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Seminar in International Trade

An Inquiry Concerning the Impact of Trade Agreements and Immigration on German Trade

Introduction:

Since the end of the Second World War and the establishment of the European Coal and Steel Community (ECSC) in 1952, Germany and Western Europe as a whole (and Central and Eastern Europe too after the fall of the Soviet Union) have been moving towards more open free trade with one another and the rest of the world. As the ECSC transformed into the European Economic Community and eventually the modern European Union (EU), free trade has expanded throughout Europe and between the EU and other countries. According to the European Commission, properly managed free trade “is an opportunity for economic growth...EU trade policy seeks to create growth and jobs by increasing the opportunities for trade and investment with the rest of the world.” Hence, according to the European Union, increased trade leads to increased economic growth and improves the well-being of the countries involved.

The reduction of tariffs and other trade barriers in theory positively increases trade between nations within the free trade area or customs union, as foreign producers are now better able to compete in domestic markets and vice-versa. According to the Hungarian economist Bela Balassa (1966) in *The American Economic Review*, “multilateral tariff reductions may lead to an increased exchange of clothing articles, automobiles, and other consumer goods” (p.469). Since free trade agreements effectively lower the cost of doing business in other countries, we expect to see an increase in the quantity of exports and imports once countries enter into some sort of free trade agreement, all else being equal.

Economists have also debated the effect of immigration on trade. Hypothetically, an increase in immigration causes an increase in a country's population, which thereby increases both output and aggregate demand. These increases would cause a country to both increase its exports (due to increased output) and its imports (due to increased aggregate demand). However, a contrary view arises in the Heckscher-Ohlin model, where an increase in immigration could increase the labor force in a relatively labor-scare country, thereby reducing their need to trade (for the makeup of its economy becomes more similar to other countries). In support of the positive impact of immigration, "Immigration and Trade Creation: Econometric Evidence from Canada," Keith Head and John Ries (1998) argue that immigrants also 'expand trade with their country of origin, owing to superior knowledge of, or preferential access to, market opportunities' (p.47). In other words, immigrants may also expand trade because they create new opportunities between their new and home countries.

In this paper, I first study the effect that free trade agreements have had on the quantity of German trade, both exports and imports. To accomplish this goal, I employ a modified form of the gravity equation that uses a dummy variable for free trade agreements. As evident from the statements above, I expected the existence of free trade agreements between Germany and its trade partners serves to increase the volume of trade between them through the lowering of tariffs and other trade barriers. Through studying this relationship, I hope to ascertain the positive effect that free trade agreements have on trade, and, going by the EU's belief that trade is fundamentally good, look at the positive effect on welfare. I also include a variable for origin of migrants in Germany, through which I hope to see the impact of past immigration on exports and imports. In addition to this econometric analysis, I will also conduct a simple time-series analysis of immigration's effect on German trade and will conduct a literature review on these effects on

Germany, as Germany has had a great increase in immigration in recent years due to the Syrian refugee crisis and other factors.

In my empirical results, I found that free trade agreements had a positive and significant effect on German exports and volume of trade, as the presence of a trade agreement between German and its trade partner increased exports by an estimated 70.8% and volume of trade by an estimated 66%. Although migration origin was not significant in the cross-sectional analysis, I found a positive and somewhat significant relationship between migration and volume of trade in the time-series data, with a 10% increase in net migration correlated with a 3.5% increase in the volume of trade.

In the subsequent segments of this paper, I will first examine my empirical methodology, in which I shall describe the four regressions being used, the relationships between the independent and dependent variables, and a description of the estimation technique. Next, I shall look at the data used in the econometric models, describe the independent and dependent variables, and provide a table and statistics along with a description of the variables. The next section presents and analyzes the results from our regressions and provides a description of these results and the issues encountered. The following section will deal further with the topic of immigration and the reasons for its positive effect on trade. Finally, I shall provide a conclusion of my findings.

