

Economic factors as determinants of the formation of the ECO trade agreement

Are there economic determinants behind the formation of ECOTA?

Key words: ECO, ECOTA, FTA, economic determinants, Baier and Bergstrand
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Abstract

This paper has its base in the article “Economic Determinants of Free Trade Agreements” where the authors Baier and Bergstrand (2004) basically treat the economic determinants of FTAs and in which they develop a model to provide proof and support of the robustness of those determinants. I consider their theory and their model but not to make the same point. Instead I analyze if an FTA, ECOTA to be specific, is driven by economic determinants and thus specifically those defined by Baier and Bergstrand (2004). I do this by using their model, but not to support the significance of the variables by the high percentage level of FTA predictions. In this paper the FTA is given and the interest lies in whether Baier and Bergstrands (2004) identified determinants are significant for ECOTA. By analyzing the determinants of one specific FTA one step is taken towards predicting the welfare effect of the agreement, although that prediction is not made in this paper.

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Introduction

The question of this paper is “Are there economic determinants behind the formation of ECOTA?”. ECOTA is the free trade agreement of the Economic Cooperation Organization and was signed in 2003 between ten countries in Central and South Asia. The aim of the agreement is to promote economic development and intra-regional trade. Economic determinants are a concept that was identified by Baier and Bergstrand in the paper “Economic Determinants of Free Trade Agreements” in 2004. They are factors in the areas of economic geography, intra-industry and inter-industry and are believed to promote or favour that trade agreements are created or joined.

One can ask what the reason behind looking at economic determinants of FTAs is. By analyzing economic determinants of a specific agreement one step is taken towards predicting the welfare effect of that agreement. That is one way of evaluating the success of the FTA, and a great part of understanding that specific agreement but also FTAs in general. I have chosen the FTA of ECO because it is between countries in an area that often is not covered in media or in economics, but also because there are not many scientific papers that treat ECOTA.

The theory of this paper has its ground in the econometric findings of Baier and Bergstrand. Their model is very successful with correctly predicting 85 percent existing and 97 percent non-existing FTAs. From the results of Baier and Bergstrand the conclusion is drawn that FTAs in the world mainly are driven by the economic variables that are included in the authors model; the included variables are proved not only to be significant (qualitative) but also to what extent (quantitative). I use the econometrically significant results of Baier and Bergstrand as a theoretical ground when I assume that there are certain economic determinants affecting the probability of FTAs and that it is specifically those proven by the authors. The authors support their model by including several variables that have other dimensions, such as being political, cultural, institutional or social. Beside one variable concerning CO₂- emissions none of the other variables showed to have statistical support. This strengthens the economic perspective, but one should have in mind that this result naturally depends on what variables are included. I analyze the significance of the economic variables of Baier and Bergstrand but for a specific FTA, namely the ECOTA.

The main result to the question of the paper is yes; there are economic determinants behind the formation of the ECOTA. But not all the variables that Baier and Bergstrand state are economic determinants for trade agreements in general are significant for ECOTA. For ECOTA it is specifically economic determinants that belong to the areas of economic geography and inter-industry and not intra-industry.

When I theoretically treat the specific economic determinants behind ECOTA it inevitably includes treating the expected welfare effects of forming the FTA. I however disregard to evaluate the welfare aspect of the already formed ECOTA. That involves not discussing whether it is good or bad whether the agreement is based upon economic characteristics or other characteristics, or if the agreement is considered excessive or insufficient.

This paper is disposed as follows; section one is an introduction to the ECOTA. Section two is a literature study of papers treating economic determinants. Since the first paper that empirically treats economic determinants of FTA was written in 2004 the literature is divided into pre 2004 and post 2004 literature. In the third section the theory and model used are accounted for. That includes how the theory of Baier and Bergstrand is applied, hypotheses and the empirical model. The fourth section treats the data covering both the variables and measuring problems. Section five is the method part with a description of the estimation process. Possible weaknesses of the model are discussed in section six. In section seven the empirical results are gone through and in section eight the results are discussed and a conclusion is reached. In section nine and ten one find the references and the appendix.

1 The ECO trade agreement

1.1 ECO

In 1985, in the middle of the Iran-Iraq War and the Soviet War in Afghanistan, Iran, Pakistan and Turkey created the Economic Cooperation Organization (ECO), an organization similar to the predecessor Regional Cooperation for Development (RCD) that was founded over twenty years earlier (www.ecosecretariat.org/). It was argued that the organization could become a considerable actor in Asia since it in 1992 expanded to include additional seven Central and South Asian countries, see Table 1, and since the extended region possess factors such as rich minerals, agricultural resources, large population and a strategic location, all beneficial for evolving into a competing economic bloc (Peimani 2003). The basic aim of the organization is to promote cooperation among the ten member states in the three main fields of technology, culture and economy. The focus in the economic area is towards trade through the removal of trade barriers and development of transport infrastructure.

