

Trade in a United Nordic

An Analysis of the Potential Trade Effects of Creation a Union Country of the Five Nordic Countries

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Seminar date: 25 - 01 – 2016

Abstract

This paper analyzes the internal and external trade effects of uniting the five Nordic countries into one bigger country, in order to find if there are any trade benefits of a unification. The estimation of the potential trade levels and the subsequent analysis will be done using models based upon the gravity theory of trade with data from four of the Nordic and eight other European countries. The result of these estimations support the two hypothesis of the internal trade within the Nordic region will be increasing while the external trade to and from the region will be decreasing upon a unification. Hence, it supports the idea of a unification of the Nordic countries will decrease trade barriers between the Nordic countries which will increase trade between them but this will happen through trade diversion. However, the paper fails to with accuracy predict the extent to which the internal trade will increase and the external will decrease. But, it clearly predicts the overall trade effects will likely not be beneficiary for the region. Hence, the paper finds trade improvements to not be a reason for the Nordic countries to unite.

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I. Introduction

Since the Nordic countries went separate ways in 1523, upon the dissolution of the Kalmar Union (Encyclopædia Britannica, 2012), has the idea of re-uniting the Nordic countries been an at times popular idea. The idea is still alive today with a debate on the topic going on across the Nordics whether or not the idea of creating one grand country out of the five small Nordic countries is a possibility and if the Nordic countries should attempt to do so (Harder, 2011; Aabø, 2011; Wetterberg, 2012; Huuskonen, 2015). Hence, it is interesting to study what the economic effects would be of re-uniting the countries to one bigger country, in order to from an economic perspective discuss whether such a unification would be an idea worth further discussion.

There are many possible economic effects of unifying smaller countries into one bigger country. These logically range from reduced costs of bureaucracy to a greater degree of trade and investments between the unified countries. For example, a previous paper on the topic of a Nordic union by Jervelund et al. (2012) found there to be increased trade between the countries, increased investments, and a more integrated labor market in the case of a unification. However, in this paper will only the trade effects be studied and discussed, trade effects which comes from that a Nordic union results in a unified Nordic market. The discussion in this paper will be divided into the effects on internal trade within the Nordics, which Jervelund et al. found to increase, and the effects on the region's trade as a whole with the rest of the world, which Jervelund et al. was lacking. Both internal and external trade will be included as it is possible to assume a unification would create more trade within the Nordic countries as well as a more self-sustainable Nordic region which trades less with the outside world.

The Nordic countries are defined as Sweden, Norway, Denmark, Finland, and Iceland with their respective territories, as these five are the members of the Nordic Council (Norden, 2015). Further, these are the included countries as they through history have been closely tied to each other through the Kalmar Union, through the empires of Denmark and Sweden, and through more recent cooperation. However, countries such as Scotland (Little, 2014) and Estonia (K.S., 2010) could be seen as Nordic countries, but will be excluded as they are not currently nor historically as closely tied as the included five.

The essay will start of with a theoretical discussion of the likely trade outcomes of a Nordic union in chapter II. In chapter III are models for how this likely trade outcomes can be tested discussed. In order to use the empirical models will data on the topic be collected in chapter IV. The data will then be used to through empirical testing and analysis test the predictions in chapter V. Finally will the results be discussed in chapter VI and summarized in a conclusion in chapter VII.

II. Hypothesis

Trade within the five Nordic countries is an important part of the Nordic economy as it makes up 5% of the total economy of the region. (OECD, 2015; World Bank 2015) However, trade within the Nordic countries do currently meet a number of hinders in the form of trade barriers. Because, even though official trade barriers, such as tariffs, are abolished within all of the European Union (EU) do technical trade barriers still remain; for example through differences in health and safety requirements (Chen & Novy, 2009); causing a home-bias when companies do trade. The problems with trade barriers are likely to hold also within the Nordic countries and might be greater than in many other regions of Europe as only three of the five are EU members, the other two still being members of the European Economic Area (EEA). These unofficial trade barriers, even though not being as direct as tariffs do have similar effects on trade, as they do impose a cost on the trade between countries by rendering it more complicated than it would be if there were no border between the countries. Hence, lowering these barriers would likely create more trade between the countries. Thus, the first hypothesis is:

- A unification would increase the internal trade in the Nordic region.

In 2014 was Sweden the world's 22nd biggest economy, Norway the 27th, Denmark the 34th, Finland the 40th, and Iceland the 112nd, in terms of nominal GDP . However, would the Nordic countries have been united would they, under *ceteris paribus*, in 2014 been a country with a nominal GDP of US\$1.7 billion and therefore would it have been the world's 12th biggest economy and the 5th biggest economy in the EEA. (IMF, 2015) What this means in terms of trade to and from the region is a more powerful Nordic region which would be more self-reliant and therefore not needing to trade as much with the rest of the world. The reason for this is to be found in how a lowering of trade barriers within the Nordic countries, as suggested by the internal trade discussion, would cause some of the trade which the countries of the region have previously had with countries outside of the region to turn to trade within the region, as the difference in barriers would make it more beneficial. Hence, a Nordic union would likely divert trade from the rest of the world to internal Nordic trade. Thus, the second hypothesis of the paper is:

- A unification would decrease the external trade to and from the region.