Empirical Methodology:

Below are the four models used:

$$1: \ln Exp = \beta_0 + \beta_1 \ln RGDP + \beta_2 \ln RGDP_{PPC} + \beta_3 \ln Dist + \beta_4 \ln Mig + \beta_5 Border + \beta_6 Lang + \beta_7 FTA + \beta_8 EU + u$$

$$2: \ln Imp = \beta_0 + \beta_1 \ln RGDP + \beta_2 \ln RGDP_{PPC} + \beta_3 \ln Dist + \beta_4 \ln Mig + \beta_5 Border + \beta_6 Lang + \beta_7 FTA + \beta_8 EU + u$$

$$3: \ln ExIm = \beta_0 + \beta_1 \ln RGDP + \beta_2 \ln RGDP_{PC} + \beta_3 \ln Dist + \beta_4 \ln Mig + \beta_5 Border + \beta_6 Lang + \beta_7 FTA + \beta_8 EU + u$$

$$4: \ln Vol = \beta_0 + \beta_1 \ln Migration + u$$

The theoretical model used for all four of the above regressions is a basic OLS regression model with robust standard errors. I employ robust standard errors to help correct for any possible heteroscedasticity. The first three equations employ cross-sectional data from the year 2016, while the final equation uses time series data between 1950 and 2015. In the first equation, I regress several variables, such as the natural logs of real Gross Domestic Product (GDP) and distance between Germany and other countries, on the natural log of German exports to that country. The second equation is much the same, except this time the natural log of imports is utilized instead of exports. The third equation regresses the same variables onto the natural log of the combination of exports and imports, otherwise known as volume of trade. The final equation regresses German migration on Germany's volume of trade over time.

In the first regression, I study the impact of several variables on the natural log of the quantity of exports from Germany to a specific country. For this regression, the first independent variable is the natural log of the real GDP of Germany's trading partner. According to the gravity equation, a larger GDP will cause a country to trade more, as large economies simply trade more due to their size. Using the natural log allows me to capture the relationship between a percentage increase in exports and a percentage increase in real GDP. The next variable is the natural log of real GDP per capita. In a similar vein to real GDP, an increase in a country's real GDP per capita should also increase the quantity of exports to that country, as it serves as a proxy for economic development and institutional quality and homogeneity. More developed countries with similar and effective institutions should trade more (Groot et al. 2005). The third variable is the natural log of the mean distance between Germany and its trading partner. This

variable should have a negative relationship with exports, as countries with great distances between them should trade less due to an increase in transportation costs, and thus this variable should serve as a proxy for transportation costs. The fourth variable is the natural log of the immigrant population of each trading partner in Germany, which is expected to have a positive impact on trade with that country. The next four variables are all dummy variables. We first have border, which is equal to one if the trading partner shares a land border with Germany. I believe there could exist some border effect in trade that is separate from the distance effect, for countries that share a border with Germany could have some historical relationship that subsequently affects trade. Consequently, I have included a dummy to capture this potential effect. Second, we have a variable for language which is equal to one if the trading partner speaks German. This variable attempts to capture the effect of shared language on trade, for countries that speak the same language should have an easier time facilitating trade and may feel more comfortable trading. Third, I included a dummy variable for free trade agreements. The existence of a free trade agreement between Germany (i.e. the EU) and a trading partner should serve to facilitate additional trade through lower trade barriers and tariffs. Finally, I have also included a variable for EU membership, which should pick up any additional effects of the close integration of Germany and other EU countries, for EU countries have greater integration than a simple bilateral trade agreement.

The second regression is nearly identical to the first, except I now use the natural log of imports as the dependent variable. Consequently, this regression now allows me to measure the effect of the above dependent variables on the quantity of imports and measure the percentage change. I expect the relationships between the independent and dependent variables to be the same direction as the first equation. The third regression is also nearly identical to the first two,

but it uses the natural log of the volume of trade (exports plus imports) as the dependent variable. Like the second equation, I also expect the relationships between the variables to be the same direction as the first regression. In all the regressions, I am able to leave out the size of Germany's economy, which is usually included in the standard gravity equation. Since Germany is one of the trading partners in all the cross-sectional data, including its real GDP and real GDP per capita would not provide any additional information, and we can think about it being contained within the constant term. Thus, it has been omitted.

The final regression is a simple regression to measure somewhat the impact of migration on trade over time. The dependent variable is the natural log of the total volume of trade of Germany in the years 1950 to 2015. The first independent variable is the natural log of the net migration of Germany from the same years. As stated before, I expect a positive relationship between higher migration and trade for various reasons, and I explore and investigate this relationship further later in this paper.

The estimation technique used, Ordinary Least Squares (OLS), is a simple regression model that regresses the independent variables on the dependent variables. I hold the Gauss-Markov assumptions to be true and thereby conclude that the models are the best, linear, unbiased estimators (BLUE). However, in case the data is heteroscedastic, I also utilize robust standard errors to correct for any heteroscedasticity.

