou analýzu vlivu politiky na mezinárodní obchod.

První část práce je teoretická. K soudobé teorii mezinárodního obchodu přispívá zejména dvěma vlastními modely. První z nich vysvětluje, že komplementarita institucí nutí stát ponechat si neefektivní instituce a v důsledku toho čelit zbytečně vysokým obchodním bariérám. Státy mohou uniknout z této suboptimální rovnováhy jen koordinací svých kroků. Druhý model se zabývá rozhodováním vlády v oblasti mezinárodního obchodu. Vláda sleduje své vlastní zájmy, ale pro jejich sledování si musí udržovat podporu občanů. Ti čelí nerovnoměrným dopadům mezinárodního obchodu: zatímco pro většinu z nich je vliv obchodu pozitivní, existuje i skupina která je postižena restrukturalizací domácí ekonomiky způsobenou zvýšeným tlakem zahraniční konkurence.

Druhá část práce je empirická. Využívá gravitační model obchodu, s multilaterálními rezistencemi vyjádřenými buď pomocí fixních efektů nebo prostřednictvím lineární aproximace teoretických rezistencí navržené Baierem a Bergstrandem. K odhadu je použit PPML (Poisson pseudo-maximum likelihood) estimátor. Výsledky vesměs odpovídají jak závěrům teoretické části práce, tak i stávající literatuře. Některé z odhadů, zejména koeficientů vlivu institucionální kvality, jsou ovšem překvapující a těžko vysvětlitelné.

Klasifikace JEL	C23, D02, D72, F13, F14
Klíčová slova	mezinárodní obchod, politika, politická ekonomie, instituce, gravitační model obchodu

E-mail autora	`jan.sosnovec@email.cz`
E-mail vedoucího práce	`vilem.semerak@fsv.cuni.cz`

Contents

List of Tables

Master's Thesis Proposal

Author	Jan Sosnovec
Supervisor	Ing. Vilém Semerák, M.A., Ph.D.
Proposed topic	Trade and Politics: Political Determinants of International Trade Flows

Preliminary abstract

This thesis will analyze the links between international trade flows and political factors.

There is a considerable body of research focusing on the effect of trade policy instruments on international trade flows (see e.g. Kepaptsoglou et al., 2010). The issues of optimal tariff settings, non-tariff barriers, free trade areas etc. have received a substantial attention. However I argue that there are other channels by which political factors influence trade flows. These could range from the rather obvious ones - an armed conflict or a threat thereof - to the more subtle ones, which can include issues such as how much support can an exporter expect from her country's diplomatic representation in the country (does it have an embassy? How much cooperation from the local authorities can be expected?), but also availability of information, costs associated with obtaining local contacts, costs of adapting to local (potentially very different) legal system etc.

While there have been a number of studies focusing on a certain specific issue - e.g. do certain policies affect trade with a certain country? - I will attempt to analyze the issue more broadly, in order to provide a set of benchmark results for further research focusing on more specific questions. The questions

I will try to answer are general: are political factors significant determinants of trade? Which ones? In what type of countries are they especially important? Is the link bidirectional - does trade increase political relations or similarity of political systems?

There is relatively little literature on the effects of politics beyond trade deals and trade barriers on trade. Nevertheless, there appears to be a wide consensus among economists that trade is significantly influenced by a wide array of institutional factors; this is supported by empirical studies by Linders et al. (2005), De Groot et al. (2004) and others. Since many of these institutions are in fact shaped either by political decisions or by general sociopolitical, cultural, legal etc. environment, it is logical to expect that there are causal links between trade and politics beyond trade policy. Indeed some authors found for example evidence of a correlation between the level of democracy and trade (Mansfield et al., 2000). Morrow and Siverson (1998) reached similar conclusions; at the same time they found that sharing similar geopolitical interests is associated with more trade more (however being in a military alliance is not).

The core of the thesis will be the empirical – an econometric analysis attempting to tests the hypotheses formulated in the first, theoretical part. I will construct a model based on the standard Gravity model of trade, with additional variables representing political factors and a set of controls for trade policy as well as language similarities, historical ties etc. I will attempt to estimate several specifications of the model with various proxies for political factors – these will include especially the similarity of UN voting record, democracy index, military alliances etc.

In line with contemporary literature, I will use Poisson distribution specification of the Gravity model proposed by Santos Silva and Tenreyro (2006) in order to deal with heteroscedasticity in the data, which can cause inconsistency of the traditional specifications with log-normal distribution. (This estimator also eliminates the problem of country pairs with zero trade, which lead to undefined or infinite values in the logarithms.)

Předběžná náplň práce

Cílem práce bude analyzovat vliv politických faktorů na mezinárodní obchod. Většina literatury zabývající se tímto tématem se soustřeďuje na obchodní

politiky - celní politiku, necelní bariéry, obchodní dohody atd. Vliv politických faktorů na obchod však nemusí být zprostředkován pouze obchodní politikou. Politické faktory mají zásadní vliv na tvorbu institucionálního prostředí – právního systému, obchodní kultury atd. Vliv institucionálních faktorů na otevřenost státu vůči importu je zjevný; empiricky ho potvrzují např. Linders et al. (2005), De Groot et al. (2004) atd. Další autoři se zabývají přímo vztahem mezi politickými faktory a obchodem - např. Morrow a Siverson (1998) nalézají pozitivní korelaci mezi mírou demokracie a otevřeností k obchodu; jiní autoři nalézají vliv určitých úzce definovaných politických faktorů. Mým cílem bude vytvořit šířeji zaměřenou analýzu s odlišnými způsoby identifikace různých politických faktorů.

Jádrem práce bude ekonometrická analýza postavená na standardním gravitačním modelu obchodu rozšířeném o kontrolní proměnné identifikující politické faktory. V souladu se současnou literaturou bude použit estimátor s Poissonovým rozdělením reziduálů navržený Santos Silvou and Tenreyrem (2006), který řeší nekonzistenci výsledků v případě heteroskedasticity dat; tato metoda také eliminuje problém nulových obchodních toků, které v případě konvenční specifikace modelu s log-normálním rozdělením vede k nedefinovaným (resp. nekone- čným) hodnotám.

Core bibliography

Van Bergeijk, Peter A. G. and Steven Brakman, eds. (2010). *The Gravity Model in International Trade: Advances and Applications*. Cambridge: Cambridge University Press.

Borrmann, Axel, Matthias Busse and Silke Neuhaus (2006). Institutional Quality and the Gains from Trade. *Kyklos* 59 (3): 345-368.

Carrere, Céline (2006). Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model. *European Economic Review* 50 (2): 223-247.

Choi, E. Kwan and James Harrigan, eds. (2003). *Handbook of international trade*. Malden: Blackwell Publishing.

Cipollina, Maria and Luca Salvatici (2010). Reciprocal Trade Agreements in Gravity Models: A Meta-Analysis. *Review of International Economic*s 18 (1): 63-80.

Gómez-Herrera, Estrella (2013). Comparing alternative methods to estimate gravity models of bilateral trade. *Empirical Economics* 44 (3): 1087-1111.

Greif, Avner (1992). Historical Perspectives on the Economics of Trade: Lessons from the Commercial Revolution. *The American Economics Review* 82 (2): 128-133.

De Groot, Henri L. F., Gert-Jan Linders, Piet Rietveld and Uma Subramanian (2004). The Institutional Determinants of Bilateral Trade Patterns. *Kyklos* 57 (1): 103-123.

Jensen, J. Bradford, Dennis P. Quinn and Stephen Weymouth (2016). Winners and Losers in International Trade: the Effects on U.S. Presidential Voting. *NBER Working Paper No. 21899.*

Kepaptsoglou, Konstantinos, Matthew G. Karlaftis and Dimitrios Tsamboulas (2010). The Gravity Model Specification for Modeling International Trade Flows and Free Trade Agreement Effects: A 10-Year Review of Empirical Studies. *The Open Economics Journal* 3: 1-13.

Krasner, Stephen D. (1976). State Power and the Structure of International Trade. *World Politics* 28 (3): 317-347.

Levchenko, Andrei A. (2007). Institutional Quality and International Trade. *Review of Economic Studies* 74 (3): 791-819.

Linders, Gert-Jan M., Arjen Slangen, Henri L. F. de Groot and Sjoerd Beugelsdijk (2005). Cultural and Institutional Determinants of Bilateral Trade Flows. *Tinbergen Institute Discussion Paper No. 2005-074/3.*

Low, Linda (2004). The Political Economy of Trade Liberalization. *Asia-Pacific Development Journal* 11 (1): 1-23.

Mansfield, Edward D., Helen V. Milner and B. Peter Rosendorff (2000). Free to Trade: Democracies, Autocracies and International Trade. *The American Political Science Review* 94 (2): 305-321.

Morrow, James D., Randolph M. Siverson and Tressa E. Tabares (1998). The Political Determinants of International Trade: The Major Powers, 1907-90. *The American Political Science Review* 92 (3): 649-661.

Santos Silva, J. M. C. and Silvana Tenreyro (2006). The Log of Gravity. *The Review of Economics and Statistics,* 88 (4): 641–658.

Vicard, Vincent (2008). Trade, conflicts and political integration: explaining the heterogeneity of regional trade agreements.*Centre d'Economie de la Sorbonne working paper 2008.22.*

Westerlund, Joakim and Frederik Wilhelmsson (2011). Estimating the Gravity Model without Gravity Using Panel Data. *Applied Economics.* 43 (6): 641-649.

Introduction

Approaching any topic as broad and rich as the relation between international trade and politics is naturally rather difficult. There are number of factors interacting with each other; causal links are often bidirectional; the problem is not clearly delineated. Therefore this thesis must begin by a section which would summarize how I define the problem, how I approach it and what kind of necessary assumptions I make.

On the most fundamental level, international trade is shaped by decisions of firms, consumers and (to lesser extent) governments. The resulting market equilibrium depends on **economies of states** - their sizes, structures, factor endowments etc.; on **trade costs** - representing all trade barriers, the most important of them being geographical distance; and finally on **institutions**. To quote the seminal work of the New institutional economy, North (1991), institutions are *the rules of the game*. In this thesis I focus on institutions which are affected or even directly shaped by politics and policies. Fundamentally, all the aforementioned factors - economies of states, trade costs and institutions - are affected by politics. Politicians make policy decisions which greatly affect size, structure and even factor endowment of economies. Politics might not be able to move countries together or apart on the physical sense, but almost every single element of trade costs is to some extent shaped by politics (including transportation costs, which depend on infrastructure built in most cases by governments). Finally, if institutions are rules of the game, governments - alone or as part of intergovernmental organizations - are very often the rule-setters.

It is apparent that I must restrict myself only to certain group of issues in order to keep the topic manageable. Therefore this thesis will generally focus only on how various factors (related to politics) affect trade either **directly** or **intentionally**. For example if I ask whether political regime affect trade

openness, I will disregard the indirect effect via the size and structure of the economy. Clearly political regime can have massive impact on the structure of the economy and its macroeconomic fundamentals, which in turn determines how much does the economy export and import; however, this effect is not intentional - communist governments did not undertake farm collectivisations in order to significantly decrease net export of agricultural products, even though this was one of the effects of these policies. The main direct and intentional channel between politics and trade is trade policy. An example of indirect but still intentional impact of politics on trade is construction of infrastructure projects such as ports or interstate railroads, which reduce trade costs.

It is also clear that the link is bidirectional: trade can be expected to have some effect on the size and structure of economies, trade costs and institutions which govern it. Most importantly, trade increase specialization of economies, and (probably) leads to higher growth. However, I will generally disregard this direction of the causality. I will treat macroeconomic fundamentals, institutions and trade costs as given and fixed except when these are shaped as a result of political factors with intention to affect trade.

Finally, it is necessary to clarify the use of the word *politics*. I will not go into political science literature, as it would serve little purpose. Instead I use the word in its rather narrow, traditional sense: I mean firstly the actions of governments and secondly the process these government come to power, try to keep it and make policy decisions. For the purpose of this thesis, a war, elections or the creation of a free-trade area are all manifestations of politics; on the other hand, decisions made by companies or consumers are not.

Broadly speaking, the interaction between trade and politics and be divided into two categories: first there is the international scene, in which individual governments use the tools at their disposal - many of which affect international trade - to pursue their objectives. Then there is the domestic political arena: governments try to stay in power and pursue their political objectives. These two areas are quite separate: most voters typically care little about foreign policy (except for few major topics, which generally do not include international trade), and other countries generally care relatively little about internal politics of their trading partners.

Both types of political actors - governments and voters[1] - make decision in order to maximize their utility. Their utility depends on - among other factors - international trade. Both types of actors have tools to affect trade: governments can set tariffs, conduct diplomacy, start wars etc.; voters have the power which is both much more limited an much more powerful - they can change governments.

The goal of this thesis is to take a comprehensive look at the relationship between political decision-making and trade. This is done first in the form of theoretical discussion, in which several simple models are introduced when necessary. Many conclusions from this discussion are then put into test on trade data using econometric techniques.

[1] I disregard international organizations and other types of non-state actors

Chapter 1

Literature review

This chapter provides a very brief overview of the literature relevant for the topic of this thesis. Note that given the scope of the topic, it is not very practical to present a cogent in-depth literature review common in more narrowly focused papers. Instead, the first two sections of chapter will briefly cover (in rather broad terms) first the general development of the economic thought about international trade (with some additional notes regarding the perception and interpretation of these theories in policy making) and then specifically the link between trade and politics. Finally, the third section will discuss the literature about the gravity model of trade. Additional references will be provided throughout the text.

1.1 Economic theories of international trade

This section will provide a very brief overview of the history of economic thought about international trade. This is a highly relevant topic for this thesis. Politicians do not have a magical ability to approach a complex issue such as international trade from a fully rational, informed standpoint; instead they rely on various pieces of economic theory which are either in fashion or fit the politician's ideological preconceptions. John Meynard Keynes expressed this idea more eloquently: "*Practical men who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct*

economist." (From The General Theory of Employment, Interest and Money; cited from Screpanti & Zamagni, 2005.)

For a formal treatment of the models, which is not necessary for the purpose of this text, consult Krugman et al. (2012) and specially Feenstra (2015). For the history of economic thought perspective see Screpanti & Zamagni (2005).

Before the modern economic theory of trade was established by David Ricardo and his contemporaries, the most important school of thought about trade was mercantilism. Mercantilists saw trade as a way to accumulate monetary reserves (historically especially gold); reserves were historically associated with the ability to quickly raise and sustain large armies. Since the amount of gold in the world was essentially fixed, trade is a zero-sum game; some countries win and others lose. To increase the odds of ending up winning, countries should promote export (even by subsidies), discourage import by setting up high tariffs and secure monopoly position in export markets.

The cornerstone of the modern international trade theory is undoubtedly Ricardo's theory of competitive advantage. This model, appearing in Ricardo's *On the Principles of Political Economy and Taxation* first published in 1812, demonstrates how trade can be beneficial for both countries involved (instead of being a zero-sum, winner-loser affair); each country can successfully compete in some sectors. Trade is allowed by the differences between country's (relative) productivities in different sectors; by trading, countries can specialize in the production in which they are relatively more efficient.

Until 1970s, the most important alternative to the Ricardian framework was offered by the Heckscher-Ohlin theory, first proposed by Swedish economists Eli Heckscher and Bertil Ohlin (Ohlin, 1933) and later formalized by Paul Samuelson (especially in Samuelson, 1949). In this framework, countries have identical technology, but differ in their factor endowments. Trade allows countries to export goods they can produce more efficiently because their production is intensive in the factor they have in abundance. According to this logic, most trade should exist between countries with very different endowments; capital-rich developed countries should export capital-intensive products to labour-rich countries in exchange for labour-intensive goods.

The problem with Heckscher-Ohlin model is that while it sounds very sensible,

it does not fit data very well. This was found quite early, most famously in 1954 in the form of the so-called Leontief paradox, which noted that the United States - at the time one of the most capital-abundant economies in the world - exported mostly labour-intensive goods and imported capital-intensive goods (the opposite of what Heckscher-Ohlin predicted). Poor predictive power remains the main issue also of later developments in the Heckscher-Ohlin trade theory, such as the Stolper-Samuelson theorem (Feenstra, 2015).

The Heckscher-Ohlin framework has one distinct advantage highly relevant for the topic of this thesis: it appears to be highly intuitive. If non-economists (such as majority of policy makers) think about trade, they intuitively tend to think in terms similar to the Heckscher-Ohlin model. They view trade as something which should be offsetting insufficient production capabilities in different sectors in different countries. It seems natural that the Czech Republic should export cars to, for example, Kazakhstan - a country which is not self-sufficient in car production. However, trade between similar countries, and especially intra-industry trade, is often underappreciated or even seen as being somewhat suspicious - after all, common sense suggests that exporting Czech cars to France in exchange for (functionally basically identical) French cars sold in the Czech Republic must be inefficient. I would argue that this is possibly one of the reasons why policy makers in many western countries (such as the Czech Republic) appear to spend too much effort on promoting export to distant and somewhat exotic destinations at the expense of more similar, more developed (and often larger) markets.

On the other hand, Ricardo's comparative advantage, while certainly elegant and powerful, is not that easy to grasp. Much of the recent public debate about international trade and globalization demonstrates this fact abundantly clearly. Namely, the idea that countries with lower wages - especially China - are making Europe and America unable to compete with them in any sector (which would lead to massive unemployment) is predicated on the total lack of understanding of Ricardo's basic concepts.

In 1979, international trade theory experienced a major development. Paul Krugman published the first of his three seminal papers (Krugman, 1979), establishing a new trade model framework, which became known as the New trade theory. This approach is based on the assumption of monopolistic competition in the context of increasing returns to scale. Trade allows firms to

produce for larger market, and thus exploit the economies of scale. This leads to lower consumer prices, higher real wages and higher consumer utility. Krugman model was later expanded by Marc Melitz (2003) by introducing firm heterogeneity; unlike Krugman model, Melitz model provides an explanation why only a certain number of firms are exporters. Melitz (2003) and its later extensions, especially Melitz-Ottaviano (2008), represent the state of the art of the (mainstream) economic thought about international trade.

New trade theory dispenses with the traditional reasons for trade. Trade is not a result of differences between countries, it exists simply because firms (under certain, rather realistic, assumptions) can operate more efficiently in larger markets. Countries with identical factor endowments and technologies can – and do – trade with each other, and this trade can be just as welfare-enhancing as trade between very different countries.

1.2 International trade and politics

International trade cannot be separated from politics. This fact is evident from the very first word of the term: it is inter*national* trade - trade between *nations*; and what can be more political than the concept of nations?

Historically, governments used to see trade as one of their primary concerns, chiefly because it was one their primary sources of income. Taxation, especially or the lower classes, requires a large bureaucracy, on the other hand collecting tolls and tariffs can be done with a handful of officials at border crossings (which are likely to be controlled for defense purposes anyway). However, as governments became more able to secure their income from taxes, tariffs became less important and trade was becoming more and more free of government interferences (Bergeijk, 2001). With modern economics came the idea that free markets are efficient and thus any government meddling should be eliminated. In a way, the prevailing thought moved from seeing trade as inherently political (this was sill the case in 18th century, before Ricardo, and remained the case for Marxist economists much longer[1] On the other hand, mainstream Western economics basically took free markets as a starting point; the theories did

[1]Of course Marxist economist see essentially everything as inherently political, and there is no reasons why trade should be an exception.

not bother with factors from outside the realm of economics as a matter of course. The result is that in the modern economic literature, the topic of the relationship between politics and trade has been covered by a large number narrowly focused papers and monographs, while there is a surprisingly small number of more comprehensive texts, such as Bergeijk (2001).

The political economy of international trade has received some attention of economists - e.g. Rodrik (1994, 1995), Badwin (1989), Milner (1999). The vast majority of the literature in this field is much more narrowly focused; there is for example a rich literature on the preferential trade agreements, political economy of the World Trade Organization etc. (e.g. Hoekman and Kostecki, 2009).