(www.ecosecretariat.org/)

1.2 ECOTA components

The need for a specific agreement on trade evolved over the first decade of the ECO and in 2003 the ECO trade agreement (ECOTA) with 39 articles was concluded for the ten years to come. The agreement basically covers the path towards achieving economic development and intra regional trade through the reduction of tariffs, the elimination of non-tariff trade barriers, fair conditions for competition in trade, new climate for economic relations and the improvement of transport infrastructure (TTA). In connection with the agreement being accepted the tariff-reducing target would be relatively exhaustive. All goods that are traded between members before the implementation would enter one specific tariff-reducing list with some exceptions that would enter another list. The articles on tariffs specifically prescribe the members to, during a period of eight years, yearly reduce the tariffs by at least ten percent of existing tariffs to at the end of the period having achieved to bring the highest tariff slab of

each item to a maximum of 15 percent. The deadline of the abolishment of tariff charges on imports (those that have the same influence as custom duties), on custom duties and similar charges on exports has a much shorter time span and is set to two years from when the agreement is implemented. (www.ecosecretariat.org/)

1.3 ECOTA development

The intended establishing of the agreement as occurring gradually and the aim of it benefitting all members equally was enough to have it signed in 2003. The spirit in connection with the signing was hopeful and the secretary-general of the ECO expressed his expectations for the agreement as "the beginning of a new era of economic cooperation amongst the member states"(Peimani 2003). But through the 8th (2004) and 9th (2006) summit meetings and catastrophes such as the earthquake in Pakistan (8th October 2005), ratification and finalization of the agreement were constantly called for (Dushanbe Declaration and Baku Declaration). It was not until April 2008 that the agreement was ratified by Afghanistan, Iran, Pakistan, Tajikistan and Turkey (minimum number of signatories needed), and the agreement could officially come into force (Kakakhel 2008). Despite all the years of struggle with reaching consent and implementation, the vision that constantly has been a priority in ECOTA is that in 2015 having accomplished a free trade area in the ECO region (www.ecosecretariat.org/). As late as in 2010 talks about implementation were still present and in the end of last year the Foreign Minister of Pakistan announced that Pakistan together with Turkey had agreed to implement the ECOTA bilaterally. He still stressed the 2015 vision and also urged the other signatories to follow Afghanistan and overcome what seem to be the main obstacle, to provide the lists that are a must for the ratified agreement to be implemented (Speech). Thus, although the agreement is officially specified, signed and ratified there are fundamental problems in the actual implementation of it.

1.4 ECO challenges

Hence there exist challenges facing an organization with members such as the three ECO founding countries and members such as the Islamic Republic of Afghanistan, Republic of Azerbaijan, Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, Turkmenistan

and Republic of Uzbekistan. The difficulties are found in disputes regarding foreign policies towards Russia and the United States, debates over the Caspian Sea and difference of opinion considering economic policies that has its source in the lack of many necessities such as economic means, skills and technology. (Peimani 2003) This demonstrates through a distinct difference between official decisions in ECO and the actual implementation of them, such as the ECOTA.

2 Literature study

In literature that treats FTAs there were for a long time no attempts to reach a comprehensive understanding of the actual determinants of FTAs. The path towards that as a separate field to study was initiated in 2004 with the research of Baier and Bergstrand. The relevance of this relatively new field of study on FTAs is well stressed in a quote from Lipsey.

“If one wishes to predict the welfare effects of a customs union it is necessary to predict the relative strengths of the forces causing trade creation and trade diversion.” (Lipsey 1960 p. 498)

This quote also gives a picture of how the literature has approached the study of FTA determinants since 1960.

From having studied literature I make the distinction between literature treating determinants of FTAs pre 2004 and post 2004. This distinction has however not been pronounced in literature.

2.1 Pre 2004

2.1.1 Trade Diversion and Trade Creation

A more established field of research on FTAs is when analyzing the agreements effects on welfare, particular in terms of trade creation (TC) and trade diversion (TD) (brought up by Jacob Viner in 1950). What determines if an FTA is agreed upon is partly driven by how the FTA is expected to affect the relationship between TC and TD. Thus, what drives FTAs is to some extent what drives TC and TD. This is where the two fields of study on FTAs, which are the driving determinants of FTAs and the FTAs effects on

welfare, interact. The literature that approaches the subject of determinants often does this in connection with the effects on FTAs, particularly the welfare effects.

In my outline of both the theory and empirical proofs of the determinants of FTAs I treat the year of Baier and Bergtrands study as the benchmark between those two. Articles before 2004 are mainly theories that approach determinants, I however account for them to show that they have formed the post 2004 articles that exhaustively cover the determinants with empirical support.

2.1.2 Endogenous FTAs

When one considers countries decision to enter or leave an FTA as exogenous one assumes the decision to be statistically independent of other variables in the model. I have with the formulation of this papers question taken the opposite position of treating FTAs as endogenous. The following literature support endogeneity but explain the determinants on FTAs differently by analyzing and including different variables in the models.

Eichengreen and Douglas claim in their study from 1996 that the standard gravity model suffers from omitted variable bias and emphasise that history is the excluded factor. Their analysis of the evolution of trade from the 1950s and fifteen years forward confirms that historical factors have a significant influence on the direction of trade. Eichengreen and Douglas identify that the effects of the history variable has been misread into preferential agreements, specifically the link between the agreements in the present and the direction of trade flows in the past. (Eichengreen 1996 abstract)

Four years later Freund investigated a factor that Eichengreen and Douglas claimed was overrated. Freund identified PTAs as self-enforcing by showing that there is a relationship between the forming of PTAs and multilateral tariff reduction and vice versa. (Freund 2000 p. 359).

