

Czech University of Life Sciences Prague

Faculty of Economics and Management

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Bachelor Thesis

The impact of International Trade on the Economic Growth of Germany

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BACHELOR THESIS ASSIGNMENT

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Economics and Management

Thesis title

The impact of International Trade on the Economic Growth of Germany

Objectives of thesis

The main objective of this thesis is to determine how the international trade contributes to sustainable economic growth of Germany which is positioned among the five most economically advanced countries in the world. Drawing on the example of Germany, the following thesis provides an explanation as to why foreign trade is a crucial, if not a fundamental safeguard to the economic prosperity of developed, industrialized countries. It can be further used as a theoretical framework for future macroeconomic research on post-industrial economies.

Methodology

The theoretical part will consist of a literature review of economic growth theory and its dependence on foreign trade in the context of the 21st century. To provide an overview of the current economic position of Germany and the role of foreign trade in its development, secondary data from public sources, OECD and Observatory of Economic Complexity (OEC) being among them, will be analyzed. Comparative and descriptive methods will be used in the thesis.

The proposed extent of the thesis

35 – 40 pages

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CARDWELL, M. – RODGERS, C P. – GROSSMAN, M R. – C.A.B. INTERNATIONAL, ISSUING BODY.

Agriculture and international trade : law, policy, and the WTO. Wallingford, Oxfordshire, UK: CABI, 2003. ISBN 0851996639.

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I declare that I have worked on my bachelor thesis titled "The impact of International Trade on the Economic Growth of Germany" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on: 15.03.2019

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Dopad mezinárodního obchodu na hospodářský růst Německa

Souhrn:

Cílem této práce je lépe porozumět tomu, jak Německo po válce, recesi a znovusjednocení se svou východní částí vytvořilo jedno z nejsilnějších ekonomik na světě a podpořilo ekonomiku mezinárodním obchodem a novými obchodními dohodami. Od EU a WTO k dvoustranným partnerstvím Německo neustále zvyšuje vývoz a dovoz. Není divu, že jednu z klíčových rolí v růstu německé ekonomiky hraje exportní a importní činnost. Cílem této práce je pochopit, jak mezinárodní obchod přispívá k udržitelnému hospodářskému růstu Německa. Krátký závěr je, že mezinárodní obchod značně pomohl německé ekonomice vytvořit a udržet si své pozice, ale zjištění práce také ukazují, jak velká německá ekonomika je závislá na zahraničním obchodu a extrémní čísla vyžadují přehodnocení myšlenky spoléhat se pouze na zahraniční poptávky.

Klíčová slova:

Německo, HDP, mezinárodní obchod, export, import, regrese, obchodní přebytek, ekonomický růst, ekonomický rozvoj.

The impact of International Trade on the Economic Growth of Germany

Summary:

This thesis is aimed to develop a better understanding of how Germany has come to establish one of the most powerful economies in the world after the wartime, recession, and reunification with its Eastern part and boost the economy with the international trade and new trade agreements. From EU and WTO to bilateral partnerships, Germany has been consistently increasing its exports and imports. It is no surprise that one of the key roles in German economy growth is played by its exporting and importing activity. This thesis' objective is to understand how the international trade contributes to sustainable economic growth of Germany. The short conclusion is that international trade has greatly helped German economy to establish and maintain its positions, but the finding of the thesis also show just how large German economy is dependant on foreign trade and the extreme numbers call for reconsidering the idea of relying solely on foreign demand.

Key words: Germany, GDP, international trade, export, import, regression, trade surplus, economic growth, economic development.

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1. Introduction

1.1. Objectives

The main objective of this thesis is to determine how the international trade contributes to sustainable economic growth of Germany which is often positioned among the five most economically advanced countries in the world. The assumption derived from the literature review is that the expanding foreign trade of the post-Berlin Wall Germany is one of the major reasons behind the country's drastic economic growth. Drawing on the example of Germany, the following thesis provides an explanation as to why foreign trade is a crucial, if not a fundamental safeguard to the economic prosperity of developed, industrialized countries. It can be further used as a theoretical framework for future macroeconomic research on post-industrial economies.