Besides the political economy, the second natural starting point in this discussion is institutional economics, as politics often manifests itself from the viewpoint of an economics in the form of changing institutions; authors working in this area include e.g. Levchenko (2007, 2013).

On the other hand, there is a very large body of empiric research on this topic. However, this research is again highly fragmented. There are studies which analyse the link between trade and market institutions and studies which analyse the link between trade and democracies, but few which do both at the same time. Number of these studies are referenced throughout this thesis, but it would serve little purpose to list them here.

1.3 Gravity model of trade

The Gravity model of trade first emerged from empirical observations rather than any economic theory. Bergeijk and Brakman (2010) note that while the first formal use of the model is by Tinbergen (1962), the core idea is significantly older. This core is astoundingly simple: international trade volumes are simply directly proportional to the sizes of the two participating economies, and negatively proportional to the geographical distance between them (which represents trade costs). This concept in remarkably similar to the Newtonian model of gravity, which gave the gravity model its name. Furthermore, the use of the concept of gravity in relation of international trade allows for an inter-

esting (and, at least at the time of model's inception, novel) way of thinking about trade. Trade is simply "attracted" to economies, or more precisely, their aggregate demand. One can perhaps imagine countries simply throwing their exports into the imaginary space between them; the goods then float there until they are caught by the gravitational field of any other country; countries which are closer as well as those which are bigger (and thus exert stronger gravitational field) are more likely to catch the exports then those which are more distant and smaller. Note this style of thinking, in addition to being (obviously) based on a convenient metaphor rather than any economic theory, was directly contradictory to the economic theories of the time, which predicted that trade should be predicated on certain characteristics of the participating countries, such as differences in relative sector productivities (Ricardian theory of trade) or differences in factor endowments (Heckscher-Ohlin framework).

Thanks partly to its simplicity of implementation and its versatility, gravity model quickly became a popular tool for applied researchers and policy analysts. The most important reason for the popularity of the gravity model is however its almost incredibly good performance - despite its simplicity and (in the beginnings) lack of theoretical foundations, the model has been very successful in predicting trade flows and their reaction to various changes. (For example, Bergeijk and Brakman (2010) point out that gravity model has been used to great effect to accurately predict changes of trade flows in Europe after the collapse of the Eastern bloc.) Bergeijk and Brakman also speculate that another feature responsible for the popularity of the model is the fact that it does not rely on any specific economic theory - gravity equation has been derived in a number of different ways, including Heckscher-Ohlin framework (see Deardorff, 1998), monopolistic competition (Alho, 2005) or Ricardian competitive advantage (Eaton and Kortum, 2002), which makes it acceptable for economists of all persuasions. Interestingly, this means that the model which used to be criticized for not being derived from any theoretical foundations can now be derived from several different theoretical foundations, possibly contradicting each other.

Note especially that the gravity equation can be derived from the New trade theory models, based on Krugman (1979). This framework, especially in the form of Melitz (2003) and later Meliz-Ottaviano (2008) models (see also Feenstra, 2015), represent the state-of-the-art of the mainstream trade theory.

Since its popularization, a significant body of literature has attempted to build the theoretical microeconomic foundation of the model; in the beginning there were none. Consequently, there have been several important advances in terms of estimation methods, as the newly developed theoretical underpinnings of the model revealed several issues with traditional OLS specifications.

The most significant attempt to put gravity on a solid formalized theoretical footing was Anderson (1979). Anderson postulated countries with identical preferences consuming goods differentiated by country of origin. This basic framework - with further restriction of constant elasticity of substitution (CES) preferences - was further refined by the seminal work of Anderson and van Wincoop (2003). Unfortunately, the result of Anderson and van Wincoop are not practical for empirical work due to nonlinearity of the equations. Feenstra (2015) and other authors have suggested a simple workaround involving the use of country fixed effects in the econometric models, however this approach, while being very useful for applied work due to its simplicity, has its own problems. The latest development in this area is by Baier and Bergstrand (2009), who proposed a simple linear approximation of the Anderson and van Wincoop equations.

The traditional way to estimate the gravity model is by the Ordinary Least Squares (OLS) estimator. The fact that the gravity model (in its log-linearized form) is so easy to estimate by this most basic of econometric methods has in fact arguably been one of the main selling points of the gravity model. However, researchers soon found that this approach has its shortcomings. Namely, these are zero trade observations, which are actually rather common in real world trade data, and heteroskedasticity generated by the log-linearization (see Santos Silva and Tenreyro, 2006). Different methods have been proposed to deal with these problems (see e.g. Westerlund and Wilhelmsson, 2011 or Frenkel and Wei, 1993) but in most empirical work these issues have been (until recently) often ignored, largely because of the technical complexity of the proposed alternative estimation methods. One of the most recent and most practical of these alternatives is the use Poisson pseudo-maximum likelihood (PPML) estimator suggested by Santos Silva and Tenreyro (2006). This method eliminates the problem of zero trade observations as well as (under certain assumptions) the heteroskedasticity issue while remaining easy to estimate using modern econometric software. On the other hand, some authors, such as Martinez-Zarzoso et

al. (2007), argue that this estimator is inefficient and in practice might produce results inferior to OLS. The debate is ongoing, see Gomez-Herrera (2013) or Kareem et al. (2016) for recent overviews.

The gravity model theory, especially the estimation methods, will be covered in some detail, including further references, in later chapters. For comprehensive treatment of the history and development of the gravity model see Anderson (2011) and especially Bergeijk and Brakman (2010).

Chapter 2

Preliminary notes about international trade

Before beginning the discussion of the link between trade and politics, it will be useful to make two notes regarding the contemporary international trade and corresponding economic theory. Namely, I will briefly discuss first the non-discriminatory nature of (most of) international trade, and then the issue of trade with intermediary goods and reexports.

Both of these issues are generally ignored in discussions about trade, despite the fact strictly speaking, their omission may (at least in principle) skewer certain conclusions.

2.1 Non-discriminatory nature of trade

There is an implicit assumption in almost all contemporary thought about international trade: it is assumed that it is - generally speaking - irrelevant who conducts the actual trading. What I mean by this is that it plays very little role whether the goods are transported from their country of origin to their destination by the exporter, by the importer by another actor. All actors of international trade face level playing field in terms of trade costs. Nobody is discriminated in any way.

What this means – assuming it is true - for the analysis of international trade

is that it is sufficient to focus on countries (or companies) on both ends of the process – exporters and importers – and disregard everything that happens in between.

In reality, the process is obviously rather complex: it includes shipping, often via several means (e.g. the goods are transported by train to port, then by sea to another port and finally by truck to the final destination), but also insurance, possibly storage (at various points of the journey) etc. However, the analysis generally silently assumes that this process can be undertaken by exporters and importers from every country at equal cost, and if it is undertaken by third actors, the intermediary does not profit in any significant way. These assumptions are (arguably) more or less justifiable at the moment, but they are not self-evident.

Historically, there used to be many merchant cities and even states which based their wealth to considerable degree by transporting the goods between various foreign markets. Indeed, the common theoretical approach to international trade would be unable to account for, say, Venice of 14th century -this city state profited enormously on trade without being (in most cases) either the producer (and thus exporter) or the final place of destination. In other words, Venice - as well as many other merchant states found throughout the history - managed to extract rent from trade between other regions. This means that suddenly there are three actors in international trade: exporter, importer and the merchant (trader, shipper), with the last actor - the one omitted in the standard theory - often holding the most power and reaping lion's share of the profits.

Similarly, powerful countries - or, in some cases, semi-private actors (such as the British East India company and its counterparts in other colonial powers) - at various points of history managed to obtain monopoly or near-monopoly control over certain important trade routes. Controlling sea routes was often seen as a major opportunity of rent extraction. These monopolies could be maintained principally by two ways: either the merchant state is able to provide their services at significantly lower costs than any other actor, typically by having a technological edge (e.g. safer or faster ships), or it has a military power sufficient to physically stop any possible competitor. Both of these mechanisms have been used extensively by various historical actors to take control over

various profitable trade routes.[1]

As already stated, the reason why this is not the case today, which allows us to omit the intermediary actor from the international trade analysis, is not self-evident. First of all, it is arguably true only for naval routes - ships from any country can essentially carry goods between any two ports in the world with little restrictions or limitations. It is not true for railway transportation, because it relies heavily on linear infrastructure typically owned and operated by monopolies (often state-owned); there are also technical considerations such as different track gauges of various national railroad grids. It is also not true for air transportation, as the so-called Freedoms of the air - the international commercial aviation rules - generally do not allow for an airline registered in one country to operate a route between another two countries.[2] However, the naval transportation is what counts, because it is responsible for overwhelming majority of world's freight transport. But even here the fact that, for example, important straights and canals are open for all ships regardless of their flag, and that the sole naval superpower - the United States - does not try to use its dominance to capture some economic benefit, is not self-evident; rather it is a product of a number of factors, such as the prevalence of the free-market ideology and the position of the US as the worlds chief exporter in the early post-world war II period. Incidentally, both of these are now increasingly challenged: American economic and political (and, to lesser extent, military) dominance is threatened (mainly) by China, and the free trade paradigm is now disputed by the very country which championed it for such a long time (US).

In summary, modern international trade theory, which is the theoretical basis of the analysis in this text, assigns typically no role to any intermediary between the exporter and the importer. Trade between two countries has no direct effect on any third country. This feature of the models is arguably justifiable given the contemporary realities of the cargo transport and related industries, but it should not be taken as granted. It is not inconceivable that this state of affairs

[1] Note that this is not just ancient history. Control of Suez Canal was the key objective of the Franco-Anglo-Israeli coalition in the Suez war in 1956; given the complicated situation in Middle East and North Africa generally and in Sinai peninsula especially, it is not completely unconceivable that we might see another conflict over this strategic passage. Similarly, control over Panama Canal was one of the main reasons of the American invasion of Panama in 1989.

[2] The only major exception is the EU, which allows any European airline to fly any route within the EU, effectively treating the airspace of all member state as a single airspace.

might change in the future (although there appear to be no indications of such change at the moment[3]). On the other hand, it is certain that the situation was quite different for majority of the recorded history.

2.2 Intermediary goods and reexports

When discussing international trade, it is generally assumed that the exported article is produced in one country and then sold and consumed in the other.[4] This is clearly often not the case. With increasing share of intermediaries in international trade flows, more and more goods contain elements from several countries. Exporting goods using imported components constitutes co-called indirect trade. Principally similar are reexports, which is trade exporting imported goods directly, without adding any significant value to them. Finally, even the discussion in the previous subchapter concerning the role of traders and other agents facilitating transportation can viewed in this framework. An actor which extracts rent from trade between two countries - e.g. a third country with monopoly over trade routes - might be seen as buying the traded goods from the original exporter and reexporting them to the final country of destination. The difference is that unlike reexports (as well as indirect exports), this is not shown in trade statistics as exports to the "middle country" followed by another export to the final destination.[5]

From the standpoint of pure economic theory, this is not an issue. Trade with intermediary goods is a trade like any other, and there is no particular reason to worry about the final destination of these goods. However, once the politics and policy is allowed to enter the discussion, this becomes potentially relevant.

Most importantly, trade with intermediary products and reexports - or omission thereof in commonly available statistics - might skewer the perceived relative

[3]There are however concrete steps being taken – albeit arguably slowly – in this direction. For example the Chinese Belt and Road Initiative, or the Russian attempts to promote the Northeast passage, which is becoming increasingly available due to global warming and consequent melting of polar ice sheet, can be viewed in this light.

[4]Of course there is a body of literature examining the role of intermediary goods - see Chapter 4 in Feenstra (2015) for overview.

[5]At least in most cases. Existence of the "Rotterdam effect" - the vast volume of Dutch exports and imports, which appears to be disproportional to the size of the Dutch economy, attributed to the presence of the most important European shipping hub, Rotterdam - is an evidence to the contrary.

importance of various trade partners. The example of the Czech Republic can be used very well here: while trade statistics show that overwhelming majority of Czech export goes only across the nearest borders, especially to Germany, which leads politicians to constantly stress the importance of trying to expand to new markets (esp. in Asia), these statistics disregard the fact that significant part of the Czech exports to Germany are intermediary products, which are incorporated into German cars and other products and then exported to the very same Asian markets.

One might ask why should a country exporting intermediary goods care about their final destination. After all, the trade flows physically from the country of origin to the country where the intermediaries are used to assemble final products. Trade barriers between these two countries are the ones that should be kept low; trade barriers between the producer of intermediaries and the importer of final goods is irrelevant for this trade, and trade barriers between the final importer and the country in the middle of the process is outside of control of the first country. Strictly speaking, it should make no difference in which country do the intermediaries eventually end up. Similarly, reexports should not matter. However, there are reasons why in reality this is not so simple.

First of all, looking at intermediary trade flows without considering their final destinations might cause incorrect evaluation of sensitivity of country's export on changes in various foreign economies. For example, Czech export to Germany would be affected by a slowdown dynamics of Chinese economy more than the raw trade data would suggest. Secondly, indirect exports (sometimes masquerading as export of locally produced final goods, which might be basically just imported intermediary products put together with little value added) can be used to bypass trade restrictions and avoid tariffs. There are mechanisms to mitigate this problem, such as use of rules of origin based on value added, but these create additional bureaucracy and thus increase trade barriers on their own. Finally, misjudging the importance of various export markets (import sources) can lead to incorrect policy decisions. For example, a country might decide to commit its (limited) resources and political capital to push for increased export to a country identified as a promising export market without realizing that its products are already flowing into this market indirectly via third countries.

It is important to note that there is no reason to assume that indirect exports are somehow inferior (e.g. in terms of efficiency) compared to direct exports. This can be illustrated using the model framework proposed by Ahn et al. (2011), only slightly adjusted to fit this context. Ahn et al. modified the standard Melitz (2003) model by allowing for indirect export, by which is meant firms exporting their products not directly but via intermediaries (wholesalers). Producers can either export directly, as is the case in the standard Melitz framework, or they can instead sell their products to wholesalers, which then export the goods to the final destination. Wholesalers can export more efficiently than (most of) producers; this is reflected in the model by lower fixed trade costs. On the other hand, wholesalers obviously require certain profit margin from their sales. Therefore, producers making the decision to sell indirectly via wholesalers essentially exchange lower fixed costs for higher variable costs; this can be a rational decision, especially for smaller producers. See the original Ahn et al. (2011) paper for the technical details; also see Bernard et al. (2011) for further discussion and references.

Note that the wholesaler in the model might represent not only companies which buy and resell finished products, but the framework works equally well for a company which does the final assembly of intermediary goods (often with little value added).

Ahn et al. constructed his model primarily with producers and wholesalers from the same country in mind, but it can be applied to wholesalers from third countries as well. In fact, locating the wholesaler in another country might explain the difference in trade costs. Firms from country B might face lower trade barriers with country C than firms from country A. If producers in A want to export their products to C, it might be preferable for them to sell their the goods to country B, which then reexports them to C. Assuming the sum of trade costs between A and B and between B and C, plus the profit margin demanded by the wholesaler in B, is lower than trade costs between A and C, this can be efficient.[6] This mechanism basically allows producers from A to exploit B's ability to trade with C more efficiently, without the need to make direct trade between A and C more efficient. Assume for example that

[6]This cannot happen in the context of traditional trade models in which trade costs are represented by transportation costs, which is just a linear function of geographical distance. The situation outlined above violates triangle inequality, which means that if it is indeed permitted, trade barriers between countries cannot be represented as any sort of distance (in the mathematical sense of the word).

B is a larger country with more power in international politics compared to A. This gives exporters from B a stronger position in trade negotiations with C (especially if C is not a standard free-market economy). B might not secure lower tariffs (this would violate WTO's MFN (most favourite nation) rules), but it might expect e.g. preferential treatment in deals with C's government or state-controlled companies.

2.3 Final remarks

The discussion above has demonstrated certain limits of available international trade data. Standard datasets treat international trade as a strictly two-actor affair: one side receives goods produced by the other in exchange for money. No role for third parties is allowed. The reasons why datasets make this simplification is obvious: they work with data provided (largely) by states, which track goods entering and leaving their territories for tax and tariff reasons but have little incentive to systematically collect more extensive data (for which they would have limited use).

Is this an issue? As I mentioned earlier, it might affect how decision makers view relative importance of various trade partners, which could lead to incorrect policy decisions. On the other hand, it is important to realize that only geographical distribution of the trade flows is affected; total exports (as well as imports) remain unchanged.[7] The discussions and decisions about the overall importance of trade, effect of trade on domestic economy etc. should be therefore largely unaffected.

From the standpoint of economists, it is undoubtedly useful to be able to use datasets which take into account these issues. Fortunately, this is indeed (to certain extent) possible. The joint WTO-OECD TIVA (Trade in Value Added) dataset[8] provides exactly this type of data. However, I will not use it in this thesis; instead I will stick to the conventional data sources. This is intentional: this text discusses the interactions between trade and politics, and politicians do not usually approach their trade policy decision-making with a deep enough

[7] Except for, arguably, Netherlands and similar countries or regions with major trade hubs; their export *and* import is overstated. But even for them, *net* export is still „correct".

[8] http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm

understanding of the topic to make this distinction. This is not a criticism - politicians cannot be expected to be at the leading edge of the economic (or any other) profession; additionally, almost all common data sources (such as statistical offices), policy analyses etc. operate with traditional trade volumes instead of values added based data.

Chapter 3

Institutions and trade

Politics and institutions are closely connected. On one hand, a political discourse plays a major role in shaping the institutional framework of the country. Indeed governments are essentially the only actor able to purposefully change (some) institutions (Levchenko, 2007). On the other hand, politics itself is shaped by various historical, cultural and social institutional factors. It is therefore rational to pose the question how (if at all) do political institutions affect trade.

There is a rich body of literature supported by empirical evidence regarding the role of institutions in international trade. This is obviously a major topic, and it is not the purpose of this thesis to cover this issue in more detail than necessary. Therefore, this section will focus only on several problems related to the topic of this thesis. Namely, it will discuss the links between institutions and international trade, focusing on trade costs. Most importantly, the institutions discussed here will be (mostly) only those institutions which are shaped (in one way or another) by politics.

The (by far) most common way to approach the role of institutions is to focus on their effect on transaction costs (e.g. Levchenko, 2013; Anderson and Van Wincoop, 2004). The logic is straightforward: for example, a presence of widespread corruption increases costs associated with trade by the expenses related to necessary bribes. Similar effect can be attributed to market institutions, labour laws, consumer behaviour (which is shaped by cultural norms) etc. There is a significant body of research on the effect of particular insti-

tutional factors on trade (or on economic growth, or various other variables). Note that risks - such as the risk of expropriation, or the risk of losses related to criminal activity - are included in this category, as risks (at least on the microeconomic level) are mitigated by insurance, which constitutes additional expenses.

However, trade costs do not constitute the only channel through which institutions affect trade flows. Trade costs are arguably the most important, but not the only such mechanism. Another such mechanism relevant for this thesis concerns preferences and demand for imports.

3.1 Note about preferences and demand for trade

International trade is only possible if there are consumers who demand foreign products. This demand depends on consumer preferences. In most formal models of international trade, preferences are assumed to be identical across all products. However, it is useful for the purpose of this text to consider the possibility that they might change, namely that they can be affected by either trade flows directly, by decisions of governments or other actors or by institutional factors. This expansion is conceptually useful, because it allows to expand the debate to include factors affecting trade which do not manifest themselves in trade costs.

Note that the common assumptions about preferences are made merely for the sake of technical convenience. The models can be - in principle - easily adjusted for heterogenous preferences, and since the models are not dynamic,[1] the question whether preferences can change in time is not even relevant. For formal treatment of this issue in the gravity model framework, which enables to estimate these effects in the empirical part of this thesis, see section 6.2.1.