2.1.3 Economic and political-economic determinants

Articles that treat the economics of FTAs can be categorized into economics and political-economics, which is a distinction made by Krugman in 1991 (Krugman 1991 p. 23). Usually both categories are treated in literature or the political economy part is skipped. The

disregarding of the political economy factor might have to do with the necessities Krugman states for having such discussions, as accounting for the mechanisms of trade policy which can be very extensive (1991 p. 24).

Despite what is usually treated in literature the authors Gene and Grossman actually looked at the political perspective of FTAs in 1995. The authors assumed a framework where politically minded governments negotiate on FTAs and they received results on conditions where governments show consideration. The results indicate that industries and other special interests seem to practise political pressure and are being taken into account for. Governments also consider the average voter, or more precisely the political cost that a decision that cause welfare harm might result in. (Grossman 1995 p. 687)

Bagwell and Staiger have as Gene and Grossman analyzed the reasons behind governments undertaking trade agreements, but from an economic perspective mainly. Unlike Gene and Grossman the authors identify the main reason to be the maximization of a country's income since governments' preferences are argued to coincide with that. Bagwell and Staiger still recognize the possible importance of political costs identified in the prior article but they label that as distributional concerns. (Bagwell and Staiger 1999 p. 215). They also stress international political issues such as military security matters although they are not captured in their model that is of a general character (Bagwell and Staiger 1999 p. 242).

2.1.4 Economic geography

In Krugmans article "Is bilateralism bad?" from 1989 the, until then, relatively neglected issue of economic geography and thus transport costs was recognized (Krugman 1989 p. 19). The article has since then been evolved by other authors towards several directions. Different authors have focused on the three restrictive model assumptions of Krugman: the symmetry assumption, the one industry one factor assumption and the zero intra-continental transportation costs assumption. (Krugman 1989 p. 20)

The first assumption, which states that economies of different countries are identical in size, does not reflect reality. The question is whether economic size makes a difference when modelling the determinant of FTAs. According to Frankel et al. (1998) economic size may have harmless effects when modelling the effects of FTAs. Srinivasan (1998) and Panagariya (2000) further discuss the significance of economic size (Baier and Bergstrand 2004 p. 32).

Both Deardorff and Stern (1994) and Haveman (1996) stress that Krugman's second assumption involves the non-existence of Heckscher-Ohlin's comparative advantage (Baier and Bergstrand 2004 p. 32). Disregarding comparative advantage can be considered problematic when connecting it with what Venables concluded in 2003; the welfare effects of custom unions are dependent of the comparative advantage between partners but also towards the ROW (Venables 2003 p. 747).

In the third assumption that states no intra-continental transportation costs, Krugman focused on the welfare effects of intercontinental transport costs. Krugman argued that welfare would decrease if the intercontinental transportation costs were non-existent and the opposite would occur if they were prohibitive (Krugman 1989 p. 20). Frankel et al. (1995, 1996, 1998) added the variables of distance and remoteness to the welfare analysis of Krugman. With two new variables the welfare analysis was the following: the less distance there is between two countries the more room is there for potential TC and the countries are more likely to form an FTA, the more remote the two continental trading countries are from the ROW the lower is the risk for TD. When combining the situation of geographical closeness with high intercontinental transport costs, entering an FTA is considered resulting in large intracontinental TC and less intercontinental TD but an improvement of welfare on net. Instead of as Krugman considering non-existent intercontinental transport costs (one of Krugman's two extreme alternatives), Frankel et al. look at welfare effects when transport costs become less. In that case the net welfare of the continental countries from the potential FTA would decrease until there is no reason to form an FTA. (Baier and Bergstrand 2004 p. 31-32)

Distance role in affecting bilateral trade was further supported in 1995 by Jeffrey and Frankel and their statistically significant result supporting the geographical dimension (Frankel 1995 p. 61). They developed a model that could balance between Krugman's two extreme alternatives of intercontinental transport costs. It is a model that can treat more reasonable cases where transportation costs are between non-existent and prohibitive. (Frankel 1995 p. 62) The year after came Nitsch with a model that complemented Krugman's by recognizing intracontinental transportation costs¹. (Nitsch 1996 p. 355)

¹ See a summary of the pre 2004 studies and how they have formed the post 2004 studies in the mind-map in the appendix.

2.2 Post 2004

With the new century emerged literature that exhaustively treats the determinants of FTAs with the support of empirics. This paper has its ground in one specific article that I find act as the foundation of the field of FTA determinants and I thus account for it. I also represent the article I consider is the successor of the first, and also a third article that extends the two earlier.

2.2.1 Baier and Bergstrand 2004

The founder of the field of determinants of FTA is Baier and Bergstrand with the article “Empirical Benchmark of determinants of FTAs” from 2004 (Baier and Bergstrand 2004 p. 29). What makes their model realistic is that they relax Krugman’s restrictive assumptions; economies are assumed to have different absolute and relative factor endowments and transports costs are assumed to exist between but also within continents (Baier and Bergstrand 2004 p. 33).