1.2. Methodology

The theoretical part will consist of a literature review of economic growth theory and its dependence on foreign trade in the context of the 21st century. To provide an overview of the current economic position of Germany and the role of foreign trade in its development, secondary data from public sources, OECD and Observatory of Economic Complexity (OEC) being among them, will be analyzed. It will then be systemized by quantitative statistical methods such as trend and regression analyses in the practical part, accounting for GDP changes, memberships in international trade organizations, and import and export rates as per the theoretical framework. It will then be interpreted to showcase the intercorrelation between the level and scope of international trade that Germany carries with other countries and the trend of its domestic economic growth. To fulfill the objective of the thesis, all the conclusions will be put together to support or reject the main thesis assumption that is that the expanding foreign trade of the post-Berlin Wall Germany is one of the major reasons behind country's economic growth.

1.3. Economic growth theory

Economic growth, not to be confused with economic development, is an increase in value of goods and services produced within a particular economy over a chosen period of time (Shearer, 1961). It is generally expressed as a percentage of increase in real gross domestic product (GDP). The value is normally adjusted to the inflation to reflect the actual worth of something and to account for changes in nominal market prices (International Monetary Fund, 2018).

The theory of economic growth was developed by Joseph Schumpeter at the very beginning of the 20th century and its essence lies in a simple statement—economic growth is a multi-dimensional phenomena and is rather difficult to quantify. While real GDP is the most common measurement tool of economic growth, it is not the only factor affecting the phenomena. Moreover, it is important to differentiate between economic growth and development. Economic growth refers to an increase of production of goods and services within a country over some period of time, while economic development is an overall improvement in well-being of a nation which is also influenced by a number of economic, social, and political factors. It is normally explained by two groups of factors: extensive and intensive. Extensive factors show a quantitative increase in resources such as capital expenditures and number of employees involved in an economy. Intensive factors are qualitative improvement, for instance quality and education of personnel, production technologies, innovations, etc. Both extensive and intensive factors define economic growth which, in its turn, fosters or degrades economic development.

Concluding from the above, economic growth is mostly concerned with economic indicators leading to increase in production and consumption capacity. Therefore, the three main economic indicators of economic growth are the following:

1. Gross Domestic Product (GDP) and Gross National Product (GNP)

Gross Domestic Product reflects a monetary value of all finished goods and services produced within the borders of a country, while Gross National Products is the same estimation but limited not to the borders of a country but to the ownership by a country's residents, thus accounting for all production carried out by country's residents and residing businesses regardless of their geographical location. For this thesis, GDP is chosen as a key measure because its calculation is more standardized than that of GNP and thus is more accurate for comparison. The simplest GDP formula is below:

$$\mathbf{GDP = C + I + G + (X-M)}, \text{ where}$$

C...private consumption

I...gross investment

G...government spending

X... exports

M...imports

2. Business Confidence Index (BCI)

While Business Confidence Index seems to be self-explanatory from its name, it is not in fact limited to businesses and for-profit entities only, but is also used to assess the future outlook for an economy or a country. It is an economic indicator that quantifies pessimistic and optimistic predictions about a country's future economic growth. BCI is based on opinion surveys, production development metrics, and amount and pricing of finished goods produced in an economy. It does not have an established formula and is normally expressed in nominal numbers, where a number below 100 suggests relative pessimism and a number above 100, respectively, suggest positive future economic performance.

3. Purchasing Power Parity Index (PPP)

Purchasing Power Parity Index is similar to Consumer Price Index (CPI) in its estimation, but while CPI reflects changes in prices over a period of time, PPP is concerned with price level differences and is mostly used for comparison among the countries with different currencies and economic realities. The absolute PPP, which is the simplest PPP pivot, is calculated by the below formula. The outcome, that is, spot exchange rate, shows domestic currency units per a unit of foreign currency and is then applied to calculate adjusted prices.