Data:

In this study, I first run three regressions, all of which have the same independent variables but different dependent variables. For the dependent variables ($\ln\text{Exp}$, $\ln\text{Imp}$, and

lnExIm), I simply took the natural logs of the exports, imports, and volume of trade respectively between Germany and the partner country. This data was acquired from the World Bank's World Integrated Trade Solution (WITS). As stated earlier, taking the natural log allows me to measure the effect of percentage increases in the independent variables on the dependent variables.

The first two independent variables, lnRGDP and lnRGDPPC, take the natural logs of real GDP and real GDP per capita in 2010 USD of Germany's trading partner, and they were obtained from the World Bank's World Development Indicators. Third, we have lnMig, which is the natural log of the migrant population in Germany from each country as of 2007, which was obtained from the Global Migrant Origin Database. Next, we have lnDist, which is the natural log of the average distance in kilometers between Germany and its trading partner. This data was acquired from DistanceFromTo, a website which calculates the average distance between two countries. The final four variables are all dummy variables. The first, Border, is equal to one when the trading partner shares a border with Germany. The second, Lang, has the value of one if the trading partner also has German as one of its official languages. The third variable, FTA, equals one if the trading partner and the European Union (which conducts all trade policy for Germany) have a free trade agreement or if the trading partner is also member of the European Union. The final variable, EU, is equal to one if the trading partner is one of the 28 members of the European Union. This data was obtained from the European Commission.

In the fourth regression, I use time series data for Germany from 1950 to 2015. The dependent variable is the natural log of Germany's volume of trade during this time period. The independent variable is the natural log of Germany's net migration, which is the sum of immigrants and emigrants. The data for both variables was obtained from the Federal Statistical Office of Germany.

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>lnExp</i>	173	12.7227	3.1802	2.8953	18.5913
<i>lnImp</i>	173	11.8659	3.8889	0.8459	18.4722
<i>lnExIm</i>	173	13.2539	3.2576	3.1570	19.0659
<i>lnRGDP</i>	173	24.2664	2.4073	18.6512	30.4563
<i>lnRGDPPC</i>	173	8.5765	1.4654	5.3858	11.6173
<i>lnDist</i>	173	8.4079	0.9256	5.8319	9.8181
<i>lnMig</i>	168	7.9238	7.887	0	14.48228
<i>Border</i>	173	0.0520	0.2227	0	1
<i>Lang</i>	173	0.0231	0.1507	0	1
<i>FTA</i>	173	0.2832	0.4519	0	1
<i>EU</i>	173	0.1561	0.3639	0	1
<i>lnVol</i>	66	12.5327	1.5149	9.2193	14.5776
<i>lnMigration</i>	51	12.1254	1.0060	9.7359	13.9460

Empirical Results:

Variable	lnExp	lnImp	lnExIm	lnVol
lnRGDP	0.980*** (0.0696)	1.170*** (0.100)	1.032*** (0.0696)	

lnRGDPPC	0.150* (0.0635)	-0.00265 (0.132)	0.0744 (0.0700)	
lnDist	-0.602*** (0.171)	-0.274 (0.267)	-0.498*** (0.171)	
lnMig	0.0465 (0.0697)	0.166 (0.0920)	0.0583 (0.0695)	
Border	-0.105 (0.310)	0.0823 (0.505)	0.00907 (0.349)	
Lang	0.0509 (0.272)	0.526 (0.431)	0.176 (0.299)	
FTA	0.654*** (0.210)	0.580 (0.381)	0.585*** (0.210)	
EU	0.149 (0.199)	0.872* (0.374)	0.392 (0.205)	
lnMigrationSum				0.3501 (0.191)
Constant	-7.860*** (1.131)	-15.84*** (2.408)	-8.915*** (1.240)	8.5371*** (2.319)
R-sq	0.925	0.857	0.921	0.064
N	168	168	168	51
F	252.47	143.82	243.03	3.37

Robust standard errors in parentheses.