The actors in control are in the model of Baier and Bergstrand given to be social planners or governments that consider the economic welfare of countries citizens (Baier and Bergstrand 2004 p. 33). As in Krugman’s model the firms are regarded as monopolistically competitive (Baier and Bergstrand 2004 p. 34).

The view of Baier and Bergstrand on the determinants of FTAs corresponds to that of earlier literature. TC and TD steer the welfare net gain or loss from forming an FTA and when looking at the determinants of FTAs one look at the economic driving forces of TC and TD. (Baier and Bergstrand 2004 p. 34) The theory of Baier and Bergstrand divide the determinants into three categories driven by three variables. The first variable is Krugman’s familiar economic geography factor and Frankel et al.’s extension regarding distance and remoteness. The theory: TC is greater the closer two trading countries are in distance and TD is less the more remote two continental trading countries are from the ROW. The second variable is intra-industry. The theory: TC is greater the more alike and bigger the two trading countries

are in economic size and TD is less the smaller is the economic size of the ROW. The third trade-determining variable is inter-industry. The theory: TC is greater the wider the relative factor endowments of the two trading countries are and TD is less the smaller the difference between relative factor endowments of the trading countries and that of the ROW are. (Baier and Bergstrand 2004 p. 33)

Baier and Bergstrand strengthen their theory with statistical results through a computable general equilibrium model (CGE) (Baier and Bergstrand 2004 p. 34). Their interest is in explaining cross sectional variation of FTAs in a given year and they thus use a static approach (Baier and Bergstrand 2004 p. 34). They consider the decision-makers choice as bilateral and not multilateral (Baier and Bergstrand 2004 p. 39).

Baier and Bergstrands model demonstrates the relationship between net utility gains from an FTA relative to transport costs, economic size and factor endowment ratios. The empirical result from the model confirms their theory that the three stated variables are the economic determinants that two countries consider when regarding FTAs. (Baier and Bergstrand 2004 p. 60)

Although Baier and Bergstrand prove their examined determinants to be statistically significant there are some variables that they leave out. They regard the economic determinants of FTAs but not the political economy branch. The possible influence of political lobbies and distributional concerns of governments are thus disregarded. Baier and Bergstrands (2004) choice can however find support in a study of Goldberg and Maggi (1999) who found that “the weight of welfare in the governments objective functions are many times larger than the weight of political contributions” (Baier and Bergstrand 2004 p. 33). Their model also overlooks how non-member countries potentially are affected, as in net welfare losses (Baier and Bergstrand 2004 p. 33).

2.2.2 Egger and Larch 2008

Egger and Larch article “Independent Preferential Trade Agreement Memberships: An Empirical Analysis” can be considered the successor of Baier and Bergstrand and Bergstrands article. Egger and Larch use the same control variables for PTA membership as Baier and Bergstrand (2004) but with the extension of including interdependence of membership; a variable that allow a country pair’s PTA membership to depend on how other country pairs act. With this Egger and Larch choose to highlight what textbook-theories claim but what has often been neglected in previous empirical works. (Egger and Larch 2008 abstract) The

included variable can be traced back to the domino theory of regionalism coined by Baldwin. Baldwin's theory stresses the political economy force that the forming of an PTA have on a non-member country's desire to engage in the agreement. This force is assumed to affect the extension of existing PTAs but also the future of new ones. (Baldwin 1997 p. 884)

The empirical analysis of Egger and Larch verify that interdependence is a part of PTA membership considerations. The empirical results of their article reveal how interdependence is related to the three factors of distance, TC and TD. Interdependence relationship to the three factors is more precisely the following: if an PTA is formed and growing other non-member country pairs try to avoid welfare losses from TD by joining the already formed PTA or other ones. Since PTAs TD effect on non-member countries diminish with distance the interdependence tendency also decrease with larger distance to the PTA. The interdependence tendency is stronger for entering existing PTAs than for founding new PTAs. (Egger and Larch 2008 p. 26-27)

2.2.3 Jayathilaka and Keembiyahetti 2009

Jayathilaka and Keembiyahettis' article "Adverse Selection Effect for South Asian Countries in FTA Formation" is the most recent one I account for and I find it being a continuation of the two articles mentioned above. Jayathilaka and Keembiyahetti test five hypotheses that exist in earlier articles but also additional six own hypotheses. All hypothesis treat economic and non-economic determinants of FTAs in various ways. (Jayathilaka and Keembiyahetti 2009 p. 21).