It can be argued that preferences are slow to change, and generally do not respond very quickly to the sort of phenomena discussed in this thesis. However there are two counterarguments. Firstly, preferences demonstrably do change in deep crises, in wars etc.; history knows many examples of boycotts of imports from countries which suddenly became disliked by a population (say because

[1] At least the standard models, such as Krugman (1979) and Melitz (2003).

of a perceived hostile act by their governments). Secondly, there are still significant sectors of many economies which engage in international trade and at the same time are directly owned or controlled by governments. Governments create a portion of the demand for imports, and thus their preferences are part of the overall preferences of the country. However, governments are able to easily and quickly change their preferences regarding imports from different countries depending on the political, security and other considerations. Clear examples of this behavior can be seen in defense, energy or telecommunication sectors.

3.2 Institutions and trade costs

Anderson and Van Wincoop (2004) provided an estimated breakdown of average trade costs between developed countries. They show that costs related to regulatory burden, language barrier, information costs etc. - all of which are highly dependent on institutions (or, in some cases, *are* institutions) - are, put together, significantly higher than tariff costs, and are of similar size as transport costs. This underlines the importance of institutions in determining international trade flows - since transportation costs are difficult to change (infrastructure helps, but is costly and takes long to be built) and tariffs are already close to zero for most goods (at least in the developed world), institutions are the only area in which significant reduction of trade costs are even feasible.

Broadly speaking, there are two major ways institutions affect trade costs: firstly, certain institutions simply incur additional transaction costs (e.g. a widespread corruption incurs costs to companies having to deal with the corrupted officials), or determine the size of certain transaction costs (tax code determines the tax expenses). This mechanism is very straightforward, and most research focusing on effects of institutions is concerned with this effect (e.g. Levchenko (2013) or Iwanow and Kirkpatrick (2007) use regulatory quality, Kucera and Sarna (2006) focus on labour protection etc.).

Secondly, there might be costs related to unfamiliarity to different institutions. For example, exporting to a country with different consumer culture creates additional costs of adjusting to the difference. A rather more obvious example

is language: trading with a country with different language incurs costs related to having to translate legal documents, advertisement etc. Some kind of institutional distance (sometimes also described as a (dis)similarity) has been used in a number of studies, although often restricted to a difference of very specific institutions (e.g. Mansfield et al. (2002) focus on the difference in democracy level). More general approach has been used e.g. by De Groot et al. (2004), who estimated gravity model with both market institutional quality and distance (both of which proved to be significant and of expected signs). Others have used cultural distances (e.g. Srivastava and Green, 1986; Linders et al., 2005) or distance of political institutions (suggested by Dixon and Moon, 1993).

In conclusion, trade costs might be affected by institutional makeup of either of the trading partners, or (dis)similarity (or other such quality) of the pair. This distinction is important for several reasons. The first mechanism allows identifying effects of specific institutions on trade, and ordering various institutional arrangements in terms of how beneficial they are for trade. From the standpoint of policy applications, it makes it possible to make recommendations regarding specific institutional changes in order to increase (or, if desirable, reduce) trade. (Consequently, there is a strong temptation to normatively label certain institutional arrangements as "better" than others, which should be done with caution. Institutional arrangements which are good for trade might not necessarily be so desirable in other areas.)

On the other hand, the second mechanism does not allow any ordering; it is about complementarity. Using languages as the most straightforward example, it cannot be said that certain languages are better for trade than other languages (clearly that would be rather strange). However, it is very likely that having the same language as a trading partner is better than having a different language. (Common language dummy is traditionally included in gravity model specifications, with the coefficient consistently positive at high significance levels.) If a government could change the language of its citizens, it might decide to change it to the language of its most important trading partners, however that would only increase trade with these partners (and potentially harm the trade with countries speaking the original language).[2] The same logic extends

[2]Obviously in reality, governments cannot change the primary language of their people (at least not easily, and not in short term; when it happened historically, it happened typically as an attempt to subjugate a national minority and integrate it into the dominant culture

to other institutions, such as various laws and regulations. For example, the US and EU have different regulations concerning car safety; these differ only in details, thus both create (probably) about the same costs. However, there are additional cost incurred by the mere fact that they are different; trade costs would go down if both countries adopted the same regulations, regardless of which ones.

In conclusion, the policy recommendations from the first mechanism would be "adopt institutions favorable to trade" (or, less correctly but more likely, "adopt better institutions"). The policy recommendation from the second mechanism would be "adopt institutions similar to institutions of your most important trading partners". The problem is that often these are the same institutions, and thus the recommendations might contradict each other: on one hand adopting "better" institution would reduce trade costs in general, on the other hand it would harm trade with countries with the same inefficient institutions.

Furthermore, this distinction has an important consequence for empiric research: finding that some institutional arrangement is correlated with more trade may not mean that this arrangement is more favorable to trade (putting possible endogeneity and other more traditional issues aside) - it is possible that it just makes the country more similar to its trading partners. This might be a real issue, especially given that majority of international trade is conducted by countries with certain institutional framework (generally liberal free-market democracies). It could potentially be argued that outliers such as Cuba or Belarus are not so unsuccessful because their institutions are bad, but because they are different from institutions of their neighbors and trading partners; this is almost certainly not the case, but it is likely that the dissimilarity plays a role alongside the genuinely low quality of institutions.

From the modelling standpoint, the difference is clear: the first mechanism applies on institutions in a single country and their effect on trade costs with the rest of the world - in the words of gravity model theory (namely Anderson and Van Wincoop, 2003), it affects multilateral resistances; on the other hand,

- it is unlikely to have ever been done for trade reasons). However, governments commonly support teaching foreign languages as secondary languages. There is an element of choice here - only one or two languages can be taught to the majority of pupils or students - and thus this logic applies quite well. For example, Czech schools have switched from Russian to English as the main foreign language after the fall of the Eastern bloc, which could have had a negative effect on the trade with Russia, but (hopefully) helped to develop trade links with the West.

the second mechanism can be described as affecting bilateral resistances. This can be easily modelled in the gravity framework.

The consequence is that paradoxically, countries might have incentives to adopt "worse" institutions to create more trade. This might be problematic if these "bad" institutions have negative effects beyond trade. To illustrate this intuition, I will use a simple model.

Consequence: incentives to keep worse institutions

Let C_{ij} be the institution-related cost of trade between two countries, i and j. Trade cost depends on the institutional quality in both countries, but also on the difference between these qualities, reflecting the higher adjustment costs of companies operating in countries with different institutions. In other words,

$$C_{ij} = F(I_i, I_j, |I_i - I_j|$$

where I_i, (I_j) is some kind of measure of institutional quality of country i (j). F is thus decreasing in I_i and I_j but increasing in $|I_i - I_j|$ (the difference of institutions). For the sake of simplicity, assume that trade costs are identical for both direction of the trade; then $C_{ij} = C_{ji}$.

Furthermore, assume that the country can set its institution to whatever level it chooses; countries want to maximize total trade with the rest of the world, thus minimize a weighted average of C_{ij}. For now let there be only two countries; then country i sets I_i so that C_{ij} is minimal (treating I_j as given). The FOC of this problem is obtainable by simply differentiating C_{ij} with respect to I_i:

$$\frac{dC_{ij}}{dI_i} \;=\; \frac{\partial F}{\partial I_i} + \frac{\partial F}{\partial |I_i - I_j|} sign(I_i - I_j) \;=\; 0.$$

Since $\frac{\partial F}{\partial I_i} < 0$ and $\frac{\partial F}{\partial |I_i - I_j|} > 0$, it is clear that $\frac{dC_{ij}}{dI_i} < 0$ for $I_i < I_j$, however for $I_i > I_j$ the sign is unclear.[3]

This means that the country with worse institutions should always improve its institutions at least to the level of the second country, as improving institutions will have positive effect both in terms of institutional quality and in terms

[3]Note that the derivative is not defined for $I_i = I_j$; however this is not an issue.

similarity; on the other hand, improving institutions above the level of the trading partner has positive effect in terms of institutional quality but negative effect in terms of similarity, and overall effect is uncertain (or, more specifically, it depends on I_j).

To extend the model further, it is necessary to add a technical assumption: let $\frac{\partial F}{\partial |I_i - I_j|} = const$. In other words, trade costs created by institutional dissimilarity increase linearly with the institutional distance.[4] Furthermore, let F be convex in I_i, and let

$$\lim_{I_i \to \infty} \frac{\partial F}{\partial I_i} = 0.$$

(These are natural assumptions, given that F is decreasing in I_i yet should remain positive.)

Let us start with the country i setting its institutions to minimize trade costs with the country j; I_j is taken as given. We have already established that the optimal I_i be higher or equal to I_j. For $I_i \geq I_j$, FOC of the problem simplifies into

$$\frac{\partial F}{\partial I_i} = -\frac{\partial F}{\partial |I_i - I_j|}.$$

Figure 3.1 shows the simplest case. There is a point I_i^O where both derivatives intersect; this is the optimal setting of institutional quality for the country i. Note $I_i^0 > I_j$.

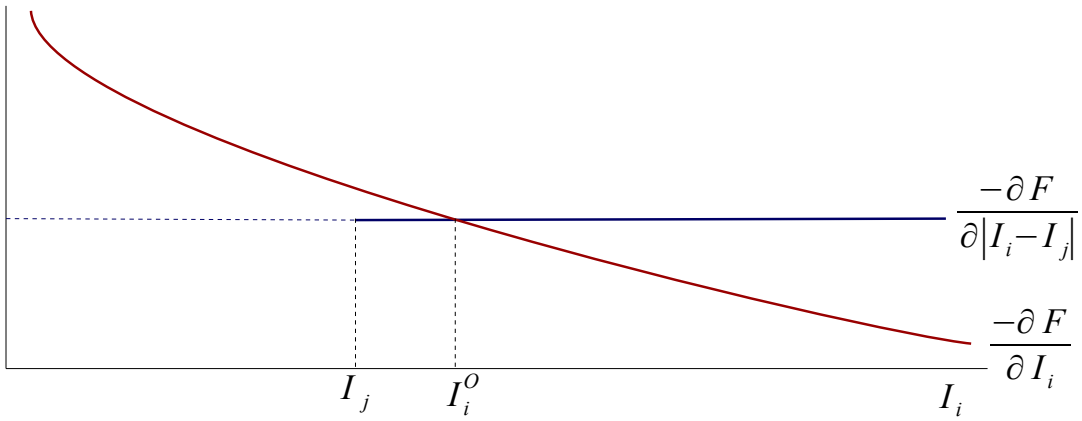

Figure 3.1

Now assume that the country j will respond to country i is the same manner, until an equilibrium is reached. Assuming both countries face identical F, this

[4] Strictly speaking, it suffices that $\frac{\partial F}{\partial |I_i - I_j|}(I_i = I_j) > 0$, and the function is increasing (not necessarily strictly).

would lead to identical institutional quality in both countries; I will call this level I^E. In this setting, this equilibrium indeed exists; there must be I^E such that

$$\frac{\partial F}{\partial I_i}(I_i = I^E) \;=\; \frac{\partial F}{\partial |I_i - I_j|}.$$

(The left hand side of the equation is decreasing to zero while the right hand side is a positive constant.) This situation is illustrated on Figure 3.2.

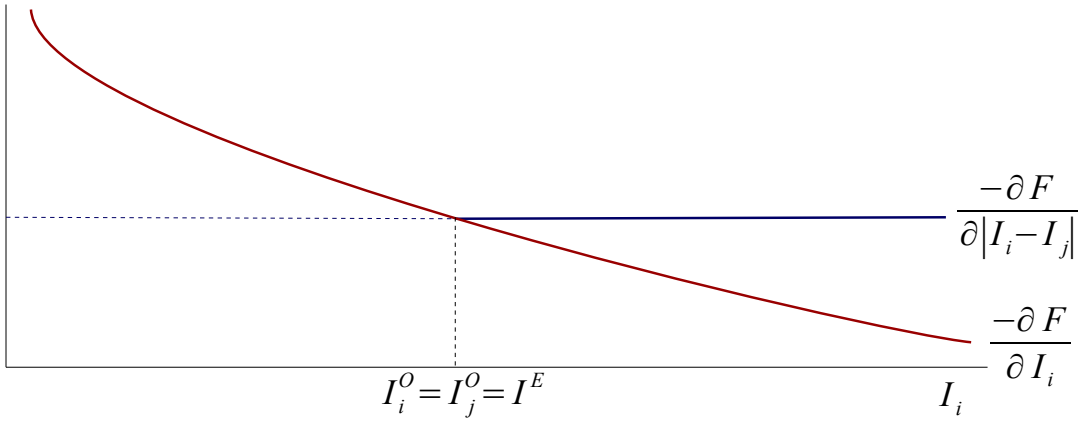

Figure 3.2

In other words, I^E is the level of institutional quality such that if $I_i = I_j = I^E$, the net effect of a small improvement of institutions would be zero (the positive effect of better institutions would be equal to the negative effect of increased dissimilarity). Because $\frac{\partial F}{\partial I_i} < 0$, it follows that for $I_j > I^E$, the overall effect of the improvement above I_j will be negative and the optimum of the country i is $I_i = I_j$; on the other hand for $I_j < I^E$, the effect of marginal improvement is positive and optimum of country i is some $I_i^O > I_j$. Once again, letting country j adjust its institutions as well, it is clear that the system will converge to the equilibrium of $I_i = I_j = I^E$, or possibly to a higher equilibrium if at least one of the countries started with institutions above I^E. If countries could only improve their institutions (only increase I_i or I_j, not decrease it), the equilibrium would be $\max\{I_i^0, I_j^0, I^E\}$ (where I_i^0, I_j^0 are initial institutional qualities of the two countries.

In reality, changing institutions takes not just government's will, but also time. Taking this into account, the conclusion would then be that trade forces countries with originally poor institutions to converge over time to a certain (better) threshold level; however, beyond this level, every institutional quality level is a stable equilibrium (which can be reached if at least one country started with

institutions higher than this level). If we assume that lowering institutional quality is not possible, the equilibrium will be either the higher of the two original levels or the threshold value, whichever is higher. To improve trade further, it would be necessary for the two countries to coordinate their behavior, so that they improve their institutions simultaneously. A single country cannot move to better institutions without increasing trade costs due to increased dissimilarity. The whole system is in a non-optimal equilibrium;[5] moving to better equilibrium would require all states undertaking the change at once - something that is unlikely to occur unless there is some type of central authority able to make this change for them; this is a role intergovernmental organizations such as the EU can play.

Finally note that expanding the model to include more than two countries is possible, but leads to somewhat cumbersome (and not very interesting) algebra. The problem is that it is impossible to aggregate the rest of the world into a representative country when modelling decision-making of a single country, because the optimum does not depend only on (weighted) average of institutional qualities of the rest of the world, but also on their distribution.

3.3 Political and market institutions and trade

There is an abundance of evidence that countries with better institutions are on average more prosperous (e.g. Borrmann et al., 2006). There are of course two major problems with this statement; firstly, there is the question of what are "good" institutions, as opposed to "bad" ones; secondly, there is the likely endogeneity of institutions (it is entirely possible that more developed countries prefer and/or can afford better institutions than poorer countries). However there seems to be more than sufficient amount of evidence that there are certain specific institutions, such as clear and enforced property rights and the presence of a stable rule of law, which are extremely significant factors in economic development; there is broadly speaking a consensus among economists which institution these are. As for the issue of endogeneity, a number of studies (e.g. Acemoglu et al., 2000) demonstrated using exogenous instruments or other methods that institutions indeed do affect economic development. Given

[5]There is no optimal equilibrium, unless there is an upper bound on I.

these findings, it is natural to expect that these institutions affect also international trade; since they apparently affect economic activity overall, there is little reason to expect that international trade should be an exception.

It should be noted that it is generally impossible to separate institutions affecting trade from those affecting other areas - not only the domestic economy, but also a variety of legal, cultural, political etc. issues. It is tempting for economists to talk about "good" or "bad" institutions, depending on how they affect economy (or specifically trade). This thesis is at certain points guilty of this transgression as well. The development of institutions is however a complicated process interwoven with historical, political and cultural development - see e.g. Greif (1992), Rajapatirana et al. (1997) or Eichengreen and Irwin (1998); it is always problematic to focus on a specific set of institutions affecting a specific area. This also makes institutions often very difficult to change, and implies that certain arrangements which work in one country might not work (or might not be feasible to enact) in another.

In the rest of this text, the terms "market institutions" and "political institutions" will be used. For the purpose of this thesis, **market institutions** are mostly formal institutions, mostly shaped directly by governments, which are purposefully set up to govern functioning of the economy. These include especially property laws, market regulations, bureaucracy related to businesses etc. On the other hand, informal institutions and institutions which affect markets only secondarily are not included; for example, culture, traditions or the criminal justice system are not considered to be market institutions.[6] **Political institutions** are institutions which determine how does the political system of the country operate. These might be formal, such as the national constitution, or informal, such as culture, traditions, historical experience etc., as long as they are primarily related to politics. Especially important will be the regime type - by which I mean whether the country is a democracy or a dictatorship - and the quality of governance, which represents factors such as rule of law, lack of unnecessary bureaucracy, lack of corruption, fair and efficient justice system etc.

There have been a number of studies attempting to estimate the effect of various

[6]There seems to be no clear definition of market institutions - most authors offer a more or less comprehensive list of institutions which govern markets; for example Fligstein (1996) lists property rights, market governance structures, conceptions of control and rules of exchange.

political institution, most commonly democracy level (e.g. Mansfield et al., 2000), on trade. However, most of these studies share one common feature: they argue that the link between political institutions and trade is indirect; political institutions are linked to market institutions which in turn affect trade. A typical example of this reasoning: democracies tend to have better market institutions than dictatorships, thus democracies trade more. But is there a direct link? Is it the case that, for example, democracies trade more even *after controlling for the effect of market institutions*? This is one of the questions this thesis attempts to answer.

At the first glance, there is little reason to assume that political institutions as such should affect trade. For example, why should the mechanism of government succession (in other words, whether the country is democratic or not) have direct effect on trade? However, there are reasons why this might be the case. These will be explored in following chapters, at this point it suffices to say that they might be connected primarily with the difference of goals and also of the constrains faced by different regime types.

Besides the regime type, I will also attempt to estimate the effect of governance quality on trade. The working hypothesis here is that there might be either no significant effect, or a small positive effect due to lower trade costs of trading with better governed country.[7] The effect should be larger for market institutions, as these affect trade costs (such as bureaucracy barriers, taxes etc.) directly, but even here the effect might not be nearly as large as one might assume. This is because market institutions affect the domestic economic activity as well as international trade. If it is difficult to export something somewhere, it is probably equally difficult to make and sell it there. In fact for imports, the relationship might even be negative - countries with bad market institutions might simply be so inefficient in their domestic production that it is more efficient to satisfy a large share of their aggregate demand by imports rather than domestic production. The overall effect of market institution quality is likely to remain positive, but it might differ between export and import quite a bit, with the effect on imports likely to be smaller.

Finally, as discussed above, bilateral institutional distances might play a role

[7]For example, countries which are better governed might be expected to be more stable and generally more predictable. Srivastava and Green (1986) and other authors have included various measures of political stability in their gravity equations, with varying results.

in trade costs. Here the hypothesis is clear: dissimilarity should lead to higher trade costs. This should be true especially for market institutions; while there might be a similar effect for the difference between governance qualities, it is likely to be smaller (if significant at all), because these institutions do not directly affect trade costs. Lastly, cultural distance should be considered.[8] Larger cultural difference might ceteris paribus decrease demand for the other country's imports; it might also increase trade costs due to having to adapt to different norms, styles of doing business etc.