$P/P^e = E$, where

P...domestic price index

P^e ...foreign price index

E...spot exchange rate

Together with national income, per capita income, per capita consumption, stock indices, unemployment level, share of raw materials, labor productivity and other indicators, the above are intended to provide a comprehensive overview of an economic growth at a given period of time.

1.4. The causality between international trade and economic growth

With an expanding globalization, however, new measuring tools came into the picture. Joseph Schumpeter initially stated that a state's economic policy cannot focus solely on one particular sector of economy and it must be pursued in all directions. Thus we can conclude that a strategy of economic growth needs to account for global affairs to be successful.

Global competitiveness drives countries to become self-sufficient and aim to have abundance production to export while also to minimize the costs associated with production when importing goods and services seems to be more cost-effective. The above explains the idea of international trade, which is a cross-border exchange of goods and services that comprises a large portion of most developed countries' GDP. That prompts governments to come up with development strategies to encourage economic growth through increasing the volume of international trade.

There is, however, some controversy about such practice. For example, some research suggests that, while increased trade with foreign countries usually has a positive influence on country's economic growth, that influence is rather insignificant as in examples of West African countries (Caleb et al., 2014; Gossel, 2013). That is mostly explained by limited capacity to produce and export of those countries. For developing countries, most of the time the most crucial driving factors for economic growth are internal ones, concerned

with domestic policies. Developed countries, on the other hand, are more likely to greatly benefit from international trade. John Stuart Mill, when theorizing about international trade, stated that specializing on comparative advantage leads to increase in real income and standard of living of people within a country that gets to enjoy relative economic development (Bastable, 1889). Thus we can conclude that direct economic advantage of international trade is available to countries that are self-sufficient in its domestic production and have access to international trade arenas. Today's Germany, being an example of a developed, First World western country, falls under a country that Mill was describing in his works.

While Germany is notorious for a whole number of domestic and international policies that ensure a rather favorable living conditions for its residents, it is clear that its exporting activities take up a large portion of that success. This thesis is thus aiming at understanding how Germany's economic growth and consequent development is correlated to its foreign trade strategies and how that relationship has been developing over the time.

2. Theoretical part

2.1. Historical background of German economy

The post World War II state of the German economy was extremely difficult. In 1946, industrial production was only a third of what it was before the war, steel production decreased by seven times, coal production decreased twice, agriculture was abandoned and most industrial enterprises were destroyed. Germany lost 25% of its territory and every second German resident was unemployed. High inflation, rationing system, absence of small entrepreneurs and speculation had a catastrophic effect on the living standards of the country.

German economy owes a lot of its recovery to the active support of the United States in accordance with the Marshall Plan. A total of USD \$3.12 billion was provided to Germany. Assistance came mostly in the form of the supply of goods, profit from which then went to funds and banks to ensure relative economic stability. At the same time, the economic policy of L. Erhard played a huge role in restoring the German economy and its further economic development which later was engraved into world history as “German miracle”. After financial reforms in 1948 and 1949, one of the most remarkable of which was a switch to Deutsche Marks—the official currency of West Germany and later unified Germany, came the period of the most intense economic tension during 1950-1951. During those years, Germany had a lot of recovering to do and foreign trade was among the last concerns on the list. Yet, when that was over and in 1952 and 1953 the unemployment rate went drastically down and the prices for domestic goods and services stabilized, Germany had started thriving by increasing its production levels and turn towards mass production. By mid-1950s, Germany ranks 7th in gold reserve levels worldwide and 3rd in industrial output. Korean War had also had an ironically positive impact on Germany’s economy since the U.S. placed lots of orders for military equipment to Germany’s factories. Later European integration, first in European Coal and Steel Community (ECSC) and then later European Economic Community (EEC) in 1957 opened the doors for expansion of economic ties with foreign partners. By 1990, all economic indicators of unified Germany reached their historical peak and laid out a favorable foundation for country’s further economic growth.