This second hypothesis is not discussed previously by Jervelund et al. (2012), who as such miss the external trade effects of a Nordic union which this paper adds. Hence, if the second hypothesis do hold can a part of the positive effects found by Jervelund et al. be shown to not hold as total trade would not increase as greatly, it would just shift origin.

III. Model

There are three possible approaches to study the trade effects of such grand policy change as a unification. Either by looking at the trade effects of historic examples of unifications and do a comparison with these, or by looking into previous studies of the matter and comparing their results, or by the use of a theoretical model try to calculate estimates of what the trade levels upon a unification are likely to be. However, in this case the first approach of looking at previous examples of unifications is not possible as unification is something rare and it therefore do not exist any historic example similar enough to the unification suggested. Real life examples are so rare over the past fifty years has only five examples of countries actually merging into one country been found of which three; Germany, Yemen, and Vietnam; unified as a result of the cold war, one; the unification of India and Sikkim; is criticized a just big country annexing a smaller (Tocci, 2008), and the final; the creation of the United Arab Emirate; is a product of decolonization. Further, the second approach is equally unsuitable for this paper as the only paper discussing a Nordic union which I could find is the paper by Jervelund et al. (2012), meaning there is not much room for a comparison between papers. Hence, there are not any good examples in recent history of a group of equal countries with a long history of good relation who under peaceful terms decide to unify to compare with. Thus, the third approach of calculating estimates based upon theoretical models is the only available option. However, despite this clearly being the best approach it is limited by the models used as no model can successfully include everything which will potentially effect the result upon trade of the unification.

The preferable type of models to use in order to estimate the trade levels and thereby trade effects of countries of varying economic size is gravity models of trade. These are all based on Tinbergen's (1962) classic gravity model he constructed in the 60's, as shown in equation (1):

$$x_{ij} = G \frac{y_i^{\beta_1} y_j^{\beta_2}}{d_{ij}^{\beta_3}} \quad (1)$$

in which x_{ij} is the exports from country i to country j , G is a constant whose magnitude is not predicted by the theory, y is the GDP of the countries respectively, d_{ij} is the distance between the two countries, and the three β s are exponents not predicted by theory which determines to which extent the economic sizes and the distance affects trade. The gravity model of trade as shown above is based on models of gravity as found in physics, with the difference of the gravitational force on the left hand side being exchanged for trade and the size being measured in countries GDP instead of in bodies mass. The reason why these models are so usable in this case is because they attempt to predict trade levels based upon accessible aggregated data and can therefore be used for predicting trade levels in hypothetical situations such as this. Further, their predictions of trade levels solely depend on distance, which will be the same independent on if a union is formed, and economic size of single economic bodies, which is the only factor relevant to trade which will change upon a unification.

Trade effects for the region can be divided into internal trade within the region and external trade to the region. Doing this enables two separate models to be used and a more in-dept look at internal and external trade to be made. This is necessary as the internal trade effects will likely be more trade within the Nordic region while the external trade effects will likely be less trade with the rest of the world, due to trade diversion, and as such estimating both at once in the same formula is a messy approach. The reason for the increase in internal trade is because a re-unification will be removing existing trade barriers between the countries; such as differences in regulations and bureaucracy; while the reason for the decrease in external trade is because as a single bigger market will be more self-reliant and as such in less need of trade with the world. Hence, the further construction and testing of the models which will estimate the trade effects of a Nordic union will be divided into two parts. However, doing this division do limit the accuracy of the estimation as both estimates will be done under assumption of *ceteris paribus*, despite both trade effects as well as other effects will happen constantly during a longer period of time.

II.I. Internal Trade Effects

In order to test whether or not the first hypothesis holds will the Nordic countries' home-bias, how many times more two countries trade within their own borders compared to their trade with the other country upon controlling for relevant factors, be calculated in order to find how big effect the unification would have on internal trade by removing or reducing the home-bias. This approach has previously been used in the paper by Jervelund et al. (2012) regarding the same region and who also quotes a series of papers which have used a similar approach to study other regions for different

purposes. Therefore, my result will be estimated by following Jervelund et al. and then will it be compared to and hopefully back up their results; which showed a trade increase with up-to 146% between the Nordic countries upon a removal of the trade barriers. In the paper by Jervelund et al. they are comparing the home biases between the Nordic countries both with national trade; id est with a trade without any home bias; as well as with the home-bias which exists between the states in the USA. Further, apart from the two examples Jervelund et al. compares with would a comparison with other multilingual and multiethnic European countries, such as Belgium and Switzerland, be of interest. However, this is not possible due to a lack of data. Hence, the two comparisons used by Jervelund et al. will be reused in this paper in order to find the magnitude of the internal trade increase. Thus, this paper will in the regard of the estimation of the internal trade increases be rather similar. However, the data which will be used differs greatly as the paper by Jervelund et al. fails to include Norway and relies upon data from the 90's instead of more modern figures. Hence, the changed economy of the world and the inclusion of Norway might cause a difference in the result.