The results of Jayathilaka and Keembiyahettis' standard probit model give support to nine hypotheses. I mention those hypotheses, both with and without support, that add to the work of the authors I have accounted for. The results show that the likelihood of forming an FTA between pair of countries is higher: the more extensive the political stability is, the more discontinued then connected by a common border countries are, the more costly the average import tariffs were in the past and if neighbouring countries already have entered a lot of PTAs. Some of the variables in Jayathilaka and Keembiyahettis' study showed not to be significant. Those results are also important to account for because they give an understanding of what is empirically proven not to affect the determinants of FTAs. In the case of Jayathilaka and Keembiyahetti that is sharing a common language, having colonial

ties and a higher degree of export/import intensity. (Jayathilaka and Keembiyahetti 2009 p. 21, 23)

3 Theory & Model

3.1 Determinants

To elaborate on the determinants of FTAs, it is those that regulate if integration between two countries is expected to be successful or not. There exist a total of six variables from the areas of economic geography, intra-industry and inter-industry that are all identified and statistically proven to be such determinants. They are all summarized in Table 2 and 3. These are: distance, remoteness, economic size, difference in economic size, difference in capital-labour ratios, difference in capital-labour ratios relative to ROW. To what degree the different determinants are expected to affect the probability of FTAs differs. Distance between two countries is proven to have considerable effect on the FTA probability. If it were to decrease with one standard deviation the probability of an FTA would increase with 13 percent. The same measure of an increase in the intra-industry variable of economic size gives a 6 percent increase in probability. The equivalent influence is calculated for changes in the two variables difference in economic size and difference in capital-labour ratios. If the situation between two natural trading countries were that all variables would exist between them in their mean level, then the probability of an FTA is calculated to be 87 percent. (Baier and Bergstrand 2004 p. 55) The probability for the same situation but between two unnatural trading partners is 1 percent. Still, in both cases the variables are significant. (Baier and Bergstrand 2004 p. 56) It can thus be concluded that the variables act as determinants, to different extent, irrespective of if partners are considered natural or not; it is simply not likely that an FTA is considered in the latter case.

3.2 Expected relationship with FTA formation

So far I have stated the determinants and to what extent they are estimated to affect the probability of forming FTAs. What is actually considered when deciding whether forming an FTA will be successful or not is how the determinants are linked to the expected effects on TD and TC, the welfare net gain. Since the variables are proved to be significant the theoretical arguments on the welfare net gain of the determinants could also be considered having ground. The theoretical links between the determinants and the expected effects on welfare net gain are the following (two variables are excluded because of causes accounted for later):

- The distance variable is explained in terms of transport costs of international trade. With less *distance* between two countries, transport costs decrease and with that there is a possibility that volume of trade and thus net gain increase. And hence it is more likely that the two trade partners form an FTA. (Baier and Bergstrand 2004 p. 41)
- With larger *size* of a country's economy come larger absolute factor endowments. The larger is the size of two countries entering an FTA the more is the varieties that can occur in the increase of volume of trade between the two. (Baier and Bergstrand 2004 p. 45)
- With less *difference in absolute factor endowments* between two countries there exists a drive towards trading that is promoted when tariffs are lessened. (Baier and Bergstrand 2004 p. 46)
- With wider *difference in relative factor endowments* between two countries the gains from entering an FTA should increase because comparative advantages becomes stronger. (Baier and Bergstrand 2004 p. 46)

3.3 Hypothesis

The general hypothesis of the question "Are there economic determinants behind the formation of ECOTA?" is that economic factors such as economic geography, intra-industry and inter-industry drive the ECOTA. This is further expressed as follows:

Hypothesis 1

ECOTA is driven by the distance variable; the lesser is the distance between economic centres the higher is the probability of an FTA. Countries are ECOTA-members partly because the distance between member pairs is low enough for being gainful to the members.

Hypothesis 2

ECOTA is driven by the economic size variable; the larger are the trading partners in economic size the higher is the probability of an FTA, after considering distance. Countries are ECOTA-members partly because the size of the member pairs' economies is high enough for being gainful to the members.

Hypothesis 3

ECOTA is driven by the difference in economic size variable; the more similar are the trading partners in economic size the higher is the probability of an FTA. Countries are ECOTA-members partly because the size of the member pairs' economies is similar enough for being gainful to the members.

Hypothesis 4

ECOTA is driven by difference in the relative factor endowment variable; the larger is the difference between two countries relative factor endowments the higher is the probability of an FTA, likely only up to a point. Countries are ECOTA-members partly because the difference of the member pairs' relative factor endowments is high enough for being gainful to the members.

All hypotheses are based on the expected effects on TC and TD. If the hypotheses are to be rejected there can be non-economic factors driving the ECOTA since the agreement already exists and since these variables are statistically proven to be among the economic variables that determine FTAs in general.

3.4 The empirical model

To from an econometric perspective being able to investigate if the variables of interest can explain the ECOTA dummy variable it is proper to use a model that is designed to consider the choice between two discrete alternatives. Such models are called binary choice models; Chester Bliss introduced the probit model which is the one used in this paper. When applying

the probit model to the variables that are being analyzed in this paper the discrete alternatives are given and are either being a member in the FTA, thus the ECOTA or not. The latent variable considers the difference in utility levels from entering the ECOTA. Although there are in theory ideas of how net gain is affected, the exact utility levels are unknown. The unknown variable is replaced with the discrete indicator variable that in this case already is given: =1 if both countries are ECOTA members and =0 otherwise. The probability model illustrates how the dependent variables such as distance between two countries vary with the ECOTA-countries. In the probit model the standard errors are assumed to be standard normally distributed, both in the latent expression and in the discrete indicator case. The response probability function is this:

$$P(\text{ECOTA} = 1) = P(y^* > 0) = G(\beta_0 + \text{NATURAL}_{ij}\beta_1 + \text{RGDP}_{ij}\beta_2 + \text{DRGDP}_{ij}\beta_3 - \text{DKL}_{ij}\beta_4 + \text{SQDKL}_{ij}\beta_5)$$

$$P(\text{ECOTA} = 0) = P(y^* < 0) = G(\beta_0 + \text{NATURAL}_{ij}\beta_1 + \text{RGDP}_{ij}\beta_2 + \text{DRGDP}_{ij}\beta_3 - \text{DKL}_{ij}\beta_4 + \text{SQDKL}_{ij}\beta_5)$$

$$y^* = \min(\Delta U_i, \Delta U_j)$$

It is important to stress the framework in which the model I use is assumed to operate in. The assumptions can concisely be described as relaxing those of Krugman's and thus being less restrictive; asymmetries between countries and sectors exist, two sectors and two factors exist and so does inter- as well as intracontinental transport costs. (Baier and Bergstrand 2004 p. 34-35)

4 Data

The data set of this paper is of a cross-sectional kind; observations are from the year 2003, when the ECOTA first was signed. The observed countries are the ten ECOTA signatories and additional ten from the same area that acts as a control group (see Table 1).

Sources for the collected data are two: The World Bank and The CIA World Factbook. The first mentioned is specifically a data set with 420 indicators from the World Development Indicators (WDI) and covers 209 countries between 1960 and 2009. The second source covers 266 countries and includes information on data, geography, transportation, economy etc.

4.1 The variables

The model has a given dummy variable called ECOTA as dependent variable. There are five explanatory variables: $NATURAL_{ij}$, $RGDP_{ij}$, $DRGDP_{ij}$, DKL_{ij} and $SQDKL_{ij}$ that are all treated as continuous. No equations are performed to construct any of the five variables. $NATURAL_{ij}$ represents the economic geography factor as the natural logarithm of the inverse of the distance (in kilometres) between two countries. Economic size is represented by $RGDP_{ij}$ as the sum of the logs or real GDP of two countries (dollars). $DRGDP_{ij}$ counts for the difference between logs of real GDPs of two countries in absolute value, thereby the difference in economic size. Comparative advantage is reflected in the DKL_{ij} variable as the difference between the logs of the capital-labour ratios of two countries in absolute value. $SQDKL_{ij}$ is the square of the DKL_{ij} -variable. This term can show to be insignificant but is included to take account for the theory that states that difference in relative factor endowments can be significant but only to a certain degree.

This model is a transformation of Baier and Bergstrands'. The difference is the exclusion of the two variables $REMOTE_{ij}$ and $DROWKL_{ij}$ mainly because of what the authors themselves express; the measuring is not that straightforward. By excluding the $REMOTE_{ij}$ variable I do not account for the remoteness factor's involvement in determining FTAs. The

comparative advantage of the country pair towards the ROW is also disregarded when losing the $DROWKL_{ij}$ variable.

4.2 Measuring problems

There exists some measuring problems; data is missing for two countries in the data set because of lack of data in the data-sources. Data on the GDP of Iraq in 2003 is one example; this can probably be explained with the US invasion of Iraq that occurred the same year. This has left all observations with Iraq as one of the partners for all variables except $NATURAL_{ij}$ empty. The other country is Israel where the sources do not provide enough data for calculating real GDP. The variables $RGDP_{ij}$ and $DRGDP_{ij}$ for all observations with Israel as one of the countries are thus empty.

5 The method

5.1 The estimation

The parameters in the probit model are typically estimated with the method of maximum likelihood because the steps of assuming a distribution and defining a probability function already are carried out (Verbeek 2008 p. 203). In this paper the distribution of the error terms are set to be standard normally distributed and the probability function is given in the above section. The estimation is performed in the data analysis and statistical software program STATA and the robust-function commando of the program is applied, which gives robust variance estimators; estimates are efficient even if the distribution assumption is not entirely correct. However the received estimates do not show the economic meaning of the variables. For that the marginal effects of the estimates are needed and are received by an additional commando in STATA. The estimates and the interpreted significance from the p-values are given in the empirical results-section and in Table 4.

5.2 Interpreting the estimates

The marginal effect estimates are interpreted in three stages: the statistical significance of the coefficient estimates, the sign of the coefficient estimates and the size of the marginal effect estimates. From those interpretations the following results are received: the statistical significance of the variables, the partial effects of the variables and the quantitative effects of changes in the explanatory variables on the probability of the dependent variable. The partial effect considers the signs of the coefficient estimates that indicate the direction of the effect of a change in an explanatory variable. (Verbeek 2008 p. 201). The quantitative effect involves the value of the marginal effect estimates that shows to what extent the explanatory variables affect the probability of the dependent variable, thus the probability of in this case both trading partners being ECOTA members.