*Denotes significance at the 0.05 level

**Denotes significance at the 0.01 level

***Denotes significance at the 0.001 level

In the first regression, four of the variables, real GDP, real GDP per capita, distance, and free trade agreement, were significant. Three of these variables (all except real GDP per capita) were also significant at the 0.1% level, indicating a high level of impact on the dependent variable. The coefficient for lnRGDP was found to be 0.980, which tells us that a 1% increase in the real GDP is associated with a 0.980% increase in the quantity of exports from Germany to its

trading partner. This effect was expected, for the size of a country's economy should greatly impact the amount it trades with another country. The second significant variable was $\ln\text{RGDPPC}$, which tells us that a 1% increase in real GDP per capita is correlated with a 0.150% increase in exports, though this variable was only significant at the 5% level. For the next significant variable, distance, we also see the anticipated relationship. A 1% increase in distance between Germany and its trading partner causes a 0.602% decrease in the exports from Germany. This result seems sensible, as a greater distance between two countries should cause less trade due to escalations in transportation costs. The final significant variable, the dummy for free trade agreements, also provides the expected sign in its result. For if the EU has a free trade agreement with the trading partner, then there is a positive impact of 0.654 on the constant. Consequently, everything else being equal, countries import more from Germany ($e^{0.654-1} = 70.8\%$ more) when they have a free trade agreement with (or are a part of) the EU.

While these results were all highly significant, the regression did not provide significant results for the other four variables. The natural log of migration provided the expected positive sign but unfortunately was not significant. Language gave us a small positive effect; however, this effect was also highly insignificant and in fact was the most insignificant of any variables in the first regression, indicating that shared language (at least for Germany) does not affect German exports. The variable for EU membership was also insignificant, indicating that there was no clear trade increase between Germany and its trading partner with EU membership when free trade agreements were also considered. Finally, the dummy for a shared border provided the opposite effect as it had a negative coefficient, signaling that a common border decreased trade. However, this effect was also highly insignificant, indicating that bordering Germany does not

positively (or negatively) affect exports, possibly since Germany is already in a strong trading bloc with all its neighbors.

The second regression had some similar results to the first, as only the dependent variable was replaced with $\ln \text{Imp}$. We still find real GDP to be significant along with EU, but distance and FTA are no longer significant. The positive coefficient of $\ln \text{RGDP}$ means that a 1% increase in real GDP leads to a 1.170% increase in imports into Germany. This result is similar to our first regression, as it is significant at the 0.1% level, but it has even a higher coefficient. Unlike the first regression, I found that EU membership was now significant at the 5% level. If the trading partner is part of the EU, then there is an $e^{0.872-1} = 87.9\%$ increase in imports. Real GDP per capita is no longer significant in this regression, perhaps indicating that economic development plays a bigger role in exports than it does in imports. Distance also is unexpectedly insignificant, allegedly demonstrating that distance does not affect German exports the way it does imports. Free trade agreements are also no longer significant on imports, as perhaps Germany focuses more on exporting to the countries it has trade agreements with, and these trade agreements do not significantly affect German imports.

Not much can be said about the third regression that has not been stated in the analysis of the first regression, as it contains the same significant variables. Since the final regression just takes the combination of exports and imports (volume of trade), it provides some similar results. The same three variables that were significant in the first regression, real GDP, distance, and FTA, are all significant in the same direction at the 0.1% level, and the rest of the variables are insignificant.

In the fourth regression, the only variable tested, the net migration, was significant at the 10% level. For every 10% increase in people migrating to Germany, Germany's volume of trade

will increase by 3.5%. This effect is due to a variety of factors which will be discussed in the subsequent section.

One of the main variables I tested in the first three regressions, that being the dummy variable for free trade agreement (which includes EU members), was statistically significant in two of the three regressions, providing increases of 70.8% and 66% to German exports and volume of trade respectively. These increases were expected, as free trade agreements lower tariffs and other trade barriers to facilitate trade. Thus, my hypothesis that free trade agreements increase the quantity of trade seems to be confirmed, especially in the case of exports.

Immigration:

Immigration is always a popular political topic, but in the past few years it seems to have become even more common. One only needs to see the waves of migration from the Middle East in order to understand the recent presidential election in the US and the prevalence and success of anti-immigration parties in Europe, such as the *Alternativ für Deutschland* (Alternative for Germany) and the UK Independence Party. Economists still argue about whether immigration helps or hurts the home country's economy, but I am going to focus specifically on immigration's impact on trade. My migration variable in the first three regressions provided the expected positive sign, though the results were inconclusive. Through the small (and limited) time-series regression run above, I also found that immigration has a somewhat significant (at 10% level) effect on a country's trade, as a 10% increase in immigration increases the volume of trade by about 3.5%. I will first look at the theoretical reasons that immigration could increase trade and then extrapolate this information to the case of Germany.