In order to calculate the home-biases will a gravity model based equation be borrowed from a 2007 paper (Minondo, 2007) in which it was used to calculate the home-biases regrading trade between a number of EU countries and which is the paper whose result Jervelund et al. base their estimates on. The gravity model which Minondo used to base his estimation model on is similar to Tinbergen's model, as shown in equation (1), but differs in it also including differences in price levels as well as the opportunity cost of trading with the rest of the world. However, the price levels have been left out of the model for use in my paper as a form of simplification, something which not seem to have effected the result. It also assume the β 's shown in equation (1) to be equal to 1, which is an assumption which will not affect relevant coefficients. The model estimates the home-bias by comparing the internal trade within a country with the external trade from the country after controlling for distance and economic size. The equation Minondo uses in this estimation model is:

$$\ln\left(\frac{x_{ij}}{y_i y_j}\right) = \alpha + \mu \ln d_{ij} + a_{12} \delta_{ij} + \dots + a_{(n-1)n} \delta_{ij} + t + \varepsilon_{ij} \quad (2)$$

Where α is a constant based on the natural logarithm of the world GDP, μ is a distance coefficient, t is a set of time dummies, and ε_{ij} is an error term. Further, the set of terms $a_{12}\delta_{ij}$ to $a_{(n-1)n}\delta_{ij}$ are the real terms of interest as they are dummy terms where δ takes the value 1 if i and j corresponds to the subscript of the given a independent of order, id est δ_{12} takes the value 1 when country 1 is the exporter and country 2 is the importer or when country 2 is the exporter and country

1 is the importer. This makes the α_{12} to $\alpha_{(n-1)n}$ border coefficients which relate to how much more countries trade within themselves compared to trade with the other country, meaning they relate to the effect which would come from removing the borders as upon removing the borders would countries which previously where separated be assumed to trade as much with each other as they previously where trading internally.

It should be noted, Minondo (2007) based these equations on the work of Anderson and van Wincoop (2003), including all assumptions made. However, Minondo adapted it further to specifically estimate these type of border barriers. By basing it on Anderson and van Wincoop did the model inherited issues as the model is assuming only one sector exists and assumes this sector to be tradeable. The model is also criticized by Minondo for assuming symmetric trade barriers. Nonetheless, the model is argued to be sufficient to get a picture of the size of the home-biases, which is the result which is needed in order to calculate the effects on the internal trade of uniting the Nordic countries. Further, most papers estimating border barriers of this type seem to use a similar type of gravity model and therefore as they have to be estimated based on a theoretical model does it seem to be the best available option.

When Minondo did the regression shown in equation (1) was a non-linear least square method used, which will be replicated in this paper as it is a reasonable approach. Further, Minondo used heterocedasticity robust standard errors, I will therefore test whether this is needed and if it is found to be the case will I include it. Moreover, Minondo used data from 1990 to 2001 and as such included time dummies in the regression. As this paper will use data from 2004 to 2010 will time dummies also be included in the case of this paper.

II.II. External Trade Effects

In order to make estimations upon the effects on external trade predicted in the second hypothesis will a simple logged version of Tinbergen's gravity model, as shown in equation (1), be used which looks like:

$$\ln x_{ij} = \ln G + \beta_1 \ln y_i + \beta_2 \ln y_j - \beta_3 \ln d_{ij} + \varepsilon \quad (3)$$

Where ε is the error term. This model will be used because it focus on determine the value of the three β as well as the value of G and will therefore show whether or not the hypothesis holds. This since if y_i are the suggested Nordic countries and $\beta_1 < 1$ would the gravity model of trade suggest the trade to and from the region would be lesser if the markets in the region merged into one big

market, compared to the sum of the parts. Because, under the assumption $\beta_1 < 1$ is $(a+b)^{\beta_1} < a^{\beta_1} + b^{\beta_1}$, $a, b \neq 0$. Therefore, if the β_1 and β_2 can be shown to be less than one would the hypothesis hold. Hence, it would be shown the creation of a Nordic union would decrease the trade between the region and the rest of the world.

IV. Data

In order to test the size of the home-biases is it needed to find data regarding each country's inter-national trade; id est the exports; and each country's intra-national trade. There is no available data for the later and therefore, following from Minondo (2007) who borrowed the ideas from previous studies, will the intra-national trade be assumed to be the part of the country's production which is not exported. The production is both based on the Annual National Accounts for the different countries obtained from the OECD STAN Structural Analysis data base (2015), with data available from between 2004 and 2010, as well as being estimated from the countries GDP obtained from the World Bank World Development Indicators (2015). The total exports were also obtained from the World Bank World Development Indicators while bilateral export data was obtained from the OECD STAN Bilateral Trade Database. Only 12 countries in the EEA had sufficient data in all four cases accessible for all the included years, these were: Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Slovenia, and Sweden. Hence, Iceland will be excluded from the regressions of this paper, which due to the minor size of its economy likely will not affect the result to any greater extent. Even though only the four Nordic countries in the data are relevant for the discussion in this paper will all countries be included in the regression in order to give a bigger set of data for the regressions; as it is 12 countries, with 11 partners and one internal market, times 7 years giving a total of 1008 data points. Hence, the regression in this paper differ from the one in Minondo (2007) as that paper had outdated data from 1990-2001, had only 10 countries in the regression, and did not have any data at all on Norway which is an important part of the Nordics. In order to get all in US\$ is the official exchange rate data between the Euro, the US dollar, and other currencies from Eurostat (2015) used.

Data for the world GDP is not needed in the regression, despite $\alpha = \ln(\text{world GDP})$ in equation (2), this is because it is constant for all included countries and as such does not affect the values of the α s, which are the important part of the regression.