6 Weaknesses of the model

The econometric model that is used is characterized by assumptions that can have negative effects on the properties of the estimates and thus be sources of model weaknesses. I evaluate the possibility of that, but restrict the evaluation with the help of some of the results of Baier and Bergstrand.

Maximum likelihood is the estimation method used in this paper. Common is to suppose normality: normal and independent distribution of error terms with mean zero and variance σ^2 (Verbeek 2008 p. 174). The characteristics of the estimator are to strive for as long as the assumed distribution is accurate. It then qualifies to be consistent, asymptotically efficient and asymptotically normally distributed. (Verbeek 2008 p. 177) There is a risk for inconsistent estimators when the function is not specified accurately. In binary choice models this occur when the dependent variable is miss-specified as a function of the explanatory variables. This could be reflected in the form of heteroskedasticity or non-normality but also as omitted variables. (Verbeek 2008 p. 210)

The bilateral assumption, which is that FTAs only are entered between two countries, has two possible effects on the estimate-properties. The assumption implicitly means that FTAs are independent across observations, which in the case of ECOTA means that an FTA between Iran and Pakistan is independent of such an agreement between Iran and Turkey. Although this does not reflect reality and certainly not the case of ECOTA, that is a multilateral agreement that consists of a group of ten countries, I do not account for this. This is because of Baier and Bergstrand attitude toward the assumption after they test for possible implications on the properties. The re-estimation that the authors do as part of a heteroskedasticity adjustment had minor effects. The same assumption also brings the risk of omitted variables problems but is also after tested for not accounted for by Baier and Bergstrand. (Baier and Bergstrand 2004 p. 51-52) Thus, even though the bilateral assumption does not reflect reality it is already proved to have no considerable effects on the characteristics of the estimates.

I however disregard Baier and Bergstrands (2004) effort to avoid a case of possible endogeneity; they use data on incomes and capital and labour stocks from the 1960s although the year for the rest of the data is 1996. This effort is done because the authors do not only aim to look at FTAs in 1996 but aim for a general result and since “an FTA formed several year prio to 1996 likely influenced subsequent trade – which then influenced economic growth -incomes and capital stocks in 1996 may well be endogenous”. (Baier and Bergstrand 2004 p. 40) Because I only analyze the determinants of the ECOTA that was signed in 2003 I do not make this kind of adjustment.

Baier and Bergstand extensively check their model for omitted variables and still end up with their original model. This model in this paper is a shortened version of Baier and Bergstrands model. The two variables that are excluded thus still bring the risk of the model suffering from omitted variables, which can be reflected as heterokedasticity or non-normality and thus inconsistent estimators. (Verbeek 2008 p. 210) Also the missing data can affect the estimators.

7 Empirical results

The results with significance, sign and values are compiled in Table 4 and 5. In Table 4 Baier and Bergstrands results are accounted for so comparisons are possible to make in the conclusion. The coefficient estimates of the variables NATURAL, DKL and SQDKL have p-values close to zero and less than 0.05 and thus three of five variables are significant. The two other variables RGDP and DRGDP are considered insignificant with p-values of 0.156 and 0.275. Among the significant variables the coefficients of NATURAL and SQDKL have negative signs while DKL has a positive sign. The explanatory variable that is estimated to affect the probability of ECOTA membership to the largest extent is DKL with 25 percent, which is followed by the SQDKL and NATURAL at 8 and 0.1 percent. The received R^2 value is 0.1326. With the coefficient estimates the following econometric model is received:

$$(ECOTA = 1) = P(y^* > 0) = G(1.634 - 0.0003451NATURAL_{ij}^* - 0.03808RGDP_{ij} + 0.05461DRGDP_{ij} - 0.8617DKL_{ij}^* - 0.2803SQDKL_{ij}^*)$$

*significant variables

8 Discussion & Conclusion

What conclusions on the determinants of the ECOTA can be drawn from the empirical results? Are there economic determinants behind the formation of the ECOTA?

With three of five variables being significant the conclusion can be drawn that economic geography and inter-industry variables are economic determinants behind the formation of the ECOTA. The two variables that treat economic size are, opposite to the general case of FTAs, proven not to be the economic determinants behind the ECOTA. Observe that that is not considered a proof of Baier and Bergstrand theory not being true. Their analysis is very extensive and treats several FTAs. The negative sign of the economic geography variable show how increasing distance between two countries decrease the probability of ECOTA membership between two countries. The comparative advantage variable has as in the case of Baier and Bergstrands model a positive sign and show that an increase in the difference of comparative advantage between two countries increases the probability of ECOTA membership. Also the value of the coefficient of the DKL variable is very close to that of Baier and Bergstrand. The positive sign of DKL and negative sign of SQDKL conforms to the theory. Although three of the variables are significant, the extent of how the variables affect the probability of ECOTA-membership vary. A small increase in difference of for example comparative advantage increase the probability of ECOTA-membership with 25 percent. The effect of a small increase in distance is much slighter and decreases the probability of ECOTA-membership with eight percent. The situation between the ECOTA members must thus be no major distances and relative large differences in comparative advantages. Concluding, there are economic determinants behind the formation of the ECOTA. However it is not all of those five that generally are the economic determinants behind formations of trade agreements.