[8]Unlike governance and market institutions, culture will be appear in the model only in the form of bilateral distance, not as unilateral quality. It is conceivable that some cultures could be intrinsically linked with more trade than others (e.g. some cultures might show higher willingness to interact constructively with foreigners than others), however this question goes beyond the scope of this thesis.

Chapter 4

Politics and international trade

There is no doubt that international trade is closely connected to politics - much more than most of the economic activity taking place within national borders. Historically, trade was a very important source of government revenues, either directly or via tariffs. Trade has also always been linked to international relations - diplomacy has been used to make trade deals and trade deals have been used as a tool for diplomacy; wars have been fought to open trade opportunities and trade has been used to finance wars.

The next two sections will first make some general remarks about the role of politics and governments in trade - namely how do governments meddle in trade and why they bother to do that. The following section will briefly cover preferential trade agreements (as arguably the most important manifestation of government trade policies); the next section will discuss the related issue of trade disruptions and overall systemic risks related to trade. The concluding section offers a simple model of trade policy decision making, especially in the context of different ideological and institutional arrangements.

4.1 How do governments affect trade

The main actors in international trade are firms and governments. Generally speaking, firms do the actual trading while government set the rules and can try to influence firms in their decisions (Souva et al., 2005). Firms generally do

not care about politics, governments generally care about little else. Therefore, in the context of this discussion, governments are the active party: they use the tools at their disposal to shape trade to fit their needs; however they cannot change trade patterns directly, but they have to do it (mostly) by affecting firm behaviour. Thus in the analysis of the link between politics and trade, one needs to determine not only what do governments want to achieve, but also what tools do they have available to pursue these goals.

Before going into specific dimensions of the trade-politics relationship, it is useful to make a few remarks regarding the tools at government's disposal. Clearly the variety of tools is considerable. What is also clear is that some countries have access to more of these tools than others. Ceteris paribus, states with a strong rule of law and limited government power - generally democracies - are significantly constrained, while states with either centrally planned economies or strong government with weak legal boundaries can employ the full variety of these tools.

First of all, not all trade is conducted by private companies. There are sectors in which governments are either directly involved in trade, or private companies require government consent and support in order to make a trade deal. The typical example is defense sector, where governments are the most common buyers (and almost always the end customers, even if private companies play the role of an intermediary), but often governments are the sellers as well. The same is true to considerable extent in energy sector and large infrastructure projects.

It must be also restated that the role of a state in international trade naturally depends on the role of the state in its economy in general. In the market democracies of the West, state plays a role limited largely to rule setting (and enforcing), with active participation possible only in several well-defined areas (such as aforementioned defense, but often also healthcare, education etc.); Western governments have only very limited powers to influence decisions of companies operating outside of these sectors. On the other hand, countries with a stronger role of government might be in a very different situation. Governments might directly control producers (especially those that participate in lucrative export, which often presents opportunities for rent-seeking); alternatively, government might be able to exert their power (either in a legal or extra-legal manner) to affect the decision-making of privately owned compa-

nies. An example of the former is much of the oil sector in Russia or Middle East; the latter can be seen for example in China.

However even if trade was conducted solely by private companies completely free from direct government interference, states would still have tools to influence trade (especially the choice of trade destinations). The most obvious way to discourage trade with a geopolitical rival and encourage trade with an ally involves trade barriers. However, as discussed above, the use of tariffs and quotas as strategic tools are limited by the WTO rules, which prohibit selective use of these instrument against a specific country. (There are exceptions from this rule, esp. related to fighting dumping prices (see Hoekman and Kostecki, 2001), but it is still a cumbersome tool.) This limitation can be in some cases bypassed by imposing tariffs on goods which are traded in especially large amount with the target country (this way a non-discriminatory measure can have a relatively targeted effect); similar result can be also achieved by non-tariff barriers. A more straightforward way to discourage trade with a specific country are trade sanctions, which have the advantage of being able to be precisely targeted, however they are very confrontational and thus are used only rarely, often as the last resort action before a military intervention.

In practice, countries rarely try to actively discourage trade with certain countries, because such an action might be legally difficult, might have only limited effect on the target country (it is usually relatively easy to redirect trade to other destinations, at least in long term), have also negative effect on the domestic economy (which creates additional political difficulties) and finally can be perceived as an aggressive and destabilizing act. Instead, countries often try to encourage trade with selected countries, either to pursue political and strategic goals or simply to help domestic economy by increasing exports. This can be done in a number of ways, which may or may not be effective, often depending on the institutional framework in both countries involved. In some cases, diplomacy can be used directly to negotiate trade deals; more often it is used to clear the way for private companies (e.g. by inviting business executives to accompany highest state representatives on state visits). Diplomatic representation in the partner country might offer support for exporters e.g. in navigating local legal system, reducing transaction costs (Bergeijk, 2001). Trade agreements might be signed; modern trade agreements are often not limited just to reduction of tariffs, but include also things such as reduction

of non-tariff barriers, agreements regarding protection of intellectual property, dispute settlement mechanisms etc. Note that this sort of trade diplomacy is likely to be more effective in undemocratic countries, or countries with low governance quality; a strong rule of law typically does not allow the government to discriminate between foreign companies.

Finally, firms might take international relations into consideration on their own, even without any government action. Most notably, trading with a hostile country ceteris paribus increases the risk of expropriation in case of any conflict (Souva et al., 2005). Furthermore, the domestic government has lesser ability to intervene in such cases. This risk is arguably higher in undemocratic countries - governments of democratic countries tend to face significant legal constrains in this regard. There is also the possibility that customer preferences might change based on nationalistic sentiments (e.g. campaigns against Western products in Russia after the imposition of sanctions following the annexation of Crimea).

In summary, governments have a wide variety of tools they can use to control trade. However, they are severely constrained by their own and international laws and treaties, by political constrains and by their capabilities. Ceteris paribus, countries which are stronger (in terms of economic, political or even military power) and countries which are less democratic should be less constrained in their ability to affect trade

4.2 Why do governments affect trade

The previous paragraphs established that states vary in their ability to shape trade to conform to their objectives. But what are these objectives? Krasner (2000) lists four aims which states generally pursue in their trade policy: political power, national income, economic growth and social and political stability. Governments primarily try to stay in power - but to do that, they typically pursue all these goals, as strong economy and stability increases their chances of re-election (or decreases the power of any oppositions in undemocratic countries). Note that it is not necessary to assume that governments are always benevolent - it is for example well within the bounds of this framework for a government to sacrifice some economic growth (e.g. by not allowing much trade) in order to increase social stability (which might mean protecting a

corrupt and oppressive regime). On the other hand, governments may also pursue objectives other than staying in power - namely, they may engage in rent-seeking. However it may be argued that rent-seeking still requires at least certain level of political stability, and thus falls within Krasner's framework.

Many researchers have restricted their modelling of the government as an actor in international trade to only one of these aims and ignored the others. E.g. Mansfield et al. (2002) proposed a model in which governments balances extracting rent and keeping economic performance good enough to stay in power. Gowa (1995) focuses on the political and strategic aspects of trade policy. Other authors simply equate states with governments, and model both as maximizing national income. However I argue that it is necessary to at least acknowledge that there are multiple factors at play, which may in some cases act against each other - any government pursues several objectives which might be consistent with higher and lower desired trade volumes at the same time.

In summary, governments generally act in order to increase aggregate income, economic growth, social stability and political power of their country, regardless of their internal motivations. Different governments will give different weights to these objectives. Krasner (2000) argues that trade generally increases national income, but decreases social stability (by exposing the country to foreign ideas and cultures, movement of labour etc.). The link to political power and to (long-term) growth is (according to Krasner) ambiguous and depends on the relative size or power of the country and relative level of its development.

Finally, it should be noted that trade provides direct income to the government - typically via tariffs, although sometimes government might own companies participating in international trade directly.[1] Historically, tariffs used to be a major source of government income, often even the main one, largely because they are simple and cheap to levy (Bergeijk, 2009); however tariffs lost their prominence as the role of a state has expanded and domestic economic activities became taxed. Nevertheless, especially in developing countries, tariffs still provide a significant funds to government budgets. This means that trade

[1]This is especially common in resource extraction sector. For this reason, governments of countries such as Saudi Arabia or Russia have direct control over uncommonly large share of their exports, which gives them stronger ability to use trade for political gains; examples include Russian use of oil and gas exports as leverage against their neighbours, or the oil embargo enacted by many Arab nations against Israel and several other western countries (including the US and UK) in 1973.

liberalization has not only costs and benefits caused by expansion of trade and exposure of the economy to world markets, but also opportunity costs in terms of lost income (or the necessity to replace the income by another source, e.g. by increasing tax burden or borrowing).

4.3 Preferential trade agreements

The most straightforward link between international politics and trade is trade policy. This is the main tool in governments' toolbox used to directly influence international trade. Trade policy might include a broad range of policy instruments, some of which will be mentioned in following sections. This section will focus on the primary tools of the trade policy - tariffs and other trade barriers, and especially on preferential trade agreements.

Interestingly enough, even though tariffs (and other similar instruments such as quotas) have been the primary tool of trade policy for centuries, they are of limited interest for this thesis. The reason is that because of the work of WTO (and its predecessor GATT), tariffs are mostly low and - more importantly - they are applied equally to all trading partners. There are some exceptions from this rule (see e.g. Anderson and Van Wincoop, 2004), however the Most Favored Nation rule of the WTO ensures that tariffs are generally applied indiscriminately. The main exception from the Most Favored Nation rule concerns trade agreements. Groups of countries can agree to mutually decrease or even completely eliminate tariffs on each other's trade.[2] This has become the main instrument of trade policy, as it is basically the only way to selectively reduce trade barriers towards specific trading partners. Furthermore, trading agreements are often much broader, covering not just tariff reductions but also mechanisms for dispute settlements, protection of intellectual property, common infrastructure projects etc. (Vicard, 2012); the importance of these "additional" items can be higher than the effect of tariff reduction. Fi-

[2]There is also a provision for unilateral reduction or elimination of tariffs towards the least developed countries - the so called Generalized System of Preferences. This provision is used by the developed economies to support the least developed countries by providing tariff-free access to their markets - e.g. EU's Everything But Arms scheme. Additionally, WTO rules allow unilateral tariff hikes in response to dumping and other specified harmful export practices; these provisions are prone to be used selectively and possibly even misused, however they still offer only limited ability to use tariffs as a policy tool. See Hoekman & Kostecki (2001) for details.

nally, trade agreements are often the first step towards deeper economic (and potentially even political) integration. See Baldwin (1989) or Hoekman and Kostecki (2001) for a more rigorous discussion of this subject.

Despite all the obvious potential benefits, the effectiveness of trade agreements is not fully established. This topic has received a substantial attention of researchers, yet their conclusions are often conflicting. The main problem for the empirical research in this area is endogeneity of trade agreements: a state can be expected to be more likely to sign a trade agreement with a country with which there already has been a significant (or significantly increasing) trade exchange (Kepaptsoglou et al., 2010). Nevertheless, it appears that at least the broader, more comprehensive trade agreements, going beyond the simple mutual tariff reduction, are clearly effective in promoting trade (Cipolina and Salvatici, 2010; Carrere, 2006). Mansfield and Bronson (1997) also found complementarity between trade agreements and defense alliances, suggesting that trade agreements might have limited effects alone but significant while accompanied by political ties.

In conclusion, the effectiveness of various types of trade agreements is not clear, however there is a consensus among most economists that overall, they do have a positive effect. Politicians clearly believe in them as well - otherwise they would not put so much effort and political capital into negotiating and signing them.[3] This belief is supported by most (but not all) empirical studies. It is therefore necessary to control for the effects of trade agreements in the gravity model constructed in the empirical part of this thesis.

4.4 Risk of trade disruption

Just like any other economic activity, international trade involves an element of risk. Risks specific to international trade include currency risks, risks of changes of trade barriers etc.

On the microeconomic level, these risks are (mostly) indistinguishable from trade barriers. Companies protect themselves from these risks via insurance, hedging etc.; these expenses are an indispensable part of trade costs. However,

[3] Or, in some cases, furiously opposing them.

it is useful to look at this issue from the perspective of the whole economy. Note that the aforementioned risks are mostly identical (and thus perfectly correlated) for all exporters or importers, at least if they trade with the same trading partner.

From the perspective of the whole economy, which is the primary perspective of political decision makers, trade necessarily creates certain risk of trade disruption. The idea is very simple: while trade does improve overall welfare in the country, it also creates a dependency. If the trade were to be disrupted, e.g. by imposition of an embargo or prohibitive tariffs by certain trading partner, national welfare would be severely impacted. In fact the situation would be - at least in the short run - worse than the in autarky, because the country's economy would be still producing the products it was exporting, however it would be unable to exchange them for the imported goods.

To illustrate this point, I will use following model, taken from Bergeijk (2009, p. 48-56). For simplicity, consider a two-product world and a small economy. (The model can be expanded to include more general cases.) Our country is a net exporter of good y and importer of good x. The situation is depicted on Figure 4.1. Point A is the production and consumption in autarky - it is the point where production possibility frontier is tangent to highest indifference curve (u_A). Given the world prices p^W, free trade optimum production is TD and consumption FT, which gives higher welfare, corresponding to the indifference curve u_{FT}.

Up to this point, this is a standard textbook illustration of the positive welfare effect of trade. However, consider the possibility that trade will be disrupted. If this happens, the economy will be forced to consume what it produces. In the short run, it is impossible to change production - this means that the production decision will have to be made before it becomes clear whether the trade is disrupted or not.

If production is in TD (as would be the case in the standard, zero-risk free trade equilibrium) and trade is disrupted, consumption will also move to TD and welfare will fall to u_{TD}, below the autarky level u_A. The country allows its economy to be highly specialized, focusing on production of export products, and relying on import to saturate demand for other goods. In the case of trade disruption, the country suffers significant welfare loss. The other extreme is

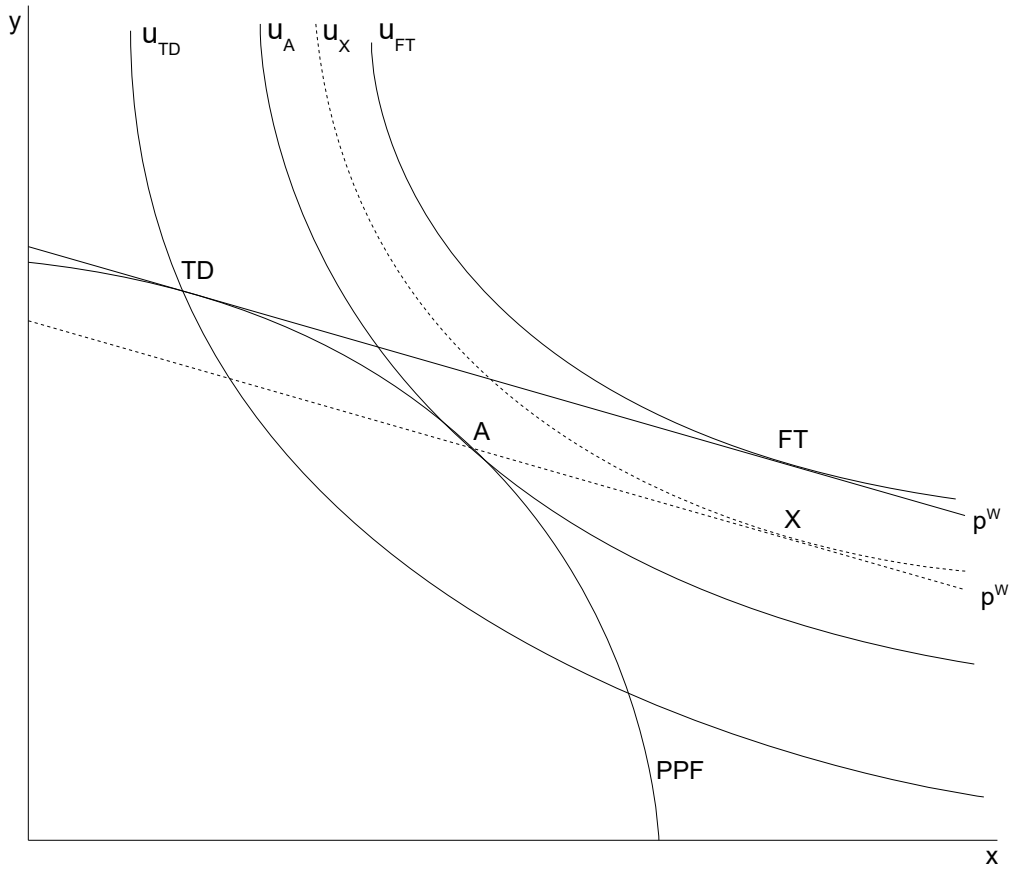

Figure 4.1

setting production to the autarky point A. If the trade is disrupted, the country is doing as well as possible in these circumstances. If trade is not disrupted, consumption moves to point X and welfare increases to u_X, which is much lower than u_{FT}.

Clearly the optimum production decision depends on the probability of trade disruption (which is exogeneous in the basic model, but can be endogenous) and on the level of risk aversion of the country (or its government). However, assuming risk-averse decision-maker and strictly positive probability of both free trade and trade disruption scenarios, it is reasonable to expect the optimal production decision to be somewhere between both extremes (TD and A). In other words, in the presence of risk of trade disruption, the country can decide to restrict its export (and thus welfare in the free trade situation) in exchange for higher welfare in the case of trade disruption.

Intuitively, this conclusion makes sense: governments are likely risk-averse, as they want to avoid the social unrest associated with economic crises. Furthermore, some countries might face a very real risk of trade disruption - probably not so drastic and not with the whole rest of the world, as is the case in the simple model above, but possibly with a major trading partner.[4] This logic might serve as a justification of trade barriers, which continue to exist despite the fact that economic theory show theoretical superiority of free trade.[5]

Trade disruptions are most likely to be caused by political decisions. From the purely economic standpoint, free trade might be seen as the natural situation, in which trade flows are dictated purely by market forces and natural trade barriers. What stops this state from being realized are artificial trade barriers enacted by states. Since the non-political trade barriers (such as transportation or language costs) are unlikely to experience sudden significant increase[6], it is the political trade barriers which are likely to be responsible for trade disruptions. Governments can - at least in principle - simply ban trade with a specific country outright. They can also use tariffs and various non-tariff barriers to achieve similar results by less dramatic measures. Three scenarios leading to trade disruption seems most realistic in the context of contemporary world economic system: Firstly, a country might suddenly significantly increase its trade barriers, possibly because of a deep political change (e.g. regime change), social unrest or violent conflict. Secondly, trade sanctions might be imposed by a country or a group of countries on another country, typically in order to punish a supposedly unacceptable behaviour such as violating international treaties or sponsoring terrorism. Thirdly, a country might withdraw from a preferential trade agreement, or simply violate such agreements, effectively increasing trade barriers vis-a-vis another country or groups of countries. The probability of the first and second scenario is reduced with increasing political stability and security. Probability of the third scenario depends on many factors, but arguably one of them is the cost of this move (economic and noneconomic): for example it can be argued that withdrawing from an PTA with an ally endangers the

[4]United Kingdom with the prospect of the uncertain outcome of the Brexit negotiations is a good example (as of late 2017); so is Mexico facing the possibility that Donald Trump will attempt to fulfil his campaign promises regarding NAFTA. Yet another example is Iran, which might fear the restoration of the international sanctions lifted in 2015.

[5]Obviously there are many other, arguably better, explanations, ranging from rent seeking to protection of sectors unable to compete on the world market.

[6]A hypothetical example would be an earthquake destroying the only bridge connecting two islands, effectively causing massive increase of transportation costs. Similar but more realistic example would be a sudden blockage of the Suez or Panama canals.

alliance, and thus has an additional cost in terms of security. Another important factor is the strength of enforcement mechanisms of the trade agreement. This last point is crucial also in relation to the WTO: strength of commitment to the WTO rules (and its conflict resolution mechanisms) is a very important factor in overall risks of trade distortion. (See Hoekman and Kostecki (2001) for further discussion of the role of WTO.)