In order to find the distances within countries and between countries must the economic center of each country be calculated, as the usage of the economic center enables finding an economic weighted distance which is more relevant for estimating trade compared to a pure geographical

distance. These economic centers of countries will be calculated, as no previous estimates of their location was found, by finding the GDP weighted midpoint between the countries' different regions. The intra-national distances will then be measured by finding the GDP weighted average distance from the midpoints of each country's regions to the GDP weighted middle of each country. The GDP weighted middle of every country will then be used to calculate the distance between countries. The regions which will be used for this calculation are the Nomenclature of Territorial Units for Statistics level 2 (NUTS 2) regions, as they are in use by the EU and data for the regions GDP as well as for the regions coordinates is therefore obtainable from Eurostat (2012). In order to find the midpoint of each country and thereafter find the average distance to it and the distance between the different countries' midpoints is a perfectly spherical earth assumed. Doing this shows great differences in internal distance as Belgium have an average internal distance of less than 50km, with a middle in Brussels, while Italy have an average internal distance of over 286km, with a middle right south of Florence. In the case of the four included Nordic countries is the average internal distance of Denmark 98km, with a middle between Sealand and Jutland, while the other three had an average internal distance of above 200km, with all three having their midpoint in the west-east center of the country and in the north-south direction between latitude 59° and latitude 62°. The coordinates of the calculated GDP weighted middles, the intra-national distances, and further details from the calculations can be found in the appendix.

The data for testing the external trade effects is the same data used for testing the internal trade effects as every element in the formula used to estimate the external trade effects are the same as in the formula for internal trade effects. However, the approach in this case is to estimate the value of the four constants, G and the β s, using the discussed data in order to use these upon the Nordic union as a country. Upon finding the values of G and β s will the GDP of the Nordic countries and the world GDP be used in order to calculate the potential levels of trade upon a unification by placing these values in equation (3) together with the estimated values of G and of the β s. The exports and imports to the Nordic countries as they were in 2014 will then be used to compare the potential trade levels to. All this data will be taken from World Development Indicators made and released by the World Bank (2015) as well as from OECD STAN Structural Analysis data base (2015) and in this data are Nordic countries included, but Iceland will keep on being excluded as it is not included in the regressions. Further, data is needed to calculate the distance between the Nordic countries and the rest of the world. For this will the GDP weighted midpoint of the Nordics be calculated like the center of countries were calculated previously; which gives an economic center point of the Nordics close to Örebro, Sweden; while the center of the rest of the world will be calculated in different ways.

V. Empirical Testing and Analysis

The empirical testing of this paper is through the use of Stata 13. Like the theoretical discussion will the empirical testing be divided into one part regarding the internal trade effects and one part regarding the external trade effects for a more efficient way of handling the regressions and the analysis. Further, even though the internal and the external trade effects will happen simultaneously upon the creation of a Nordic union will the trade increase of the region suggested by the internal trade effects likely result in an increase of GDP, in line with the increase of efficiency suggested by New Trade Theory, which will likely impact the result of the external trade decrease. However, as it is not possible to estimate what effect a trade increase will have on GDP will this possible effect have to be excluded.

V.I. Internal Trade Effects

In order to test the first hypothesis regarding the internal trade effects will a non-linear least square estimation of equation (2) be used. In order to do this must it be clear what standard errors should be used and some assumptions must be made. Running a regression of equation (2) once and then testing if there is any heteroscedasticity, as the paper by Minondo suggested such issues would exist, gives through a Breusch-Pagan/Cook-Weisberg test a χ^2 -distribution of 3.67 and as such a p-value of 0.0552. Hence, it is very unclear whether heteroscedasticity will be a problem in the data I do use as it is right on the edge, therefore will two regressions be run: one with heteroscedasticity robust standard errors and one without.

The results of running a non-linear least square regression of equation (2) with or without heteroscedasticity robust standard errors are very similar to each other. Further, most of the produced results of the regression are regarding non-relevant countries, as well as a distance coefficient of -1.32 which fits in with Minondo's results and is as such uninteresting. It should also be stated the R-square value for the regression was 0.96 and is as such good but not noteworthy. Hence, only the relevant results from the regression with robust standard errors will be shown and are so in Table 1.

From the results in Table 1 it is clear there do exist trade barriers between the Nordic countries which are of substance and as such do hinder trade within the region. Hence, it is clear the first hypothesis do hold, even though not yet clear to what extent a complete or partial removal of these barriers would affect trade. Further, if the result using my more extensive and updated data is compared to the result from Minondo (2007), shown in Table 2, it is clear all three border coefficients which were included in both cases have decreased over the past decades. Moreover, in

Table 1: Border coefficients between the Nordic countries

Border Is the same in both directions	Border Coefficient (Robust standard error)
Sweden - Denmark	-0.54 (0.05)
Sweden - Norway	-0.63 (0.09)
Sweden - Finland	-1.02 (0.06)
Denmark - Norway	-0.42 (0.07)
Denmark - Finland	-0.18 (0.07)
Norway - Finland	-0.58 (0.08)

All values are significant at 95% confidence.

the paper by Minondo was it not certain within 95% uncertainty there in fact was a home-bias between Denmark and Finland, my result shows without doubt this do exist.

Table 2: Border coefficient between the Nordic countries, from Minondo (2007)

Border Is the same in both directions	Border Coefficient (Robust standard error)
Sweden - Denmark	-0.68 (0.08)
Sweden - Finland	-1.39 (0.06)
Denmark - Finland	-0.23 (0.13)

All values except the last are significant at 95% confidence.