When relating the results to the hypotheses, number 1 and 4 cannot be rejected. Hypotheses 1: ECOTA is driven by the distance variable and ECOTA countries are members partly because the distance between member pairs is so low that it is gainful to join.

Hypotheses 4: ECOTA is driven by difference in relative factor endowment and ECOTA countries are members partly because the difference of the member pairs' relative factor

endowments is high enough for being gainful to join. Differences in relative factor endowment as a determinant however fades with very high differences in endowment (SQDKL variables). Hypotheses 2 and 3 are rejected.

Besides concluding that there are economic determinants behind the formation of ECOTA the results can be extended to several different discussions. There might exist additional economic determinants behind the ECOTA such as those two variables that are excluded in this paper but included and significant in Baier and Bergstrands (2004) model, that is remoteness and difference in comparative advantage relative to the ROW. If that is the case the coefficient estimates suffer from omitted variable bias. There can also exist additional economic variables that drive trade agreements in general including ECOTA, but that are excluded from the original model of Baier and Bergstrand (2004) and thus also in the model of this paper. That involves questioning the extensive work behind Baier and Bergstrands (2004) model and suggesting that their model suffers from omitted variables. It might also be the case that ECOTA is driven by a combination of economic and non-economic determinants. The non-economic determinants can be variables such as level of import tariffs before joining the agreement or interdependence of membership that were identified by Jayathilaka and Keembiyahetti and Egger and Larch.

It is outside the scope of this paper to test for possible omitted variables. Because this paper is based upon the research and model of Baier and Bergstrand (2004) the approach is to consider their research robust. Also the received R^2 value of 0.1326 is relatively good and strengthens the view of the model being robust. These two factors result in the following conclusion and answer to the question “Are there economic determinants behind the formation of the ECOTA? Yes, there are economic determinants behind the formation of ECOTA, specifically distance, comparative advantage and square of comparative advantage. Because all the variables that Baier and Bergstrand (2004) identify as economic determinants of FTAs do not apply to the ECOTA, both because of exclusion and insignificance, the answer is also that there might be other non-economic determinants behind the formation of ECOTA. The variables that drive the ECOTA might partly be an exception to what drives the majority of FTAs in the world. I will, as mentioned before, not put any value to if economic or non-economic determinants are desirable (welfare aspect). If it is the case that ECOTA partly is driven by non-economic determinants is a subject for additional research.

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10 Appendix

Table 1

ECOTA MEMBERS	NON-ECOTA MEMBERS
Afghanistan	Armenia
Azerbaijan	Bangladesh
Iran	Cyprus
Kazakhstan	Georgia
Kyrgyz Republic	India
Pakistan	Iraq
Tajikistan	Israel
Turkey	Jordan
Turkmenistan	Kuwait
Uzbekistan	Lebanon

Table 2		
<u>Included variable</u>	<u>Representing</u>	<u>Definition</u>
ECOTA (dependent)	How explanatory variables coincide with the ECOTA countries	Dummy: =1 both partners belong to ECOTA =0 otherwise
NATURAL _{ij} (explanatory)	Distance <i>economic geography</i>	The natural logarithm of the inverse of the distance between economic centres of country i and j
RGDP _{ij} (explanatory)	Economics size of country i and j	The sum of the logs of real GDPs of countries i and j

	<i>intra</i> -industry	
DRGDP _{ij} (explanatory)	Difference in economic size of country i and j <i>intra</i> -industry	The absolute value of the difference between the logs of real GDPs of countries i and j
DKL _{ij} (explanatory)	Comparative advantage between country i and j <i>inter</i> -industry	The absolute value of the difference between the logs of the capital-labour ratios of countries i and j
SQDKL _{ij} (explanatory)	Restriction of effects of comparative advantage <i>inter</i> -industry	The square of DKL

Table 3		
<u>Excluded variable</u>	<u>Representing</u>	<u>Definition</u>
REMOT _{ij} (explanatory)	Remoteness <i>economic geography</i>	If both countries are on same continent: the simple average of the mean distance of country i from all of its trading partners except j and the mean distance of country j from all of its trading partners except i Otherwise REMOTE = 0
DROWKL _{ij} (explanatory)	Comparative advantage between country i and j and	The absolute difference between the capital-labour ratios of the member countries and the

	the ROW <i>inter-industry</i>	ROW's capital-labour ratios
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Table 4		
<u>Variables</u>	<u>ECOTA coefficients</u>	<u>Baier & Bergstrand coefficients</u>
NATURAL	-.0003451*	1.76*
RGDP	-.0380788	0.17*
DRGDP	.0546065	-0.34*
DKL	.8616552*	0.85*
SQDKL	-.280306*	
CONSTANT	1.634398	7.90*
PSEUDO R ²	0.1326	0.728
LOG LIKELIHOOD	159.72796	-194.4
NR of OBSERVATIONS	305	1431

Table 5	
<u>Variables</u>	<u>ECOTA marginal effects</u>
NATURAL	-.0001025
RGDP	-.0113143
DRGDP	.0162252
DKL	.2560225
SQDKL	-.083287
NR of OBSERVATIONS	305