What this means for the topic of this thesis is that assuming countries actually reduce their trade when facing a systemic risk of a major trade disruption, this risk should negatively affect trade even if it is not realized, and this effect is not limited to trade costs. In other words, reducing the risk of trade disruption should lead to more trade even if the trade was never actually disrupted and if trade costs faced by companies are unchanged (for example because the companies do not perceive this risk, or are unable to insure against it). Factors which can be expected to decrease the risk of trade disruption can been identified as political stability, security, political ties and military alliances between trade partners (esp. if they have a preferential trade agreement), membership in WTO. All these factors should be therefore correlated with higher trade.

4.5 Trade, politics and ideology

As almost every area of government responsibility, international trade is a subject of internal country politics. Citizens - voters - face the economic impact of government trade policies. Governments might see trade in a number of ways: as an economic policy tool, a subject of foreign policy, a source of rent extraction, a dangerous opportunity for foreign interferences etc.

The standard economic theory demonstrates that the net welfare effect of trade - and especially the effect on consumers - is positive (see e.g. Baldwin and Wyplosz, 2006 or Feenstra, 2015).[7] On the other hand, the increased competition creates welfare losses among employees in uncompetitive industries (or, in the Heckscher-Ohlin framework, the owners of the scarce factors; see

[7]It should be noted that this relationship is empirically surprisingly not as strong as one might expect (Harrison and Hanson,1999). However, what is important here is not the actual long-term effect of trade, but rather what politicians are likely to expect the long-term effect of trade to be. In this case politicians appear to follow the general consensus among economists.

e.g. Feenstra and Lewis (1994) for further discussion). These losses are, at least theoretically, temporary - the affected workers should eventually retrain and find jobs in the more competitive sectors. In practice, this is apparently sometimes not possible, or at least it takes a rather long time.[8]

Note that international trade is a subject which is viewed very often via almost purely ideological lenses. Unfortunately, economists must bear part of the blame: the majority of the mainstream economists in the last several decades have focused on gains from trade, while possible risks and losses were delegated to sidenotes in international economics textbooks. The basic pro-trade consensus among almost all mainstream western (and, arguably, the majority of non-western) political leaders, which has been recently partially broken by the Trump presidency, was based at least as much on ideology as on the real understanding of the subject. This resulted in distrust and sometimes negation of the pro-trade paradigms by various political actors, starting during the post-2008 crisis and culminating (so far, as of late 2017) in Donald Trump's victory in the US presidential election and the decision of British voters to leave the European Union, both in 2016.

What this implies for the topic at hand is that politicians and votes do not necessarily approach trade from a fully rational, informed perspective. Politicians may take decisions based on ideological precepts or even deep-rooted preconceptions and misunderstandings of the basic economics; an example is the current resurfacing of essentially mercantilist ideas viewing trade as a zero-sum game and overstressing the importance of positive trade balances.[9] Similarly, consumers might fail to correctly associate the welfare changes they experience with their causes, in this case the international trade.

If there was a general expectation that the effect of free trade would be universally positive, all countries would simply drop all tariffs and work to minimize all other reducible trade barriers. Clearly this is not the case. Countries do maintain certain level of trade barriers, which implies that there are actors who

[8]Trade creates new jobs in sectors which benefit from it. The problem is that there is often a serious mismatch between these new jobs and the jobs which are being destroyed - in terms of geographical location, skill requirements etc. In principle, the adjustment process might take a generation or two to complete. Governments can - and often do - attempt to expedite this process, e.g. by offering subsidies for retraining or relocation of affected voters, however these programs are costly. See Feenstra and Lewis (1994) for further discussion.

[9]The striking similarity between these modern ideas and mercantilism of the 18th century was noted already by Bergeijk (2001). See also Screpanti and Zamagni (2005).

believe that their welfare is reduced by trade. On the other hand, existing trade barriers are in most cases not excessively high, and a considerable progress has been made in reducing them further. This would suggest that from the standpoint of a government, there is some equilibrium level of trade resulting from the political decision-making process; this equilibrium is generally above zero. This equilibrium level might have been decreasing in the last decades, but it is unclear whether this process will continue in the years to come.

4.5.1 Model

Economists who construct models of trade policy decision-making process generally assume that the equilibrium is reached between the interests of voters and of the government. Furthermore, they tend to simplify the problem by assuming that either voters are intrinsically anti-trade and governments are pro-trade or vice versa. For example, Mansfield et al. (2002) assumed in his model that governments collect rents from trade barriers (esp. domestic monopolies) while voters are either pro-trade, or at least they detest the rent-seeking behaviour and want to reduce trade barriers for this reason.

There is undeniably certain logic behind these arguments. Basic international trade theory shows that the net consumer welfare effect of trade is positive, therefore consumers might be justifiably assumed to be supportive of trade. At the same time, governments gain income from tariffs, or they might be under pressure from domestic firms which want to preserve their market power and are afraid of foreign competition; in this case government would try to balance their utility (which increased with higher trade barriers) and probability of staying in power (which depends on the support of pro-trade voters). However, the opposite situation is also potentially justifiable: governments can be pro-trade, either for ideological or pragmatic reasons or simply because they take the long-term view in which temporary welfare losses of certain proportion of the population can be ignored; at the same time consumers (at least many of them) can see a trade liberalization primarily as a threat to their jobs.

In summary, both voters and governments can be conceivably pro-trade or anti-trade. Governments choose their position based on their ideologies or their goals. Voters are heterogeneous in term of welfare effect of trade (at least in short run), and quite possibly either not fully rational or at least not

fully informed; they can be swayed by ideologies, identity politics, propaganda and other factors. (The importance and unpredictability of public opinion was noted by Low (2004) and other authors.) It appears that a model which is consistent with all these issues is required. Specifically, this model should allow for heterogeneity of voters, not fully rational behaviour on their part[10], and a government which is not restricted to either pro-trade or anti-trade stance. I will construct such a model here.

The starting point is the assumption that trade increases welfare of consumers – either by speeding up the economy (and therefore improving wages etc.) or at least by improving the variety and quality and reduction of prices of goods on the market caused by increased competition. However, the welfare gains are relatively small, and consumers might not always associate them with trade. Only certain share of the population will feel experience sufficient gains associated with trade to actually take a pro-trade position. I will call these people „winners". Number of winners increases with overall welfare gain from trade, and therefore with trade volume. At the same time, the increased competition forces some firms either to go out of business or to increase their competitiveness by reducing costs. Their employees lose their jobs or are forced to work for reduced wages; this is a significant welfare loss, which is easy to associate with trade. These people – from now on called „losers" for the sake of brevity - experience significant net welfare loss due to trade. In summary, the population divides into three groups: losers, winners and the remaining consumers, who do not experience the negative effect of increased trade but at the same time their welfare gain is not large enough to be recognized and associated with trade.

Finally, there is the government, which has the control over trade barriers. Governments can be pro- or anti-trade for any of the possible ideological, pragmatic or self-serving reasons. For example, a benevolent government might be pro-trade because it expects (probably correctly) the losses due to labour market adjustments to be only temporary, and in long term the positive effects will far outweigh the negatives. A rent-seeking government might be pro- or anti-trade depending on the source of their rents. However, the most impor-

[10]This is debatable, however it seems difficult to construct a model which assumes traditional fully rational, perfectly informed utility maximizing voter and at the same gives realistic predictions, unless there is a heavily anti-trade government. The problem is that in reality, governments - at least in western democracies - tend to be almost universally more pro-trade than general populations.

tant goal of the government is to stay in power. The government expects to be supported by winners (who associate their rise of welfare with government trade policy), while losers will oppose it. The rest of the population will be indifferent regarding trade - they will make their decision based on other factors, and can be ignored in this analysis.

To formalize these assumptions, let T be the volume of trade; $T \geq 0$. L is the ratio of losers in the population ($0 \leq L \leq 1$), which is an increasing function of T. Similarly, let W be the share of winners in the non-loser population (losers cannot be, naturally, at the same time winners); W is an increasing function of welfare gains from trade G, while G is an increasing function of T. Finally, T can be set to any nonnegative level by the government.

To keep L and W between 0 and 1, it is useful to specify the functions in the following manner:

$$L = L(T) = 1 - e^{-T}, \qquad W = W(G) = (1 - L)\left(1 - e^{-G}\right).$$

To account for positive but decreasing marginal utility of the trade gains, let

$$G = G(T) = \alpha \log(1 + T),$$

where α is a parameter. Plugging in the equation for U and L, we get

$$L(T) = 1 - e^{-T}, \qquad W(T) = e^{-T}\left(1 - (1 + T)^{-\alpha}\right).$$

By plotting these functions (see Figure 4.2), we see that initially, there are more winners than losers, but at certain point this trend reverses; as T increases, increasing number of losers reduces the pool of potential winners, and the rate of increase of the share of winners in this pool is dropping.

As stated before, the government might have varying agendas, but always will first and foremost work to stay in power. This means keeping the difference between W and L as high as possible, but at least positive. (For simplicity I assume that voters who are neither winners nor losers either do not take any side, or their support is equally divided between the government and opposition.)

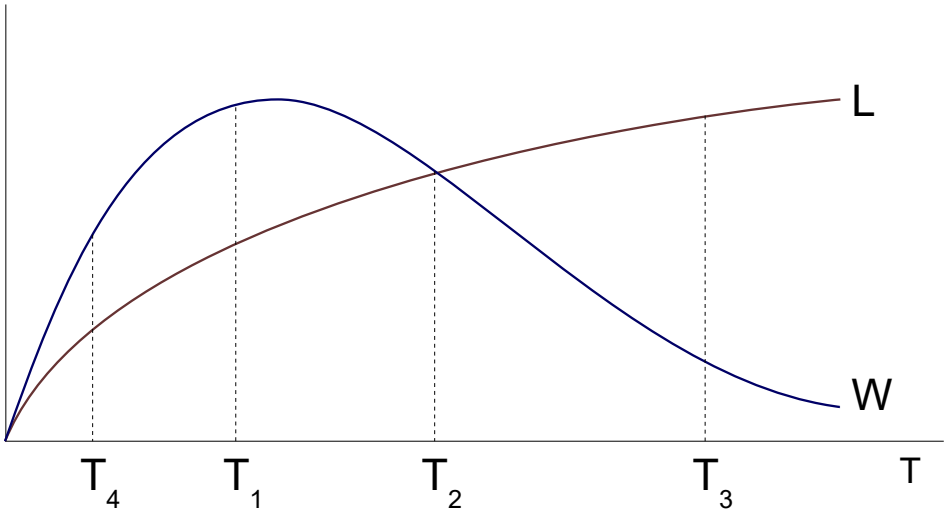

Figure 4.2

4.5.2 Implications: trade and regime type

Let us discuss three relatively realistic scenarios. First assume a populist government which aims only to maximize its popularity among the people; this government will be maximizing $W - L$, and thus set trade to T_1. Another possibility is a government which is pro-trade (however motivated this position might be), but needs to remain popular (this would be the case in democracies, where the government must regularly answer to voters to stay in power); this government will set T to T_2 (or somewhat below, to gain some safe margin of voters). Finally, assume a pro-trade dictator; he does not require majority support,[11] but he still needs to make sure that the number of losers does not get too high, as that may lead to riots and other unpleasant events, possibly culminating in overthrowing of the dictator; therefore he will set trade level to even higher level T_3. (This point is chosen arbitrarily in the graph, but it might correspond to certain threshold proportion of losers, regarded by the government as the highest safe ratio.)

Note that I did not discuss the possibility of a government with an overtly anti-trade agenda. This is intentional. Clearly such a government would be able to set trade to 0 while staying somewhat popular (for T close to 0, $W > L$). However, empirically, this does not happen - even the most isolationist regimes such as North Korea conduct international trade. The most likely explanation

[11] More realistically, the dictator can increase his popularity by other means, mainly by propaganda.

is simply the undeniable inefficiency of autarky. It appears that presently, even the most protectionist or paranoid politicians and voters do not advocate for autarky; they tend to talk about "just trade", "fair trade", reducing dependence on import in certain sectors they consider to be strategic (food, energy, arms) etc. In practice, most governments (at least the democratic ones) with anti-trade rhetoric can probably be included in the "populist" category and thus they would set trade to T_1.

There is however another factor to consider when discussing anti-trade governments. Many undemocratic regimes might be afraid of the outside influences connected to trade - they might not want their citizens to enjoy imported goods, especially goods made in rich democracies; they might fear that dangerous ideas such as human rights or democracy might slip in with them. In the context of the model, these governments essentially want to keep down the number of winners, as winners are the people who - by recognizing that they benefit from international trade - are most likely to be affected by foreign ideas, culture etc. Such isolationist governments will not opt for complete autarky, because they do not want to rule over a grotesquely poor country; they will however keep trade low enough (e.g. at T_4 in the graph) to prevent the number of winners from reaching certain level deemed dangerous.

The implications of this model are clear. Democracies will set moderate trade barriers in order to keep trade levels relatively low, generally between T_1 and T_2. Nondemocratic regimes have much more freedom in setting their trade policies. Undemocratic governments which either extract rent from trade or want to increase long-term economic power of their countries regardless of short-term losses will prefer very high trade levels; on the other hand, some dictatorships will prefer quite low (but non-zero) trade levels.

4.6 Security and strategic aspects of trade

The link between international relations and trade might seem straightforward at the first glance: countries are likely to prefer to trade with friends rather than with enemies. The reasoning is simple - trade is beneficial for both parties, and it is not in the interest of any country to do anything beneficial for its rivals. The feeling is likely mutual, thus trade between rivals should be limited (trade

barriers are likely to be high). Another reason is that it may be dangerous to be too dependent on a rival (Mansfield and Bronson, 1997), since the probability of trade disruption is naturally higher between rivals than between allies.

In reality, this does not appear to be the case, at least not to significant extent. For example Soviet Union and Germany did trade significantly before the German invasion of USSR began[12]; the Eastern and Western block during the Cold War did trade with each other (within the limitations imposed by the Cold War and the vast differences between the competing economic systems), and the currently ongoing crisis of the relations between the EU and US on one side and Russia on the other has had only a limited impact on mutual trade (and this effect was largely due to the sectoral sanctions and the (only partially related) drop of Russia's economic performance).

There are of course several reasons why this is the case. It is necessary to analyse these mechanisms to make any predictions of the role of international relations in determining trade.

One issue is (as ever) endogeneity: trade is a function of relations, but relations are determined by trade as well. (See e.g. Mansfield at al., 2002; Krasner, 2000; Vicard, 2012.) Trade is a tool which can be used to influence relations with other countries. Trade creates stability, as it is beneficial for both countries, thus it increases the cost of a conflict (Souva et al., 2005). Cutting trade links can be considered a hostile act, increasing the likelihood of a conflict. Furthermore, cutting trade can have a negative effect on the welfare of the population (in both countries), which can lead to increasing hostility towards the government which is seen as having caused the trade reduction; this makes reducing trade politically difficult. On the other hand, trade can be an instrument of exchange of people and ideas, which can decrease hostility. For these reasons the trade exchange between rival countries have a potentially very significant positive noneconomic role, which trade between allies does not have (or has only to much lesser extent).

On the other hand, trading with a potential enemy brings utility (including government revenue) to the rival, which can be used to increase his capability as a rival (e.g. to increase military spending). Furthermore, cutting trade,

[12]Of course, historians could argue that technically, these two dictatorships were allies at the time; nevertheless, they certainly expected a confrontation between them.

despite the negative effect on the domestic economy and bilateral relations with the trading partner, can be a powerful signal of willingness to commit resources to the rivalry (similar in effect to increasing defense spending).[13]

Finally, trade can be employed in a strategic way in the relations between unevenly powerful countries. A large economy can afford to trade with a small economy on unfavorable terms in order to pursue political goals in the partner country (Mansfield and Bronson, 1997); examples of this behavior might include the Warsaw Pact countries trading with Cuba after Castro's socialist revolution in order to support a communist regime close to the USA. Cutting trade might have a very significant impact on a small economy while the effect on the large one would be negligible, which can be used by the large country to put pressure on the small one.

In the end, governments engage in a complicated strategic game[14] in which trade policy can be used in a number of ways for different outcomes. Game theory would allow modelling this game and making some conclusions regarding optimal strategies depending on the settings (for example a bipolar world vs a multipolar one). However, this is not the subject of this thesis; here it will be simply observed that the simple and somewhat naive idea that allies trade more than enemies might not be always the case, at least not for the strategic reasons.

Nevertheless, empirical results generally show positive correlation of trade and political relations. For example, Mansfield and Bronson (1997) found evidence that political and military alliances are correlated with higher trade, and so are trade agreements; however there is a strong complementarity - having both alliance and trade agreements at the same time was significantly more effective than just the sum of effect of the alliance and trade agreements. Furthermore, they found that alliances with more powerful countries promote trade more, which can be interpreted as evidence of a strategic behavior. Note however that different authors often differ in terms of which variables capturing political

[13]Increasing defense spending increase one's military capability relative to those of the rival country. Cutting trade reduces rival's economic performance and government revenues, thus forcing a reduction of his military spending. Of course it also damages one's own economy, leading in principle to similar cuts in defense spending; however as long as the effect on the rival - is larger than the domestic effect (for example because the rival has lower ability to borrow money), the result is an improvement of relative military spending.

[14]There is considerable body of literature which uses tools of game theory to model trade decisions of states; see e.g. Brander (2012).

relations have significant effects and which do not: e.g. Morrow et al. (1998) found significant correlation between trade and political interests but no effect of military alliances, while Mansfield et al. (2002) reached basically the opposite results.

4.7 Conclusions and hypotheses

In summary, the relationship between politics and trade are very complex. Governments may have incentives to discourage, but also to encourage trade. They may be motivated by their own welfare, by ideologies, by trying to appease their citizens in order to stay in power and by strategic and security considerations. Furthermore, politicians set up institutions which might affect trade as a side effect.

Typically, contemporary governments typically try to encourage trade, especially export, in order to improve their economies (which in turn increases their political power, national security etc.). However, these efforts are undermined by the facts that governments as such typically do not engage in international trade directly. Undemocratic governments face less constrains in their efforts to shape trade according to their wishes - both because they do not have to worry about public opinion very much and because they can utilize methods which would be illegal or unacceptable in democracies. A strong government unconstrained by law has much wider variety of tools at its disposal to encourage or discourage both export (by exerting power on domestic producers) and import (by discriminative treatment of foreign companies).

Since this is the end of theoretical part of this thesis, it is practical to summarize the relations between various political and institutional factors and international trade predicted in the previous chapters. These hypotheses will be put to a test using the gravity model of trade.

- Quality of market institutions, and possibly (but to lesser extent) also governance quality, is positively correlated with trade. The coefficient should be higher for the exporting country than for the importing country.
- Cultural and institutional distance is correlated with less trade.

- Large and undemocratic countries have stronger ability to use trade to pursue their political goals.
- Trade diplomacy has positive effect on trade, however possibly only in undemocratic or badly governed countries.
- Political relations are positively correlated with trade. However this correlation might be limited to strong alliances (esp. military ones), especially after controlling for preferential trade agreements.
- Undemocratic countries are able to keep trade openness both higher and lower than democracies, because they are less constrained by the need to remain popular.

Chapter 5

Gravity model of trade

5.1 Introduction to the gravity model

The basic idea of the gravity model is very simple: trade between two countries increases proportionally with the size of both economies (representing export supply and import demand respectively) and decreases with geographic distance (or - more generally - trade costs). The parallel with Newton's law of gravity is obvious: the gravitational force between two physical bodies increases linearly with masses of both bodies and decreases with (the square of) their distance.