In order to find how greatly these border coefficients affect the trade within the region will they have to be translated into terms how the magnitude of the home-bias, here shown as a concrete number of how many times more a country trade within its border compared to its trade with the partner upon controlling for distance. As the result was calculated from as equation using the natural logarithm can the home bias, following Jervelund et al. (2012), be found from the border coefficients using equation (4) and the extent to which trade would increase if this home-bias would be completely removed is therefore calculated in percentage by used removing 100%, using equation (5).

$$home\ bias = e^{border\ coefficient} \quad (4)$$

$$trade\ increase = home\ bias - 1 \quad (5)$$

Equation (4) and equation (5) calculates the home-bias and potential trade increase for every pair of countries, the result is shown in all but the last row of Table 3. However, in order to find the effects removing the borders would have on internal trade in the region as a whole will the home-bias and potential trade increase in the region as a whole have to be calculated. In order to find the overall effect will the average home-bias and average trade increase be calculated, following from Jervelund et al. (2012), by a weighted average where the trade volumes over each border in 2010 is used as the weight, shown in the final row of Table 3.

Table 3: Size of the home-bias and the effect of removing them

Border Same in both directions	Home-Bias (Robust standard error)	Trade increase without bias (Robust standard error)
Sweden - Denmark	1.72 (0.06)	72%
Sweden - Norway	1.88 (0.13)	88%
Sweden - Finland	2.77 (0.14)	177%
Denmark - Norway	1.52 (0.07)	52%
Denmark - Finland	1.20 (0.03)	20%
Norway - Finland	1.79 (0.11)	79%
Weighted Average	1.95 (0.14)	95%

All values are significant at 95% confidence.

Finding the home-biases and potential increases in internal trade if they would disappear shows a great issue with home-biases exists which dampens the trade within the region. Looking at the weighted average would the internal trade in the region close to double if the home-bias between the countries would disappear completely. This is a big amount but clearly less compared to the 146% found by Jervelund et al. (2012). The reason for this decline in potential effect of removing the home-bias seems to partly come from the inclusion of Norway in the calculations as well as the general decrease in home-bias on the three borders existing in both papers.

It should be noted with a weighted average home-bias of 1.95 do the Nordic countries already have lower home-bias than the home-bias which exists between the states of the USA, which according to calculations based on Pacchioli (2011) are about 2.64 and as such is 0.69 greater than in the Nordic countries. Hence, it is not given a unification of the Nordic countries would necessarily give the doubling of trade within Nordics which is predicted by the model. However, one thing which do hold the US states back is the great independence of the states, causing

differences in regulations and therefore trade barriers. This means if the unification would be in the form of a federation, as is the case in the USA, is there a risk no internal trade increase would occur.

A possible issue for the four included Nordic countries apart from partial autonomy of the former countries is language differences. This is a minor issue between Denmark, Sweden, and Norway as the language of these countries are understandable by each other and would likely, in the same process which in many countries is erasing local dialects (Kristiansen, 1998; Røyneland, 2009), after a while merge into one language. However, it is a major issue when it comes to Finland as Finnish is a different language family than the Scandinavian language and even though Swedish is an official language of Finland is it unlikely Finland as a whole would linguistically merge as quickly as the others. Hence, assuming the trade barriers would only disappear between the three Scandinavian countries would a unification of the Nordics cause a 75% trade increase between the Scandinavian countries, with no increase towards Finland, which would mean an overall 23% trade increase in the region. However, if the barriers toward Finland are in half the differences in bureaucracy and in half the language differences, and therefor would only half of the trade barriers toward Finland disappear, do the results still imply an internal trade increase in the region as a whole of 74%.

A final possible reason for home-bias which I found could reduce the trade effects of a unification is national pride and local patriotism. This means the countries might not trade as much with each other due to a want for people identifying with one of the former countries to rather trade with others from the same former country. However, this type of local patriotism do already exist within each Nordic country and upon a unification would the local patriotism between the former countries likely fade over time. However, similarly to the language issues does this mean it might take time for the internal trade increase to reach full effect as some of the existing barriers have a period of fading.

The empirical testing and analysis of the first hypothesis has therefore shown a positive result by, within a 95% confidence interval, showing there exists a clear tendency within the Nordic countries to trade more within the country than with the rest of the Nordics and as such would a unification increase internal trade in the region. This internal trade would increase with 95% had all home-biases been removed, increase with 23% if we assume the biases toward Finland would still exist due to language differences, increase with 74% if we assume the language issues are only part of the biases toward Finland, and there would be no trade increase at all if local autonomy was allowed to exist. Due to the possible nature of the trade barriers is it also likely it would take some time for the increase to take full effect as languages and identities would take a while to merge.

V.I. External Trade Effects

The second hypothesis is tested by using the same bilateral data which was used to test the first hypothesis and which is discussed in the data chapter, in order to estimate the values of the coefficients of equation (3). However, it is done so through regressing equation (3) with an ordinary least square regression, as it is simple enough for a non-linear least square regression as above to be unnecessary. However, similarly to the first regressions will heteroscedasticity robust standard errors be used as upon running the regression once and testing for heteroscedasticity with a Breusch-Pagan/Cook-Weisberg test was the χ^2 -distribution found to be 39.4.