Immigration could increase trade simply through an increase in population. As a nation's economy and GDP grows, its trade with other countries also increases. This result is captured

through the gravity equation, a form of which was used for my first three regressions. In these regressions, I found that real GDP has a large and strong effect on both exports and imports. Thus, since increasing the population will increase GDP, it will also increase trade.

Immigrants' superior knowledge of and preferential access to market opportunities in their country of origin also improves trade. As migrants have just recently left their home state, they understand its economy better and are consequently more knowledgeable about possible market opportunities than the natives in the new country. Keith Head and John Ries (1998) argue this point in their econometric analysis of Canadian trade, contending that immigrants are more likely to trade than non-immigrants, as "by virtue of links to their home countries, they may realize lower costs associated with foreign trade" (p.48). Besides just speaking the language, a recent immigrant has market knowledge and contacts in their former country of residence. These qualities lower transaction costs and as a result contribute positively to the amount of trade between two states.

Migrants may also have different preferences for goods than natives and have a high demand for a good that cannot be obtained domestically. Thus, they will start importing this good from their country of origin, thereby increasing imports of the home country. As Head and Ries put it, immigrants "bring preferences for particular varieties of foreign products and thus may increase the demand for home-country imports" (p.48). The preferences of immigrants could also affect the preferences of the native population. In their study on the impact of immigration on international trade, Genc et al. (2011) maintain that "demand for such goods increases among the host population as well through a 'demonstration effect' (eg. ethnic restaurants)" (p.1). This demonstration effect solely affects imports, so we would expect imports (and consequently volume of trade) to increase because of immigration. In comparing the first

two regressions, I found a larger coefficient for migration on imports than exports. Though both these results were insignificant, they are somewhat indicative of this relationship between trade and immigration.

Larger entrepreneurial attitudes in migrants could also contribute to increases in trade. An article by The Economist argues that migrants in Germany are much more likely to start a business than native Germans, with 44% of all newly registered businesses founded by people with foreign passports. The Economist (2017) also contends that this trend, partly due to the risk-taking nature of immigrants, “is likely to grow with the arrival of over a million refugees in the past two years.” These new businesses could possibly increase trade through increased economic activity and providing migrants a place to work when many jobs are already taken up by natives.

From these lines of reasoning, it seems that Germany’s trade should grow due to the large amount of recent immigration. Head and Ries found that a 10% increase in immigrants increased Canadian exports to the immigrants’ home country and a 3% increase in imports, while Genc et al. also found that a 10% increase is expected to increase the volume of trade by 1.5%.

Comparing these numbers to the one found in the earlier regression of 3.5%, we see that they are somewhat similar. Although I did not include many variables in the fourth regression and the migration variable was not significant in the first three regressions, we can be somewhat confident in the result of the positive correlation between migration and volume of trade for Germany.

Conclusion:

In this paper, I hoped to uncover the impact of free trade agreements and immigration on German trade. To unearth these relationships, I both conducted a literature review and created regressions based on the gravity equation. I first found that trade agreements should theoretically

increase trade through the lowering of tariffs and other barriers (such as quotas and import bans). In all three of the regressions I ran using the cross-sectional data set, I found highly significant coefficients for both real GDP and distance, which are the standard variables in a gravity equation model. My regressions demonstrated that these factors influence German trade, as was expected. Even while controlling for these highly significant variables, I still found that free trade agreements play a significant and important role in determining both German exports and imports, as all my coefficients for trade agreements were significant at the 0.1% level.

For immigration, I conducted a more extensive literature review due to the less clear nature of the relationship it has with trade. Many of the papers consulted during this research agreed that immigration had a positive effect on trade, with estimates ranging from 1.5% to 3% increases from a 10% increase in immigrant population. The authors attribute these findings to immigrants' superior knowledge of market opportunities and to the different preferences of immigrants and the subsequent demonstration effect. I then ran a simple single-variable regression between immigration and volume of trade for Germany and found a not incredibly significant correlation (only significant at the 10% level), though this result was suggestive of a positive relationship between immigration and trade. Combining this outcome with the information from literature, I concluded that higher immigration increases German trade with other nations.

I believe there is an opportunity to expand this study and make it more comprehensive. One way that I have looked at is expanding the data from a cross-sectional data set to panel data. By expanding the data to include more than from one year, we could view some trends over time and also introduce some time trends in the immigration data. Panel data would also allow the use of including fixed effects, which would allow us to control for country-specific variables. The

only difficulty with panel data is finding all of the relevant information for multiple years, which can be difficult, especially for the immigration statistics.

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