At first glance, this relationship between trade flows on one hand and sizes of both economies and their distance on the other might appear rather naive and simplistic. However, it fits real world data strikingly well, with R^2 typically well over 50% (and often as high as 80%) even for the most basic specification of the model. Furthermore, the gravity model is easy to estimate, thanks to its log-linear form. However, its most important feature is that it can be readily expanded by additional controls, allowing for testing possible links between trade and all kinds of other variables. All these features made the gravity model appealing for applied researchers; it came into widespread use despite the fact that the theoretical grounds for the model were developed later on.

The simplest form of the gravity model can be formalized as

$$x_{ij} = k\frac{y_i^{\alpha_1} y_j^{\alpha_2}}{d_{ij}^{\beta}}$$

where x_{ij} is the volume of the trade flow from country i to country j; y_i and y_j are sizes of both economies, representing total export supply and import demand respectively, and d_{ij} is the geographical distance between the two economies. Coefficients α_1 and α_2 are traditionally assumed to be close to 1, however lower or higher values are not impossible (e.g. by postulating existence of non-tradable sector of size varying with, for example, GDP per capita). Coefficient β is expected to be close to 1 as well, assuming trade (esp. transportation) costs increase linearly with distance. For ease of estimation, this model is invariably used in log-linear form:

$$\log x_{ij} = a + \alpha_1 \log y_i + \alpha_2 \log y_j - \beta \log d_{ij} \tag{5.1}$$

Clearly all slope coefficients can be conveniently interpreted as elasticities.

As already mentioned, the most appealing feature of this model is its flexibility and ease of adding additional controls. The basic model uses GDP as control for export supply and import demand, however other factors might be included as well (e.g. dummy for oil-rich countries, which generally have very large exports relative to the size of their economies).

Much more common in practice is addition of further variables controlling for trade costs - the basic model includes geographical distance, serving (largely) as a proxy for transportation costs, however a great variety of other variables have been proposed, such as bilateral tariffs, membership in WTO or mutual preferential trade agreements, cultural similarity, political ties etc. Formally, gravity models include trade costs t_{ij} in place of the geographical distance d_{ij} in (5.1); these trade costs are however not observable ad thus are proxied by one or many variables, including geographical distance.

Generally speaking, all trade costs are represented as ad valorem tariff equivalents - trade costs are alculated as a certain multiple of the good value (see Anderson and van Wincoop, 2003). Total trade costs of export of country i to

country j are

$$t_{ij} = \prod_k (t_{ij}^k)^{\gamma_k} \tag{5.2}$$

where t_{ij}^k are variables representing (typically) specific components of trade costs and γ_k are their respective elasticities. Dummies are included in exponential.

As an illustration, let t_{ij} include following components: transport costs, tariffs and additional costs in the country of destination (administration, marketing etc.) Transport costs are represented by geographical distance.[1] Tariffs are 1 + ad valorem tax equivalent - e.g. 20% tariff would be represented as $\tau_{ij} = 1.2$. The last component can be represented by common language dummy c_{ij}. Since common language is expected to lower trade cost (or, more precisely, different languages introduces additional trade costs), corresponding coefficient is expected to be negative.[2] Total trade costs - again expressed as tax equivalent - is therefore

$$t_{ij} = d_{ij}^{\gamma_1} \tau_{ij} e^{c_{ij}}.$$

Trade is than

$$x_{ij} = A\ y_i^{\alpha_1} y_j^{\alpha_2} / t_{ij}^{\beta}.$$

It has become a tradition to include following controls in the basic 'minimal' gravity specifications: geographical distance, common border dummy, common language dummy and common colonial past dummy (to control for cultural similarity and historical economic ties). A broad range of additional variables have been used by researchers focusing on various specific aspects of international trade theory; in this thesis I will use controls for institutional and political factors (which, as I argue in the previous chapter, can affect trade costs and thus can and should be included in this model).

[1] Note that different proxies for geographical distance have been proposed - simple distance of capital, population-weighted distance, distance using shortest naval routes etc.

[2] For example assume that language differences introduce additional costs of trade equivalent to 25% ad valorem tax. Than common language decreases trade costs by 20%, and thus the coefficient will be log 0.8.

5.2 Theoretical derivation of the gravity model

Following derivations are based mostly on Anderson and van Wincoop (2003), who has (according to e.g. Bergeijk and Brakman, 2010) become the canonical references for microeconomic foundations of the gravity model. They provide a very concise version of the seminal work of Anderson (1979), as well as their own contribution, which will be discussed later. Note that the model is derived without time dimension, however this is largely for the sake of brevity of notation; adding time dimension changes relatively little within the model framework, and panel data models are largely (but not completely) identical to cross-section models. See Baldwin and Taglioni (2006) for details.

The basic assumptions beyond the gravity model in this framework are following: 1. Each country export distinct set of products, 2. Each country demands all products on the market, and 3. Demand for each good decreases with trade costs, which in turn increase with geographical distance. These assumptions are quite intuitive; however it is necessary to put them on a solid theoretical footing. Fortunately, this is not very difficult.

As already stated, each country is assumed to produce a single (aggregate) distinct good.[3] Countries have identical preferences[4] represented by a CES utility function. Let c_{ij} be consumption of goods from country i by country j. Then countries maximize their utility function

$$U_j = \left(\sum_i \beta_i^{(1-\sigma)/\sigma} c_{ij}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \tag{5.3}$$

s.t.

$$\sum_i p_{ij} c_{ij} = y_j, \tag{5.4}$$

where y_j is income of country j and p_{ij} is price of export of country i in country j. Additionally, σ is elasticity of substitution.

Price p_{ij} comprises of two elements: producers' price, denoted p_i, and additional trade costs, which is assumed to take form of an unobservable multiplicative

[3] Note that this model is concerned only about tradable goods. There might be identical goods produced in many countries as long as they are not traded.

[4] As I will show later, the preferences do not need to be identical. However it is useful to impose this restriction for now in order to simplify the derivations.

factor t_{ij}:

$$p_{ij} = p_i t_{ij}. \tag{5.5}$$

Still following Anderson and van Wincoop, it is assumed that trade costs are borne by the exporter, noting that the alternative - trade costs borne by consumer - would clearly ultimately lead to the identical equilibrium. (Exporters pay the trade costs, but naturally they adjust their prices accordingly.) The way the trade costs work in this model framework is thus as follows: exporter sets price p_i for a unit of production, however consumer in country j faces price $p_{ij} = p_i t_{ij}$. The difference $(t_{ij} - 1)p_i$ are trade costs, which are paid by the exporter. Value of export from country i to j is therefore $x_{ij} = p_{ij} c_{ij}$.[5]

Finally, country i has income

$$y_i = \sum_j x_{ij}.$$

Maximizing (5.3) subject to budget constraint (5.4) and plugging in (5.5) leads to

$$x_{ij} = \left(\frac{\beta_i p_i t_{ij}}{P_j} \right)^{1-\sigma} y_j, \tag{5.6}$$

where P_j is consumer price index of country j;

$$P_j = \left(\sum_i (\beta_i p_i t_{ij})^{1-\sigma} \right)^{1/(1-\sigma)}. \tag{5.7}$$

Adding the requirement of market clearance yields for each i:

$$y_i = \sum_j x_{ij} = (\beta_i p_i)^{1-\sigma} \sum_j (t_{ij}/P_j)^{1-\sigma} y_j \tag{5.8}$$

Anderson and van Wincoop proceed by solving the problem for $\beta_i p_i$. They assume symmetry of trade costs: $t_{ij} = t_{ji}$. Defining share of country j on world income $\theta_j = y_j / y^W$, where $y^W = \sum_j y_j$, it can be shown (see the original paper)

[5] Anderson and van Wincoop note that this framework can be visualized as "cargo lost": to get a unit of cargo to the customer, exporter must essentially send $t_{ij} > 1$ units of cargo, because $(t_{ij} - 1)$ will be "lost at sea".

that equation (5.6) then becomes

$$x_{ij} = \frac{y_i y_j}{y^W} \left(\frac{t_{ij}}{P_j P_j} \right)^{1-\sigma}, \tag{5.9}$$

with constraints on the prices indices

$$P_j^{1-\sigma} = \sum_i P_i^{\sigma-1} \theta_i t_{ij}^{1-\sigma}. \tag{5.10}$$

This formalization of the gravity model is significantly simpler than those derived by previous authors, especially Anderson (1979), which is very useful for its operationalization. The price indices P_i defined by (5.9) are called multilateral resistance terms; crucially, they depend on all trade barriers t_{ij}, not just those related to the country in question. Multilateral resistances can be interpreted as average trade barriers towards the rest of the world. The connection to prices is straightforward: if the average trade costs of a country are high, for example because the country is geographically isolated or if it imposes high tariffs on trade, imported goods will be on average more expensive.

5.2.1 Note about preferences

Before continuing with the discussion of the Anderson and van Wincoop gravity framework, it will be useful to make a short note regarding one of the assumptions. Namely, Anderson and van Wincoop (as well as other authors) assume that preferences of all countries are identical; in other words, parameters β_i of (5.3) do not differ between countries.

However, it is clear - both intuitively and formally - that any equilibrium with heterogenous preferences could be also achieved by changes of trade barriers. To illustrate, let's start with a case of homogeneous preferences case, formalized in the model above. Now let preferences of country j change with respect to goods from country k; formally this means change of parameter β_k of the utility function of country j. Let the parameters of j's utility function be β_{ij}; then $\beta_{ij} = \beta_i$ for $i \neq k$ and $\beta_{kj} \neq \beta_k$. It is therefore possible to write this as $\beta_{ij} = \omega_i \beta_i$, where $\omega = 1$ for $i \neq k$.

Equation (5.6) than becomes

$$x_{ij} = \left(\frac{\omega_i \beta_i p_i t_{ij}}{P_j} \right)^{1-\sigma} y_j, \tag{5.11}$$

and (5.7) is

$$P_j = \left(\sum_i (\omega_i \beta_i p_i t_{ij})^{1-\sigma} \right)^{1/(1-\sigma)}. \tag{5.12}$$

Now it is clear that identical change of trade barrier t_{kj} will lead to identical equations, since β_i coefficients and trade barriers appear always together in both formulas.

Why is this simple observation relevant for the topic of this thesis? The answer is simple: preferences might depend on political and institutional factors, and thus represent another channel (besides trade costs) by which politics and institutions affect international trade. For example, cultural similarity, represented in the gravity models traditionally by common language dummy and common colonial past dummy, might affect not only trade costs (as larger cultural dissimilarity leads to higher costs), but can possibly also impact preferences - goods from more dissimilar countries are less demanded, because consumers are not used to them, have different tastes etc. However, both of these instances will be reflected in the model in the same manner.[6]

Note that the preferences regarding imports from different countries do not reflect only consumer tastes related to different products, but also (at least possibly) their feelings regarding their country of origin. This can be simply because of the reputation of certain countries and their products (e.g. goods made in Switzerland have arguably better reputation than goods in, say, Bulgaria). There is however another possibility, more relevant for the purpose of this thesis: it can be because of the sentiments towards the country caused by political relations, past or present conflicts etc. [7]

[6]For example, Americans do not buy many European SUVs, because they consider them too small and not practical; reciprocally, Europeans do not buy many American SUVs, because they consider them too big and not practical. This is not because it is especially expensive to move SUVs across the Atlantic (compared to other goods) - however if it were (and preferences regarding SUV sizes were identical on both continents), the resulting market equilibrium would be the same.

[7]A good example might be the boycotts of Western goods in Russia after the imposition of sanctions responding to the annexation of Crimea in 2014. While the Russian government has actually banned many Western goods, which might be interpreted as imposing high trade costs resulting in high consumer prices (but not infinitely high, as these goods could still be

It can be argued that consumer boycotts and similar manifestations of changing preferences for goods from a specific country are rare, and in most cases not very successful (and thus of little economic importance). However, this mechanism is not restricted to consumer behaviour - in fact it is (arguably) much more relevant in sectors in which demand is partially or fully controlled by governments. Since government sector is not modelled separately in the gravity model (or the models from which the gravity equations can be derived, such as Krugman model), government sector is merely a part of the representative consumer of each country. It is however not a small part, especially if we include all the sectors which depend on government permission or licenses. For example, energy, communication and aerospace sectors all depend (to varying extent) on governments, and governments can - and do - use their power to promote trade with allied (or otherwise desirable) countries while potentially discouraging trade with opponents. In some sectors such as defence, governments are very open and explicit about this. This behaviour might be represented as increasing preferences for goods from allied countries and lowering preferences for goods from rivals. Alternatively - and this is how it is modelled in the gravity framework - it can be modelled as increasing bilateral trade costs, e.g. by imposing a unilateral tariff against rivals. Both alternatives are indistinguishable in the gravity framework.

In summary, this simple feature of the Anderson - van Wincoop gravity framework enables a much more general use of the gravity model when estimating effects of noneconomic factors on trade. While these factors often affect trade costs directly (e.g. a language difference clearly imposes additional costs in e.g. marketing), in many cases the effect is subtler and can be better represented in terms of changing preferences rather than trade costs. However, this case can still be estimated in the current gravity framework (which is traditionally formulated with identical, unchanging preferences) without any need for adjustments, because formally both cases are identical.

obtained by smugglers or reexports from third countries), this was not the case for all types of goods. There have been attempts to mark even the non-banned western products and convince the population not to buy them for political, patriotic reasons.

5.2.2 Log-linearization and multilateral resistance terms

Gravity equation is almost universally employed in the log-linearized form. This has two obvious major advantages: resulting equation is additive, which makes is extremely easy to estimate using standard econometric tools, and obtained coefficients can be conveniently interpreted as elasticities.

Log-linearization of equation (5.9) is

$$\log x_{ij} = \log y_i + \log y_j - \log y^W + (1-\sigma)\log t_{ij} \tag{5.13}$$

$$-(1-\sigma)\log P_j - (1-\sigma)\log P_j.$$

Trade barrier t_{ij} is a product of geographical distances and other variables, such as dummies (e.g. border; note that dummies are in exponential). Therefore, $\log t_{ij}$ can be written as a sum of $\log dist$ and other variables, including dummies. Since world income can be considered a constant, (5.13) becomes

$$\log x_{ij} = a + \log y_i + \log y_j + (1-\sigma)\log dist_{ij} + \gamma(1-\sigma)border_{ij} \tag{5.14}$$

$$-(1-\sigma)\log P_j - (1-\sigma)\log P_j + u_{ij},$$

assuming $t_{ij} = dist_{ij}e^{\gamma border_{ij}}$ and adding random error term u_{ij}.

The critical element here is the presence of the last two terms, $\log P_i$ and $\log P_j$. Since these multilateral resistance terms are functions of all trade barriers (see equation (5.10)), they are correlated with $dist_{ij}$ and the border dummy (as well as any other potential trade barrier-related variables). Therefore, omitting these terms lead to biased estimation results.

This is the crucial point made by Anderson and van Wincoop (2003). This means that conclusions based on research using intuitive, naive version of the gravity equation, which omits multilateral resistances, are of questionable reliability. This is the case of vast majority of studies using gravity model prior to 2003.

Some authors (e.g. McCallum, 1995) have used a so-called *remoteness index.* These indices were intended to capture the average distance between the country and all its trading partners, which is in principle similar to the multilateral resistances; however these indices appear in forms which were purely intuitive

and atheoretical. A common formula (used among others by McCallum) is the average geographical distance to trading partners weighted by their share on world's economy:

$$remoteness_i = \sum_j \frac{dist_{ij}}{y_j/y^W}$$

The main limitation of this approach - besides the lack of a theoretical foundation – is that remoteness is defined purely in terms of geographical distance, which is responsible only for portion of trade costs. Empirically, Anderson and van Wincoop demonstrate that estimates obtained with model including proper (theoretically derived) differ significantly from those obtained using this (atheoretical) remoteness index.

Any unbiased estimation of the gravity equation must therefore deal with the presence of multilateral resistance terms. This is not trivial, because the multilateral resistance terms are not directly observable, and are given as functions of *all* trade barriers. Anderson and van Wincoop propose a non-linear least square estimator to solve this problem; their method is however cumbersome to implement.

An obvious alternative, noted already by Anderson van Wincoop and discussed in more detail by Feenstra (2004) and Baldwin and Taglioni (2006), is to use country-fixed effects. This method is much easier to implement, which makes it significantly more applicable for empirical research. The obvious disadvantage is that introduction of fixed effects leads to issues of collinearity with country-specific variables. In cross-section datasets, country-specific variables cannot be used at all; in panel models they can (as long as they change in time) but the collinearity issues should be at least carefully watched.[8]

5.2.3 Baier and Bergstrand approximation

Yet another approach has been proposed by Baier and Bergstrand (2009). They use first-order Taylor polynom linear approximation to get rid of the nonlinearity. Resulting model can be conveniently estimated using OLS (or other standard estimators), however authors show that it provides estimates almost identical to those obtained by Anderson and van Wincoop (the bias is shown

[8]There is an additional issue with the use of country dummies in panel models; see Baldwin and Taglioni (2006) for details.

to be smaller than error introduced by measuring error of the data); at the same time, it does not suffer from the collinearity problems encountered by fixed effects.

Formally, Baier and Bergstrand use first-order Taylor expansion of equation (5.10). (5.10) can be written as

$$e^{(1-\sigma)\log P_i} = \sum_j e^{\log\theta_j} e^{(\sigma-1)\log P_j} e^{(1-\sigma)\log t_{ij}}, \tag{5.15}$$

which is the basis for Taylor expansion.

Authors offer two possible linearizations, with different choice of equilibrium around which is the Taylor series centred. One possibility is to choose a symmetric equilibrium, with all economies being of identical size and all trade barriers being identical: $\theta_i = 1/N$ for each I, when N is number of countries, and $t_{ij} = t$ being independent on i and j. This implies $P_i = P$ (multilateral resistances are also identical), and from (5.10) then follows $P = \sqrt{t}$. First-order Taylor expansion of (5.15) around this equilibrium leads to, after some manipulations (see the original paper), following equation:

$$\begin{aligned}\log x_{ij} \;=\; a_0 \;+\; \log y_i \;+\; \log y_j \;+\; (1-\sigma)\log t_{ij} \\ -\;(1-\sigma)\left(\frac{1}{N}\left(\sum_j \log t_{ij}\right) - \frac{1}{2N^2}\left(\sum_i\sum_j \log t_{ij}\right)\right) \\ -\;(1-\sigma)\left(\frac{1}{N}\left(\sum_i \log t_{ij}\right) - \frac{1}{2N^2}\left(\sum_i\sum_j \log t_{ij}\right)\right)\end{aligned} \tag{5.16}$$

The alternative is linearization around frictionless equilibrium: $t_{ij} = 1$ for each i, j. In this case (5.10) yields solution $P_i = P_j = 1$. Plugging this into (5.15) and taking Taylor expansion again leads to, again after some tedious algebra,

$$\begin{aligned}\log x_{ij} \;=\; a_0 \;+\; \log y_i \;+\; \log y_j \;+\; (1-\sigma)\log t_{ij} \\ -\;(1-\sigma)\left(\left(\sum_j \theta_j \log t_{ij}\right) - \frac{1}{2}\left(\sum_i\sum_j \theta_i\theta_j \log t_{ij}\right)\right) \\ -\;(1-\sigma)\left(\left(\sum_i \theta_i \log t_{ij}\right) - \frac{1}{2}\left(\sum_i\sum_j \theta_i\theta_j \log t_{ij}\right)\right).\end{aligned} \tag{5.17}$$

Both Baier and Bergstrand and other authors (see Bergeijk and Brakman, 2010) have demonstrated on Monte Carlo simulations as well as real world data that this method provides estimates nearly identical to those obtained by the non-linear estimation method proposed by Anderson and van Wincoop. This (near) consistency, combined with simplicity of implementation, makes this method very useful for applied research, and for this reason it will be employed in this thesis.