Running the regression on equation (3) using robust standard errors and data from all twelve EU countries gives the result shown on the first row of Table 4; the second row of Table 4 is the same regression but only using data from the four Nordic countries and will be discussed later. In it is clear both β_1 and β_2 are, within a 95% confidence interval, of a value less than 1 and therefore will the trade to a country decrease as the economic size of the country increases. Hence, the regression shows the second hypothesis to be true. Further, it shows a similar coefficient for the distance function as was found in the regression for the internal trade hypothesis, which indicates consistency in the result of the applied formulae for the used data. Also, the G , the constant from equation (1), shows a reasonable magnitude, as it is positive, and the R^2 value is 0.82 and as such is also this regression fitting the data well. The regression also seems to have gone well as it fits rather well with results found in previous studies (Gómez Herrera & Milgram Baleix, 2002), even though the value of the G seems to vary a lot across studies.

Table 4: Result of a regression of equation (3)

Included countries	Log of constant, $\ln G$ (SE)	Constant G (SE)	GDP Home, β_1 (SE)	GDP Foreign, β_2 (SE)	Distance, β_3 (SE)	R^2
All 12 countries which had data	3.63 (0.63)	38 (5.3)	0.45 (0.01)	0.46 (0.01)	1.52 (0.05)	0.82
Only the four Nordic countries	-3.36 (8.85)	0.03 (68)	0.67 (0.17)	0.47 (0.17)	1.62 (0.15)	0.80

All values except the values of G in the second row are significant at a 95% confidence.

The estimated values of the three β s and the G can now be used in order to calculate the potential trade in the case of a unification of the Nordic countries. This by using the sum of the Nordic economies GDP as the economic size of the region, the world GDP except from the Nordic economies as the external trade partner, and the distance between the Nordic and the rest of the world as the distance. These values will be used to calculate both potential exports to the Nordic economies and the potential imports to the Nordic economies of which the sum of exports and imports will be used as the value for total trade. The estimated potential levels of trade, exports plus imports, will then be compared with the real levels of trade as they were in 2014, which for the four included Nordic countries summed up to US\$ 1.6 trillion when removing the internal trade in the region.

While it is generally clear what the economic size of the Nordic, US\$ 1.685 trillion, and the rest of the world, US\$ 76.160 trillion, are is the concept of the distance between the Nordic region and the rest of world more abstract and unclear. Hence, three different measures for this distance will be used in order to calculate the potential trade effects. The first distance to be used will be the distance to the world's economic center of gravity, which in 2010 was calculated by McKinsey Global Institute to be close to Selemal, Russia (Economist, 2012). Hence, the first distance which will be used is about 2830km. The second distance is the distance to the economic center of Germany, as calculated earlier, as Germany is a big and important trading partner for all Nordic countries (CIA, 2015). Hence, the second distance is about 1018. The third and final distance to be used is the distance from the Nordic economic center to each non-Nordic country used to estimate the models and in this case will the trade effects not be calculated in relation to the rest of the world, but instead be calculated in relation to the included non-Nordic countries as an average weighted on trade levels and in this case is it trade data from 2010 which will be used instead of from 2014. The estimation using these three different values for distance, and a different value of the GDP of the rest of the world, are presented in the first three rows of Table 5, the final row will be discussed later.

By estimating the external trade decrease with the three different measures for distance, and the difference in measure of GDP of the rest of the world, is it clear the estimated decrease gets lower as the used values gets more specific. Hence, three different values; 100% decrease, 98% decrease, and 83% decrease; are estimated of which a 98% decrease is likely more valid than a 100% decrease and an 83% decrease is likely to be the most valid. The reason why a 98% decrease is more likely to be more correctly estimated compared to a total removal of external trade is because the 100% decrease was estimated under the assumption of the Nordic countries having equal trade with all parts of the rest of the world, hence would the distance to the economic center of the world

be a relevant distance, however in reality do the Nordic countries have more trade with their neighbours (CIA, 2015) making the distance to Germany more relevant. Further, the reason why the 83% decrease is likely to be closer to the truth than the 98% decrease is because there likely is a great variation in the values shown in Table 4 across the world (Gómez Herrera & Milgram Baleix, 2002) which could cause problems when all of the rest of the world was included in the GDP value, as in the second row of Table 5, a problem which is avoided in the third row of Table 5 as it only used the GDP of the countries included in the estimation of equation (3). However, irregardless of values used for measuring the distance and measuring the GDP of the rest of the world are the estimations agreeing on a decrease in external trade would occur and it would be a decrease of great magnitude. However, it is not fully clear exactly how great the magnitude would be, even though a 83% decrease seem to be the most reliable decrease found.

Table 5: External trade decrease for different ways of estimation.

Estimation	Specification	External Trade Decrease (%)
World's economic center of gravity	Distance of 2830km and all the world's GDP included	~100%
The economic center of Germany	Distance of 1018km and all the world's GDP included	98%
The economic center of the country's included in the regression	Distance of 1300km and only including the GDP of the countries in the regression.	83%
Estimating the values both of the region as united and as separated	Distance is moot and all the world's GDP is included	53%

If there is a great difference in the magnitude of the G depending on the country, which is indicated in the paper by Gómez Herrera and Milgram Baleix (2002) to be the most varying variable, could this cause major problems in the estimations shown in the first three rows of Table 5. This means a re-estimation of equation (3) could produce a more realistic result if only data for the Nordic countries is used, this is shown in the second row of Table 4, as it reduces influence from non-Nordic countries upon the result. However, as shown is the G in this re-estimation not at all applicable as it is estimated to almost 0 with a standard deviation of 68. Hence, this approach is not possible as the low amount of data renders the result useless.