5.3 Estimation of the gravity model

5.3.1 OLS estimation and its limitations

Traditionally, gravity model has been estimated using least squares methods, typically OLS. This is the case for vast majority of empirical research using gravity models. Use of LS estimators is tempting, because gravity equation in the log-linearized form can be directly turned into an econometric model. However, there are two major problems with this approach.

First of all, this methodology is unable to deal with observation with zero trade values. Since the dependent variable is logarithm of trade, zero trade would imply infinite values. This is a very relevant issue, because zero trade values regularly appear in trade statistics - trade between very small and geographically distant countries often simply does not exist. This problem has been known by researchers for some time. Several solutions have been used to deal with this issue - however mostly in a not very satisfactory way. The most common methods have been either to simply exclude observations with zero trade, or to replace zero values by a small positive value. The first method leads to estimation bias - unless the distribution of zeros in the trade statistics is uncorrelated with the other explanatory variables, which seems unlikely, as these variables include size of the economies and their distance. The second method is clearly arbitrary and can lead to biased estimations as well. For more detailed discussion see e.g. Linders and de Groot (2006) or Westerlund and Wilhelmsson (2011).

The second, somewhat subtler issue is related to heteroskedasticity. In short, the problem is that expected value of logarithm of a random variable is generally

not equal to the logarithm of the expected value. This problem applies to all log-linear models (Santos Silva and Tenreyro, 2006).

Formally, let the log-linearized model be

$$\log y_i = x_i\beta.$$

(In our case the dependent variable (y_i) is trade and independent variables on the right hand side include logarithms of sizes of both economies, distance etc. However, for simplicity I follow the general notation, used also by Santos Silva and Tenreyro (2006).) This equation is log-linearization of

$$y_i = exp(x_i\beta).$$

Obviously this equation holds only on average: $E(y_i \mid x_i) = exp(x_i\beta)$. The difference is the error term: $u_i = y_i - exp(x_i\beta)$. The exact model is therefore

$$y_i = exp(x_i\beta) + u_i.$$

Log-linearization of this equation is

$$\log y_i = x_i\beta + \log \epsilon_i,$$

where

$$\epsilon_i = 1 + u_i/exp(x_i\beta).$$

For an consistent OLS estimation of this equation, $\log \epsilon_i$ must be uncorrelated with the independent variables x_i. However, this clearly generally not the case. As $\epsilon_i = 1 + u_i/exp(x_i\beta)$, it would be the case only if $u_i = exp(x_i\beta)\gamma$, where γ is independent on x_i. In all other cases, the estimator is biased.

In the context of the gravity model, this means that OLS estimation of the log-linearized model is consistent only if the (original) error term is proportional to the explanatory variables. This is not an unreasonable possibility: the standard deviation of the random element in the value of trade between two countries is likely to increase proportionally with the predicted trade volume. This means that the standard deviation relative to the predicted dependent variable(s) is in fact constant; this is in line with the economic intuition. (The error term in the log-linearized model is homoscedastic in this case.)

Nevertheless, there is no reason to expect that the heteroskedasticity of the (original) error term will in reality take exactly this particular form. If it is not the case, OLS estimation is not only inefficient (which is the standard consequence of heteroskedasticity), but also inconsistent, because the error term in the log-linearized model is correlated with the dependent variables.

Unlike the zero values, this problem has not been widely recognized by trade economists until the seminal paper by Santos Silva and Tenreyro (2006). It is also more difficult to solve, as it requires a significant change in the estimation methodology. There have been proposed solutions using non-linear least squares (NLS) methods, however if these are to be efficient, they require prior assumptions regarding the distribution of the standard error; alternatively, nonparametrical GLS methods might be used (see e.g. Frenkel and Wei, 1993). However, Santos Silva and Tenreyro note that these solutions are impractical for applied research and as such they have never become widely used.

5.3.2 Poisson pseudo-maximum likelihood estimator

To answer both of these issues, Santos Silva and Tenreyro (2006) proposed to use Poisson pseudo-maximum likelihood (PPML) estimator. Formally, their method is a non-linear least squares estimator modified by the assumption that conditional variance of u_i (and thus of y_i) is proportional to its conditional mean; this is both consistent with economic intuition (variance increases with the variable), and it leads to first-order conditions which are conveniently identical to PPML estimator used traditionally on count data models. Authors however show that this estimator is consistent regardless of the form of heteroskedasticity (however White covariance matrix should be used to deal with the remaining heteroskedasticity). The potential use of the PPML estimator with non-count data has been demonstrated by previous authors, e.g. Woolridge (2002); see the original paper by Santos Silva and Tenreyro (2006) for additional references.

This method estimates the coefficients from the original equation (unlike OLS, which estimated the log-linearized model); this removes the zero-trade issue, as the values are not in logarithms, and also deals with the bias caused by heteroskedasticity, as the error terms are included directly. Arvis and Shepherd

(2013) demonstrated that PPML estimation has an additional advantage in that it preserves total trade volume.

PPML estimator is theoretically not as efficient as it could be, because it does not take into account the exact form of heteroskedasticity, assuming instead that variance is proportional to mean. However, authors argue that it is a good compromise between simple NLS, which is consistent but inefficient because it ignores heteroskedasticity, and nonparametrical GLS methods which are theoretically superior but difficult to implement. It is (at least in theory) clearly superior to OLS, as OLS is biased in the presence of heteroskedasticity. Santos Silva and Tenreyro demonstrate the efficiency of their method both on real trade data and using Monte Carlo simulation; comparable results were reached e.g. by Westerlund and Wilhelmsson (2011), and once again by Santos Silva and Tenreyro (2011).

It should be noted that PPML estimator has not been universally accepted by trade economists. It removes the heterogeneity bias of OLS, however it does so at the cost of imposing a somewhat arbitrary assumption regarding the form heteroskedasticity, and while it is consistent even if this assumption is not met, it is not efficient. The other major issue solved by PPML - zero trade observations - might be resolved in other ways; see Bergeijk and Brakman (2010) or Kareem et al. (2016). Martinez-Zarzoso et al. (2007) show that in some cases, PPML performs worse than either GLS or even OLS. Burger et al. (2009) proposed a modified binomial PPML estimator. See e.g. Gomez-Herrera (2013) or Kareem et al. (2016) for overview and references regarding the ongoing debate. Nevertheless, the PPML has been demonstrated to be theoretically superior to OLS. While it is possible that it will be eventually rejected in favour of OLS or some other method, at the moment it can be considered to be the state of the art. As such, I will employ PPML estimator in this thesis.

Chapter 6

Empirical analysis

6.1 Data and data sources

The principal gravity model data come from the TRADHIST dataset by CEPII.[1] This dataset provides trade volumes and GDP values, geographical distances as well as dummies for common borders and common language.

The most important source for the political variables proved to be the Correlates of War (CoW) project[2]; namely data on military alliances, colonial history, diplomatic exchange (embassies) and religions all come from various datasets from CoW. Alliance dummy is a simple dummy for country-pairs with common nonaggression treaty or in a military alliance, from the CoW's Formal Alliances Dataset (Gibler, 2009). Embassy dummy is from Diplomatic Exchange Dataset by Bayer (2006); this variable serves as a proxy for highly developed, active bilateral relations. As discussed earlier, note that active diplomatic relations can have a very direct effect on trade, via economic diplomacy or other forms of support. Consequently, there is a potential issue of endogeneity: embassies can be more likely to be established in countries with large potential for mutual trade. Finally, the religion distance is based on data from the World Religion Project Dataset (Maoz and Henderson, 2013). The primary purpose of this variable is to serve as a proxy for cultural distance.

The alternative measure of cultural distance is based on the World Values Sur-

[1] http://www.cepii.fr/CEPII/En
[2] http://www.correlatesofwar.org

vey data.[3] This unique dataset scores nations in the 10 dimensions representing cultural or psychological inclinations - e.g. secularism vs faith, emancipation vs submission etc. The distance indicator is calculated as a sum of square differences in each dimension. The problem with this variable is that it is available only for certain subset of countries; including this variable in the model leads to the reduction of the number of observations by approx. 75%. On the other hand, it is a dedicated indicator of cultural distance, unlike the similarity of religion which is merely a proxy. For these reasons this variable is not included in the baseline model; later estimation will rerun the model with religious distance replaced by this variable.

Trade agreements data are from the Design of Trade Agreements (DESTA) database by Dur, Baccini and Elsig (2014). Only FTAs and deeper types of economic integration are included; simple preferential trade agreements are disregarded. WTO/GATT membership dummy was obtained directly from WTO.

Quality of market institutions is represented by the Economic Freedom of the World index by the Fraser institute. This index is compiled from a number of indicators, such as tax burden, regulatory burden, property rights etc. Besides the scores of individual countries, bilateral distances - calculated as the square root of squared differences of the individual indicators - is included.

As a proxy for political similarity between countries, the Affinity of nations index by Erik Gartzke[4] is used. This index is a measure of similarity of voting in the UN General assembly. Given the nature of the votes in the General assembly, this can be seen as a proxy for similarity of political values and persuasions, but also of strategic partnerships of all kinds.[5]

[3] www.worldvaluessurvey.org

[4] http://pages.ucsd.edu/ egartzke/datasets.htm

[5] It is well known that certain small and/or poor countries are willing to exchange their votes for monetary compensations - hence tiny pacific atolls taking the side of Israel against the rest of the world, or certain African countries helping to defeat resolutions condemning Chinese human rights violations.

variable	data source	description	available
ldist	TRADHIST (CEPII)	log of population-weighted distance in km	1992-2014
lgdp	TRADHIST (CEPII)	log of nominal GDP	1992-2014
Contig	TRADHIST (CEPII)	common land border dummy	1992-2014
Comlang	TRADHIST (CEPII)	commonlanguagedummy (at least 9% common language)	1992-2014
ta_2	DESTA	dummy for trade agreements; only FTAs and deeper	1992-2014
wto	WTO	WTO membership dummy	1992-2014
colhist_colony	Correlates of War	common colonial past dummy	1992-2014
alliance	Correlates of War	military alliance dummy	1992-2012
embassy	Correlates of War	presence of embassy of at least one country in the other	1992-2009
un_voting	Affinity of Nations dataset	index of similarity of voting in the UN general assembly	1992-2008
wvs_CultDist	World Values Survey	cultural distance,index	1992-2014
relig_similarity	Correlates of War	similarity of,religious beliefs	1992-2014
gov_average	WB World Governance Indicators	governance quality index	1995-2014
poli_polity	Polity IV dataset	Polity score; -10 - dictatorship, 10 - full democracy	1992-2014
dd_polidist	Democracy-Dictatorship dataset	distance of political institutions	1992-2008
efow_score	Fraser institute	Economic Freedom of the World index	1992-2013
efow_dist	Fraser institute	Economic Freedom of the World index	1992-2013

Table 6.1: Explanatory variables

Dissimilarity between political institutions is represented by an composite index of distance of political institutions. Constructed from data from the Democracy-Dictatorship dataset by Cheibub, Gandhi and Vreeland (2010). This variable measures how different are the institutional structures of political systems of the two countries. Namely it takes into account regime type, whether legislature is elected or not, whether executive is elected or not (and by who), whether judiciary is independent on other branches of government etc.

Polity IV dataset from the Center for Systemic Peace[6] is the source of the data regarding regime type; the Polity indicator ranges from -10 (perfect dictatorship) to 10 (full democracy).

Governance quality is represented by the average score calculated from the World governance indicators by Kaufman et al. (2010). It is the mean of the six indicators from the dataset; these indicators include accountability, lack of violence, government effectiveness, regulatory quality, rule of law, control of corruption.

All variables are summarized in the Table 6.1.

The whole dataset covers years 1992-2012. However the baseline model will be estimated on the period of 1995-2008, because this is the period when all required variables all available at once. Note that dropping certain variables can allow the model to be estimated on the full length of the panel; this is not shown here, because the estimates this produces are in most cases very similar, except for variables which are correlated with the variables that had to be dropped.

6.2 Estimation method

For reasons explained in Chapter 5, using Poisson pseudo-maximum-likelihood (PML) leads to more reliable inference results than traditional OLS methodology and thus will be used throughout this thesis. In order to obtain heteroscedasticity-robust inference, White standard errors will be used in all estimations.

[6] http://www.systemicpeace.org/polity/polity4.htm

When using the Beier-Bergstrand approximation of the multilateral resistances, the variant with simple weights is used.

Note that all specifications include year fixed effects, primarily to control for the dip in the world trade flows caused by the financial crisis in 2008. However, omitting year fixed effects gives generally almost completely identical results (not shown here).

6.3 Estimation results

6.3.1 Baseline model

The first set of estimation is done on the model containing all the variables with religious similarity used as a proxy for cultural distance. The data covers years 1995-2008, total 58781 observations are available.

Table 6.2 contains the estimation results of the specifications with country fixed effects used to control for multilateral resistances.

Interestingly, common colonial history is insignificant; on the other hand, common language is positive and highly significant as usual. This indicates that historical ties (for which the colonial history dummy is a proxy) are manifested in political or institutional similarity or possibly in political ties or alliances; on the other hand, common language, another standard gravity dummy, is not overly correlated with any of the institutional similarities. This result is exactly what should have been expected.

The trade agreement dummy is positive and significant. Note that if the dummy is changed to incorporate all trade deals, even the relatively shallow preferential trade agreements, it becomes insignificant (or, curiously, even negative in different specifications of the model); this is in line with the previous findings, suggesting that only deeper trade integration has a strong positive effect on trade, while shallower PTAs are less effective. Correspondingly, WTO membership is insignificant. Religious similarity, a proxy for cultural similarity, is positive and highly significant, suggesting that culture indeed plays a role in either trade costs or import preferences.

Variable	Coef.	Std. Err.	z	P> |z|	[95% Conf.	Interval]
trh_lgdp_o	.3671807	.0454467	8.08	0.000	.2781068	.4562546
trh_lgdp_d	.5351352	.0473984	11.29	0.000	.442236	.6280343
ldist	-.9649817	.0141866	-68.02	0.000	-.992787	-.9371764
Contig	.2554061	.0178626	14.30	0.000	.220396	.2904162
Comlang	.2597225	.024094	10.78	0.000	.2124991	.3069459
colhist_colony	.0176097	.0318071	0.55	0.580	-.044731	.0799503
ta_2	.4110393	.0291102	14.12	0.000	.3539844	.4680942
wto_o	-.0941727	.088748	-1.06	0.289	-.2681155	.0797701
wto_d	-.1617077	.129604	-1.25	0.212	-.4157269	.0923115
relig_similarity	.2392086	.0448753	5.33	0.000	.1512547	.3271625
alliance	.0241714	.0249765	0.97	0.333	-.0247816	.0731244
embassy	.048532	.2336865	0.21	0.835	-.4094851	.506549
un_voting	.2195555	.0381046	5.76	0.000	.144872	.2942391
dd_polidist	-.0453399	.1078316	-0.42	0.674	-.2566859	.1660061
gov_average_o	.0276947	.0583049	0.47	0.635	-.0865807	.1419702
gov_average_d	.1118702	.059111	1.89	0.058	-.0039852	.2277257
poli_polity_o	-.0008766	.0049678	-0.18	0.860	-.0106133	.0088601
poli_polity_d	-.0020614	.0048109	-0.43	0.668	-.0114905	.0073678
efow_score_o	.0961507	.0227701	4.22	0.000	.0515222	.1407793
efow_score_d	.0210196	.0229093	0.92	0.359	-.0238818	.0659209
efow_dist	-.0004344	.005111	-0.08	0.932	-.0104518	.0095829

Number of observations	=	58781
Pseudo R^2	=	0.9702
Log pseudolikelihood	=	-2.581e+12

Table 6.2: Base model, fixed effects

Of the three international politics variables, only UN voting similarity is significant and positive, military alliance and embassy dummies are positive but insignificant.

The difference between political institutions is insignificant (but negative, which is the expected sign). Governance quality is insignificant but positive, and notably for the importing country. Democracy level appears to be insignificant.

Market institutions are, interestingly, highly significant and positive (as expected) for export but much smaller and insignificant for imports, which matches the predictions perfectly. Distance of market institutions is negative (as expected) but insignificant.

Overall, these results are definitely encouraging.

Table 6.3 summarizes results of estimating the same model, only with country fixed effects omitted and the Baier and Bergstrand approximation procedure used to deal with multilateral resistances instead.

Note that because of the omission of country fixed effects, this estimation can be expected to perform better when estimating the coefficients of unilateral variables which exhibit only small changes during the period, because these variables may be highly correlated with country dummies.

Colonial history now remains positive and significant.

Trade agreements continue to be positive and significant, WTO membership insignificant.

Cultural similarity is still positive and significant as expected.

As for foreign policy variables, UN voting (political affinity) is still positive and highly significant; military alliance are now also significant and with the expected (positive) sign.

Distance of political institutions continues to be insignificant.

Variable	Coef.	Std. Err.	z	P> |z|	[95% Conf.	Interval]
trh_lgdp_o	.7796587	.0072257	107.90	0.000	.7654966	.7938208
trh_lgdp_d	.7979028	.0064189	124.31	0.000	.785322	.8104835
ldist	-.8783378	.0181342	-48.44	0.000	-.9138802	-.8427954
Contig	.2583465	.0245619	10.52	0.000	.210206	.3064869
Comlang	.3013388	.0299165	10.07	0.000	.2427035	.3599742
colhist_colony	.358149	.0352293	10.17	0.000	.2891009	.4271971
ta_2	.0956962	.0244862	3.91	0.000	.0477042	.1436882
wto_o	5.843358	3.531234	1.65	0.098	-1.077733	12.76445
wto_d	.1234497	.9316222	0.13	0.895	-1.702496	1.949396
relig_similarity	.1112299	.051297	2.17	0.030	.0106897	.2117701
alliance	.1424812	.0259259	5.50	0.000	.0916675	.193295
embassy	.3021516	.2150565	1.40	0.160	-.1193514	.7236546
un_voting	.3802383	.0369595	10.29	0.000	.3077991	.4526775
dd_polidist	.0033956	.1046391	0.03	0.974	-.2016933	.2084845
gov_average_o	-5.057521	.7446479	-6.79	0.000	-6.517004	-3.598038
gov_average_d	-1.725462	.274495	-6.29	0.000	-2.263463	-1.187462
poli_polity_o	1.092731	.0831601	13.14	0.000	.9297405	1.255722
poli_polity_d	.7233183	.0511274	14.15	0.000	.6231104	.8235262
efow_score_o	.1800105	.5437222	0.33	0.741	-.8856654	1.245686
efow_score_d	-.1788202	.1742514	-1.03	0.305	-.5203466	.1627062
efow_distl	-.0094177	.0055454	-1.70	0.089	-.0202865	.0014512

Number of observations	=	57142
Pseudo R^2	=	0.9429
Log pseudolikelihood	=	-4.736e+12

Table 6.3: Base model, linear approximation

The rest of the results are markedly different from the previous estimates. Democracy level is now positive and highly significant, also notably higher for the exporting country. Governance quality is however negative and highly significant for both exports and importers (also significantly larger - in absolute value - for the exporting country); this result is curious and difficult to explain. Finally, market institutions are now insignificant.

Note that the unexpected result for governance quality and market institutions may be to some extent related to the high correlation (0.7584) between the two variables. However this alone cannot explain why one them end up negative and the other insignificant if both are expected to be positive. Removing the governance quality variables and rerunning the estimation leads to negative significant coefficients of market institutions; this suggests that while collinearity is indeed an issue, there is something else going on. Democracy level remains positive and highly significant even after the elimination of governance quality, and correlation between democracy and market institutions is only 0.4074.

Some other specifications not shown here included replacing the religious similarity by the cultural distance. The problem here is that the World value survey data are available only for certain number of countries, which leads to the number of observation falling approx. by 75%. Nevertheless, the results appear to be broadly similar, with the cultural distance coefficient being negative (as expected) but typically not significant (or only at relatively low levels).

6.3.2 Model with regime type interaction terms

This section tests the hypothesis that the strength of the relationship between trade and political factors increases with decreasing level of democracy. To test this, the baseline model was expanded by interaction terms between democracy level (polity variable) and UN voting similarity, military alliance dummy, embassy dummy and FTA dummy.

Results of the estimations with fixed effects and with Beier-Bergstrand transformation are shown in Table 6.4 and Table 6.5 respectively. In both specifications, more than half of the additional coefficients are significant, mostly at very high levels, suggesting that there is indeed a correlation between regime

type and strength of the links between trade and UN voting similarity, alliances, diplomacy and trade agreements.

In both specifications, note the negative significant coefficient of the interaction between diplomacy (embassy dummy) and regime (for exporters); this would imply that undemocratic countries exhibit higher correlation between diplomacy and trade, as predicted (they may be better able to steer trade from rivals to allies).

The results are not exactly consistent, however it appears that trade agreements and diplomacy get stronger correlation with trade with lowering democracy, on the other hand military alliances and UN voting similarity get weaker. In both cases the coefficients are either of this sign or insignificant.

Overall, the results appear to support the hypothesis that regime type affects the strength of the links between politics and trade.

Variable	Coef.	Std. Err.	z	P> |z|	[95% Conf.	Interval]
trh_lgdp_o	.3648647	.0442929	8.24	0.000	.2780521	.4516772
trh_lgdp_d	.5565575	.0472779	11.77	0.000	.4638946	.6492204
ldist	-.9701214	.0126324	-76.80	0.000	-.9948803	-.9453624
Contig	.2506178	.0176927	14.17	0.000	.2159407	.2852949
Comlang	.2750486	.023934	11.49	0.000	.2281388	.3219584
colhist_colony	.0083864	.0316416	0.27	0.791	-.0536301	.0704028
ta_2	.3355175	.0460434	7.29	0.000	.245274	.4257609
wto_o	-.0934935	.0923336	-1.01	0.311	-.2744641	.087477
wto_d	-.1929066	.1283448	-1.50	0.133	-.4444577	.0586445
relig_similarity	.2640682	.0453122	5.83	0.000	.1752579	.3528784
alliance	-.0226153	.0629899	-0.36	0.720	-.1460733	.1008426
embassy	.4071101	.108006	3.77	0.000	.1954222	.618798
un_voting	-.1529062	.0633999	-2.41	0.016	-.2771676	-.0286447
dd_polidist	-.1097864	.1007799	-1.09	0.276	-.3073114	.0877386
gov_average_o	.026192	.0575411	0.46	0.649	-.0865865	.1389705
gov_average_d	.1344396	.0579244	2.32	0.020	.0209098	.2479694
poli_polity_o	-.0046375	.0073055	-0.63	0.526	-.0189559	.009681
poli_polity_d	-.0482497	.0075756	-6.37	0.000	-.0630976	-.0334017
efow_score_o	.086718	.0220824	3.93	0.000	.0434373	.1299988
efow_score_d	.0143017	.0227188	0.63	0.529	-.0302262	.0588297
efow_dist	.0016222	.0038708	0.42	0.675	-.0059645	.0092088
un_voting*polity_o	-.0078561	.0056991	-1.38	0.168	-.0190261	.0033138
un_voting*polity_d	.0577666	.0059443	9.72	0.000	.046116	.0694173
alliance*poltyi_o	-.0070196	.0066004	-1.06	0.288	-.0199562	.005917
alliance*polity_d	.013741	.0063339	2.17	0.030	.0013269	.0261552
embassy*polity_o	-.0904586	.0138195	-6.55	0.000	-.1175444	-.0633728
embassy*polity_d	.017371	.0112328	1.55	0.122	-.0046448	.0393868
ta_2*polity_d	.0024152	.0049641	0.49	0.627	-.0073143	.0121447
ta_2*polity_o	.0147102	.0042742	3.44	0.001	.0063329	.0230875

Number of observations	=	58781
Pseudo R2	=	0.9706
Log pseudolikelihood	=	-2.547e+12

Table 6.4: Extended model, fixed effects

Variable	Coef.	Std. Err.	z	P> |z|	[95% Conf.	Interval]
trh_lgdp_o	.8022504	.0078974	101.58	0.000	.7867717	.8177291
trh_lgdp_d	.7963636	.0069744	114.18	0.000	.782694	.8100332
ldist	-.8627942	.0176222	-48.96	0.000	-.897333	-.8282553
Contig	.3100516	.0241546	12.84	0.000	.2627094	.3573938
Comlang	.2989541	.0293424	10.19	0.000	.2414439	.3564642
colhist_colony	.3364066	.0341797	9.84	0.000	.2694156	.4033977
ta_2	.5640036	.0521409	10.82	0.000	.4618092	.666198
wto_o	11.14161	3.722633	2.99	0.003	3.84538	18.43783
wto_d	1.600235	.9123863	1.75	0.079	-.1880089	3.38848
relig_similarity	.217396	.0522208	4.16	0.000	.115045	.319747
alliance	-.4079271	.0747799	-5.46	0.000	-.5544929	-.2613612
embassy	1.057277	.310852	3.40	0.001	.4480185	1.666536
un_voting	.1213246	.0782307	1.55	0.121	-.0320047	.274654
dd_polidist	-.397737	.134629	-2.95	0.003	-.661605	-.1338691
gov_average_o	-4.45121	.7227168	-6.16	0.000	-5.867709	-3.034711
gov_average_d	-1.544443	.2570844	-6.01	0.000	-2.048319	-1.040567
poli_polity_o	.5808778	.0963077	6.03	0.000	.3921182	.7696374
poli_polity_d	.3866438	.06195	6.24	0.000	.2652239	.5080636
efow_score_o	-.4327819	.5691948	-0.76	0.447	-1.548383	.6828194
efow_score_d	-.21	.1736935	-1.21	0.227	-.5504329	.130433
efow_distl	-.0145534	.0052325	-2.78	0.005	-.0248088	-.004298
un_voting*polity_o	.0054819	.00626	0.88	0.381	-.0067875	.0177513
un_voting*polity_d	.0444054	.0071075	6.25	0.000	.030475	.0583359
alliance*polity_o	.0455891	.0080499	5.66	0.000	.0298117	.0613666
alliance*polity_d	.0155839	.0075293	2.07	0.038	.0008268	.0303411
embassy*polity_o	-.088242	.037466	-2.36	0.019	-.161674	-.01481
embassy*polity_d	-.0610623	.0209538	-2.91	0.004	-.1021309	-.0199936
ta_2*polity_o	-.0359772	.0044045	-8.17	0.000	-.0446099	-.0273446
ta_2*polity_d	-.0312252	.0053622	-5.82	0.000	-.041735	-.0207155

Number of observations	=	57142
Pseudo R2	=	0.9444
Log pseudolikelihood	=	-4.610e+12

Table 6.5: Extended model, linear approximation

Chapter 7

Conclusions

This thesis took a comprehensive look at the relationship between contemporary international trade and politics. This is a very broad topic, thus some aspects of the problem were discussed in more detail than others.

On the theoretical side, this thesis proposes a simple model of the trade policy setting by a government answering to voters with heterogeneous welfare impacts caused by trade. Unlike previous models, this framework allows for heterogeneous voters as well as governments with different agendas and goals. Furthermore, the assumption on (especially) voter decision-making seem to be quite realistic.

Another proposed model explains the persistence of trade barriers and inefficient institutions based on complementarity of institutions. This model predicts that countries will get stuck with inefficient institutions and unnecessarily high trade costs unless they coordinate their behaviour.

The second part of the thesis is an empirical analysis. This is done principally by the gravity model of international trade, with multilateral resistances represented either by country fixed effects or by the Baier-Bergstrand (2009) linear approximation of the Anderson and van Wincoop (2003) formulas. Poisson pseudo-maximum likelihood estimator proposed by Santos Silva and Tenreyro (2006) is used to obtain model estimates. The model includes a comprehensive selection of variables representing various political and institutional factors.

The results of these estimations provided several interesting findings. They

generally support the hypotheses outlined in the theoretical chapters of this thesis. However, the results show considerable inconsistency regarding the effects of political institutions, regime type and market institutions. It seems likely that a larger (especially longer) data panel would be required to shed more light onto this issue, however there would be a substantial problem with data availability.

On the other hand, highly intriguing is the consistently positive and highly significant coefficient of the UN voting similarity index. I doubt that this is because trade is highly correlated with political stances and values. It seems more likely that this is the result of countries siding with their principal trading partners in an attempt to gain some gratitude. For example, I would speculate that many African countries which have significant trade exchange with China (mainly exporting natural resources) are also very likely to side with China in the General assembly.

Finally, the results provide some evidence that regime type affects how strong are the links between trade and democracy.

Besides these findings, this thesis provides a somewhat holistic look at the extremely complex issue of the politics-trade relationship. It would be (hopefully) a useful source for any researcher conducting a more in-depth but narrowly focused empirical work in this field. It provides the necessary context and discuss many possible issues that may be easily overlooked. Given the surprising scarcity of the comparable literature, this might be of some value.

References

Ahn, J., Khandelwal, A. K., & Wei, S. J. (2011). The role of intermediaries in facilitating trade. *Journal of International Economics,* 84(1), 73-85.

Alho, K. E. (2005). A Gravity Model Under Monopolistic Competition, *European Network of Economic Policy Research Institutes*. Working Paper No. 33/March.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2000). The colonial origins of comparative development: An empirical investigation. *NBER working paper No. 7771.*

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American Economic Review*, 69(1), 106-116.

Anderson, J. E. (2011). The Gravity Model. *Annual Review of Economics*, 3(1), 133-160.

Anderson, J. E., & Van Wincoop, E. (2003). Gravity with gravitas: a solution to the border puzzle. *The American Economic Review*, 93(1), 170-192.

Anderson, J. E., & Van Wincoop, E. (2004). Trade costs. *Journal of Economic literature*, 42(3), 691-751.

Arvis, J. F., & Shepherd, B. (2013). The Poisson quasi-maximum likelihood estimator: a solution to the 'adding up'problem in gravity models. *Applied Economics Letters*, 20(6), 515-519.

Baier, S. L., & Bergstrand, J. H. (2009). Bonus vetus OLS: A simple method for approximating international trade-cost effects using the gravity equation. *Journal of International Economics*, 77(1), 77-85.

Baldwin, R. E. (1989). The political economy of trade policy. *The Journal of Economic Perspectives,* 3(4), 119-135.

Baldwin, R., & Taglioni, D. (2006). Gravity for dummies and dummies for gravity equations. NBER Working paper No. w12516.

Baldwin, R. E. & Wyplosz, C. (2006). *The Economics of European Integration.* London: McGraw-Hill.

Bayer, R. (2006). Diplomatic Exchange Data set, v2006.1. Available online: http://correlatesofwar.org

Bergeijk, P.A.G. (2001). *Economic Diplomacy and the Geography of International Trade.* Edward Elgar Publishing, UK.

Bergeijk, P.A.G. & Brakman, S. (2010). *The Gravity Model of International Trade: Advances and Applications.* Cambridge University press, UK.

Bergstrand, J. H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The review of economics and statistics*, 474-481.

Bernard, A. B., Grazzi, M., & Tomasi, C. (2011). Intermediaries in international trade: Direct versus indirect modes of export. *NBER working paper No. w17711.*

Borrmann, A., Busse, M., & Neuhaus, S. (2006). Institutional quality and the gains from trade. *Kyklos*, 59(3), 345-368.

Brander, J. (1995). Strategic Trade Policy. In Grossman, G. M. & Rogoff, K. (Ed.): *Handbook of international economics, Vol. 3* (pp. 1457-1494.)

Burger, M., Van Oort, F., & Linders, G. J. (2009). On the specification of the gravity model of trade: zeros, excess zeros and zero-inflated estimation. *Spatial Economic Analysis*, 4(2), 167-190.

Carrane, C. (2006). Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model. *European Economic Review*, 50(2), 223-247.

Cheibub, J. A., Gandhi, J., & Vreeland, J. R. (2010). Democracy and dictatorship revisited. *Public choice*, 143(1-2), 67-101.

Cipolina, M., & Salvatici, L. (2010). Reciprocal trade agreements in gravity model: A meta analysis. *Review of International Economics*, 18(1), 63-80.

De Groot, H. L., Linders, G. J., Rietveld, P., & Subramanian, U. (2004). The institutional determinants of bilateral trade patterns. *Kyklos*, 57(1), 103-123.

Deardorff, A. (1998). Determinants of bilateral trade: does gravity work in a neoclassical world? In *The regionalization of the world economy* (pp. 7-32). University of Chicago Press.

Dixon, W. J., & Moon, B. E. (1993). Political similarity and American foreign trade patterns. *Political Research Quarterly*, 46(1), 5-25.

Duer, A., Baccini, L., & Elsig, M. (2014). The design of international trade agreements: Introducing a new dataset. *The Review of International Organizations*, 9(3), 353-375.

Eaton, J., & Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, 70(5), 1741-1779.

Eichengreen, B., & Irwin, D. A. (1998). The role of history in bilateral trade flows. In *The regionalization of the world economy* (pp. 33-62). University of Chicago Press.

Feenstra, R. C. (2015). *Advanced International Trade: Theory and Evidence*. Princeton, NJ: Princeton University Press.

Feenstra, R. C., & Lewis, T. R. (1994). Trade adjustment assistance and Pareto gains from trade. *Journal of International Economics,* 36(3), 201-222.

Fligstein, N. (1996). Markets as politics: A political-cultural approach to market institutions. *American sociological review*, 656-673.

Frankel, J., & S. Wei (1993). Trade Blocs and Currency Blocs. NBER working paper no. 4335.

Gibler, D. M. (2009). *International military alliances, 1648-2008.* CQ Press.

Gomez-Herrera, E. (2013). Comparing alternative methods to estimate gravity models of bilateral trade. *Empirical Economics*, 44(3), 1087-1111.

Gowa, J. (1995). *Allies, adversaries, and international trade.* Princeton University Press.

Greif, A. (1992). Institutions and international trade: Lessons from the commercial revolution. *The American Economic Review*, 82(2), 128-133.

Harrison, A., & Hanson, G. (1999). Who gains from trade reform? Some remaining puzzles. *Journal of development Economics,* 59(1), 125-154.

Hoekman, B.M., & Kostecki, M.M. (2001). *The Political Economy of World Trading System (2nd ed.).* Oxford University Press, UK.

Iwanow, T., & Kirkpatrick, C. (2007). Trade facilitation, regulatory quality and export performance. *Journal of International Development*, 19(6), 735-753.

Kareem, F. O., Martinez-Zarzoso, I., & Brummer, B. (2016). Fitting the gravity model when zero trade flows are frequent: A comparison of estimation techniques using Africa's trade data. GlobalFood Discussion Papers (No. 77).

Kaufmann, D., Kraay, A. & Mastruzzi, M. (2010). The Worldwide Governance Indicators : A Summary of Methodology, Data and Analytical Issues. *World Bank Policy Research Working Paper No. 5430*

Kepaptsoglou, K., Karlaftis, M. G., & Tsamboulas, D. (2010). The gravity model specification for modeling international trade flows and free trade agreement effects: a 10-year review of empirical studies. *The Open Economics Journal*, 3(1).

Krasner, S. D. (2000). State power and the structure of international trade. In *International political economy: Perspectives on global power and wealth*, 19-36.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of international Economics,* 9(4), 469-479.

Krugman, P. R., Obstfeld, M., & Melitz, M. (2012). *International Economics,* Boston: Pearson.

Kucera, D., & Sarna, R. (2006). Trade union rights, democracy, and exports: A gravity model approach. *Review of international economics*, 14(5), 859-882.

Levchenko, A. A. (2007). Institutional quality and international trade. *The Review of Economic Studies*, 74(3), 791-819.

Levchenko, A. A. (2013). International trade and institutional change. *Journal of Law, Economics, and Organization*, 29(5), 1145-1181.

Linders, G. J., HL Slangen, A., De Groot, H. L., & Beugelsdijk, S. (2005). Cultural and institutional determinants of bilateral trade flows. Tinbergen Institute Discussion Paper No. 05-074/3

Linders, G. J. M. & H. L. F. de Groot (2006). Estimation of the Gravity Equation in the Presence of Zero Flows. Tinbergen Institute Discussion Paper, No. 06-072/3.

Low, L. (2004). The political economy of trade liberalization. *Asia Pacific Development Journal*, 11(1), 1-24.

Mansfield, E. D., & Bronson, R. (1997). Alliances, preferential trading arrangements, and international trade. *American Political Science Review*, 91(01), 94-107.

Mansfield, E. D., Milner, H. V., & Rosendorff, B. P. (2000). Free to trade: Democracies, autocracies, and international trade. *American Political Science Review*, 94(02), 305-321.

Mansfield, E. D., Milner, H. V., & Rosendorff, B. P. (2002). Why democracies cooperate more: Electoral control and international trade agreements. *International Organization*, 56(03), 477-513.

Maoz, Z., & Henderson, E. A. (2013). The world religion dataset, 1945-2010: Logic, estimates, and trends. *International Interactions*, 39(3), 265-291.

Martinez-Zarzoso, I. D. Nowak-Lehman & S. Vollmer (2007). The log of Gravity Revisited. CeGE Discussion Paper 64, University of Gottingen.

McCallum, J. (1995). National borders matter: Canada-US regional trade patterns. *The American Economic Review*, 85(3), 615-623.

Melitz, M. J. (2003). The impact of trade on intra?industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695-1725.

Melitz, M. J., & Ottaviano, G. I. (2008). Market size, trade, and productivity. *The review of economic studies,* 75(1), 295-316.

Milner, H. V. (1999). The political economy of international trade. *Annual Review of Political Science,* 2(1), 91-114.

Morrow, J. D., Siverson, R. M., & Tabares, T. E. (1998). The political determinants of international trade: the major powers, 1907-1990. *American Political Science Review*, 92(03), 649-661.

North, D. C. (1991). Institutions. *Journal of Economic Perspectives.* 5(1), 97-112.

Ohlin, B. (1933). *Interregional and International Trade.* Cambridge, MA: Harvard University Press.

Rajapatirana, S., De La Mora, L. M., & Yatawara, R. A. (1997). Political economy of trade reforms, 1965-1994: Latin American style. *The World Economy*, 20(3), 307-338.

Rodrik, D. (1994). What does the political Economy Literature on Trade Policy (not) tell us that we ought to know? *CEPR Discussion Paper No. 1039*

Rodrik, D. (1995). Political economy of trade policy. In Grossman, G. M. & Rogoff, K. (Ed.): *Handbook of international economics, Vol. 3* (pp. 1457-1494.)

Samuelson, P. A. (1949). International Factor-Price Equalisation Once Again. TextitEconomic Journal, 59 (234): 181–197.

Santos Silva, J., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and statistics*, 88(4), 641-658.

Santos Silva, J.M.C., & Tenreyro, S. (2011) Further Simulation Evidence on

the Performance of the Poisson Pseudo-Maximum Likelihood Estimator. *Economics Letters*, 112(2): 220-222.

Screpanti, E., & Zamagni, S. (2005). *An outline of the history of economic thought.* Oxford University Press.

Souva, M., Smith, D., & Rowan, S. (2005). Market Institutions and the Determinants of International Trade. In a presentation at the Annual Meetings of the Southern Political Science Association, New Orleans.

Srivastava, R. K., & Green, R. T. (1986). Determinants of bilateral trade flows. *Journal of Business*, 623-640.

Vicard, V. (2012). Trade, conflict, and political integration: Explaining the heterogeneity of regional trade agreements. *European Economic Review*, 56(1), 54-71.

Westerlund, J., & Wilhelmsson, F. (2011). Estimating the gravity model without gravity using panel data. *Applied Economics*, 43(6), 641-649.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data.* Cambridge, MA, MIT Press.