Another possible way to estimate the decrease in external trade is by instead of comparing the potential trade at unification with current actual trade compare the potential trade at unification with

the estimated potential trade of having the four nations separated. This has the benefit of not relying upon finding the optimal way of estimating the distance from the Nordic countries to the rest of the world and it also excludes the highly varying G from the estimation. This works because the potential exports if the countries are separate is as shown in equation (6) while the potential exports if the countries are united is as shown in equation (7), which gives an equation for calculating the percentage decrease as shown in equation (8) in which G and distance are no longer factors as they are the same independent of whether or not the Nordic countries do unite.

$$Separate_{exports} = \frac{Gy_{RoW}^{\beta_2}}{d_{Nordic/RoW}^{\beta_3}} (y_{Sweden}^{\beta_1} + y_{Finland}^{\beta_1} + y_{Norway}^{\beta_1} + y_{Denmark}^{\beta_1}) \quad (6)$$

$$United_{exports} = \frac{Gy_{RoW}^{\beta_2}}{d_{Nordic/RoW}^{\beta_3}} (y_{Sweden} + y_{Finland} + y_{Norway} + y_{Denmark})^{\beta_1} \quad (7)$$

$$Decrease = \frac{(y_S^{\beta_1} + y_F^{\beta_1} + y_N^{\beta_1} + y_D^{\beta_1}) - (y_S + y_F + y_N + y_D)^{\beta_1}}{(y_S^{\beta_1} + y_F^{\beta_1} + y_N^{\beta_1} + y_D^{\beta_1})} \quad (8)$$

The approach only works if the percentage decrease in exports and the percentage decrease in imports are calculated separately. Hence, it does not calculate the percentage decrease in overall trade. However, this is possible to solve by assuming the percentage decrease in overall trade is the average of the percentage decrease in exports and the percentage decrease in imports. The result of estimating the external trade decrease this way is shown in the final row of Table 5

As seen in the final row of Table 5, the new approach gives an estimated decrease in external trade which is much lower than the previous estimations. However, similarly to the three first rows of Table 5 does it show a likely decrease in external trade, which means the second hypothesis just as the first is shown to be correct. Further, all estimated changes to external trade shown in Table 5 suggest the decrease in external trade will make the Nordic countries turn inward toward each other to such great extent the region is likely to end up losing money as it on one hand trade double as much with each other but as a consequence trade half as much or less with the rest of the world. Hence, the second hypothesis, just like the first hypothesis, has been shown to hold but it is unclear to what magnitude.

VI. Discussion

Both the two hypothesis were confirmed upon a regression of the data. Confirming the idea of a unification of the Nordic countries would increase trade between the included states but the increase would occur by diverting trade from the rest of the world. However, there are some potential limitations to the two estimations which have been conducted in this paper which need to be discussed.

VI.I Internal Trade Effects

A potential limitation in the estimation of border coefficients is there seem to be lower border coefficients the further apart two countries are. Hence, part of the reason why the Danish-Finnish border coefficient is the one showing the least home bias in both my regression and in the regressions by Minondo (2007) is potentially because the distance between them is the greatest and as such is the distance coefficient taking care of much of the explanation for the low trade between the two. This is a limitation in the model as it implies the model does not correctly estimate the magnitude of the border barriers as it over-corrects for distance. Hence, the level of potential increase in trade might be underestimated since the over-correction might skew it.

Another limitation in the estimation of border coefficients is the suggestion of decreasing border barriers over time. First, across the board did the estimations I do show lower barriers compared to the ones Minondo did on older data in 2007. Second, the time dummies included in my estimation show a steady decline; the dummies were: $t_{2004} = 0.039$, $t_{2005} = 0.035$, $t_{2006} = 0.031$, $t_{2007} = 0.010$, $t_{2008} = 0.002$, $t_{2009} = 0.001$, $t_{2010} = 0$; which means an overall slow decrease in the average border coefficient over time. However, there is no clear reason why these border coefficients would decrease over time. It might be due to the ongoing globalization and an ongoing lowering of trade costs, but it might also be a hint of a limit in the model which results in a skewed estimation. Hence, a removal of the barriers could give another level of increase in trades compared to the one suggested, if the pattern exists due to a skewed estimation. However, it is clear independent if the decrease in border barriers over time is due to the estimation or is something actually occurring will there likely be increased internal trade if a unification takes place, even though it might be a lower increase.

If both the distance coefficient and the time dummies do skew the magnitude of the border coefficients does it mean the potential increase in trade discussed in this paper as well as the potential increase in trade discussed by Jervelund et al. (2012) are likely to be skewed. It is not very

surprising as accurately quantifying arbitrary things like non-tariff border barriers is not easily done. Hence, the method used to estimate the potential magnitude of increase in internal trade might therefore have greater margins of error than reported and there might be room for improvement. However, as there is a great lack of real life unifications to compare to and since these type of errors are likely to crop up in any estimation of a potential reality is the method used still likely the best way to estimate the potential trade and the best way to test the given hypothesis. Further, even if the magnitudes of the border coefficients all are wrong do the fact of them all being positive still stand. Hence, this paper despite potentially having great margins of errors has confirmed there do exist trade barriers within the Nordic countries which dampens trade and a unification would therefore increase internal trade.

VI.II. External Trade Effects

The major limitation with the gravity model approach to estimating the external trade of the Nordic countries is it only takes the economic size and geographical distance into account, which means it is easier to obtain accurate data but it might leave something out. The distance could be defined as cultural distance or similar, but the only distance which is possible to accurately quantify is geographical distance. Hence, it assumes if the Nordic countries when unified would in international trade become more similar to other countries in the data set which are the same economic size as a combined Nordics, of which the closest is Italy. However, there are likely more differences between the Nordic countries and Italy than economic size which makes Italy a relatively low trading country while the Nordic countries are trading relatively much. For example, the Nordic countries rank in top in English proficiency (Education First, 2015), democracy (Economist Intelligence Unit, 2014), and innovation (Global Innovation Index, 2015) while Italy in all three cases rank further down, suggesting Nordic trade rely upon more than only the small size of the Nordic countries. The impact of other factors than economic size and geographical distance can also be illustrated by looking at Canada, which is the country with a GDP closest to that of a unified Nordic, which has a trade of 38% the Nordic external trade and therefore suggests a trade decrease of 62% upon a unification, which is greater than the decrease found in the final row of Table 5. Hence, the decrease in external trade upon a unification might not be as great as what is found in Table 5 as the Nordic countries would still keep their Nordic culture and other similar parameters.

Another possible limitation to the estimation of the external trade effects is the estimations are heavily based upon the GDP of the united Nordic country, but might give incorrect estimations as it

assumes the GDP of the region would remain the same upon a unification. However, the increase of internal trade would likely increase the GDP of the region; a paper by Franklin and Romer (1999) found upon an increase of the traded volumes will the GDP increase with at least 50% of the value of the trade increase; and other effects upon a unification might bring similar increases in the GDP. Hence, the GDP which was used for the united Nordic countries to estimate the external trade effects might have been understated and thus would the predicted decrease in external trade been overestimated.

The external trade effects might, like the internal trade effects, had a skewed estimation of their magnitudes. However, as for the internal trade effects is it hard to quantify all variables correctly resulting in a skewed estimate likely being the best possible estimate. Further, as for the internal trade effects are there a great lack of real life examples to compare to and a great lack of better methods, leaving the used method to be one of the best ways to estimate the change in external trade despite it potentially skewing the results. Hence, it is not possible to with great accuracy state how much the trade would decrease upon a unification of the Nordic countries but it is possible to state the effect do exist and a unification of the Nordic countries would likely divert Nordic trade from the rest of the world to the other Nordic countries.

VII. Conclusion

The conclusion of this paper is a unification of the Nordic countries can be shown to increase the internal trade within the Nordic countries as border barriers can be shown to currently exist which would be removed. Further, it can be shown the trade increase within the Nordic countries would to some extent divert trade from the rest of the world, which could even be to such extent it would end-up hurting the Nordic economy.

It is not possible to in an accurate way estimate the magnitudes of the effects found in this paper as both models used are likely to contain different sets of flaws. Thus, both this paper and likely previous papers which have attempted similar forms of estimations are likely to be incorrect in the extent to which the trade would increase or decrease as unquantifiable factors do play an important role.

In order to find better results regarding the trade effects of a Nordic union would real-life examples be needed and better data would be helpfull. Real life examples are unlikely to come about any time soon leaving the greater data acces as the greatest source of potential improvement. Mainly data regarding the internal trade of other countries which in different ways would be similar to a Nordic union, such as Belgium and Switzerland, would supply a new approach to estimate the

effects. However, in lack thereof is the used method likely to be the closest one can come to know the trade effects of a Nordic union.

The greatest conclusion which can be drawn is it is beyond doubt a Nordic union would increase intra-Nordic trade, but it would to a great extent be through trade diversion from other Nordic partners. Further, it should be noted even though the trade effects do not seem to be a good reason to combine the five Nordic countries did Jervelund et al. (2012) also find other positive effects such as increased investments and a more integrated labor market which can be studied further to find the full effects of integration. Also the effects of being a more powerful player in international negotiations could be studied.

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Appendix

Appendix Table 1: Included countries, their calculated economic center, and their calculated internal distance

Country	Latitude (Decimal degrees)	Longitude (Decimal degrees)	Average Internal Distance (km)
Belgium	50.87	4.38	48.9
Czech Republic	49.82	15.41	102.7
Denmark	55.89	10.93	98.0
Finland	61.89	25.07	204.2
France	47.20	2.76	266.0
Germany	50.71	9.64	224.2
Hungary	47.35	19.26	77.3
Italy	43.56	11.64	286.4
Netherlands	52.19	5.27	65.8
Norway	60.94	10.09	242.5
Slovenia	46.09	14.72	50.6
Sweden	59.02	15.96	218.5
Nordic Union	59.36	14.95	311.0

Regarding the calculations of the midpoints and intra-national distance, it should be noted Greenland, Faroe Islands, and Svalbard were not included in the data and therefore excluded from the calculations of the distance of Denmark and Norway respectively. Further, in the case of France was all Départments d'Outre Mer; id est Guadeloupe, Martinique, French Guyana, Réunion, and Mayotte; excluded as they are not big enough not effect French economy significantly but distant enough to skew the measures, which reduced France distances to only mainland regions. It should also be noted in the case of Slovenia do only two NUTS2 regions exist, making this calculation more unreliable for the actual economic center compared to the calculations for the other countries.