The fall of the Berlin Wall in November of 1989 had an intensive influence on the reunified Germany. The economic differences between Eastern and Western Germany, that being GDP per capita and unemployment rate, reached a balance and were within a reasonable regional differences like in other developed countries such as the United States

and Canada (Mauk, 2017). Post reunification, eastern states of Germany were largely funded by the western ones which lessened the regional differences and boosted country's overall economy (Mauk, 2017).

2.2. Overview of German foreign economic policies and trade agreements

Germany is among the countries most integrated in international trade which can be seen through its export and import ratios to gross domestic product — an impressive 84% in 2017, with every fourth employment opportunity related to exporting (Federation of German Industries (BDI), 2017). Yet, with such enormous reliability on foreign trade, the Federal Government of Germany and the Bundestag is rather limited in its decision-making. While Germany has a lot of space for trade negotiating when it comes to bilateral agreements with particular countries, most of its regional and international economic cooperation is in unions and panel discussions. Under the Lisbon Treaty, which is a foundation agreement for countries in the European Union, trade policies are mainly governed by the European Union itself. Similarly, within the international trade organizations such as the World Trade Organization (WTO), Group of Twenty (G20) and Group of Seven (G7), Germany is merely one of the members with a voting right and not a sole decision-maker. This stresses the importance of trade agreements and their reasonability for a country as heavily relied on foreign trade as Germany.

2.2.1. Trade policies in the European Union

The European Union has the largest influence on Germany when it comes to

supranational trade. The EU has a single market representing more than 500 million citizens, with \$21 trillion of Geary-Khamis, also known as international, dollars in compound GDP of member countries (International Monetary Fund, 2014). Being among the leading trade regions and represented as a unit in World Trade Organization, the key EU trade policies are outlined as a part of the Lisbon Treaty and are focused on promoting open markets within the EU, establishing clear regulatory statutes, and reinforcing EU competitiveness on the global arena (European Commission, 2011). Besides the free market and lowered tariffs within the EU, the Lisbon Treaty and the EU intertrade agreements are mostly concerned with unified standards of production and licensing practices, along with protection of environment, human rights and labor rights associated with trade. Germany, being among 28 member states of the European Commission, has a direct say in its trade-related negotiations. Decisions of the Commission are then reported to the Council of the European Parliament, with Council and Parliament then co-deciding on the negotiation process. EU also has trade agreements with EU neighbouring states such as Ukraine, Moldova, and Georgia. Most bilateral agreements that Germany has with non-EU countries are also powered through the European Union, examples of such are EU-Australia, EU-CETA (Canada), EU-Japan, EU-Mexico and other agreements (European Commission, 2018).

2.2.2. World Trade Organization (WTO)

Germany has been the member of the World Trade Organization (WTO) since January of 1995. It is represented both as a separate country and as a member state of the EU, called the European Communities in WTO for legal reasons (World Trade Organization, 2017). The importance of WTO is not only in its lower trade barriers, but also in creating a safe trade arena for its members by ensuring trade dispute resolution. Germany, as it was

stated before, being a country depended on export, is especially interested in multilateral relations and WTO success (World Trade Institute, 2016).

2.3. Germany in World Trade

Germany is among the largest exporting and importing economy in the world, ranking 3rd out of 214 as reported by The Observatory of Economic Complexity (OEC) in 2016 (The Observatory of Economic Complexity, 2016). According to OEC report from 2016, Germany exported USD \$1.25 trillion and imported USD \$973 billion worth of goods, which made to a positive trade balance, also called surplus, of USD \$280 billions, which was the peak of indicators from 1950 to 2018. Table 1 provides a better overview of most important trade-related metrics with the most recent evidence available which will be later closely observed in theoretical part.

Table 1: Latest Trade Metrics of Germany

Trade	Last	Reference
Balance of Trade (EUR Million)	18300	Oct/18
Current Account (EUR Million)	15900	Oct/18

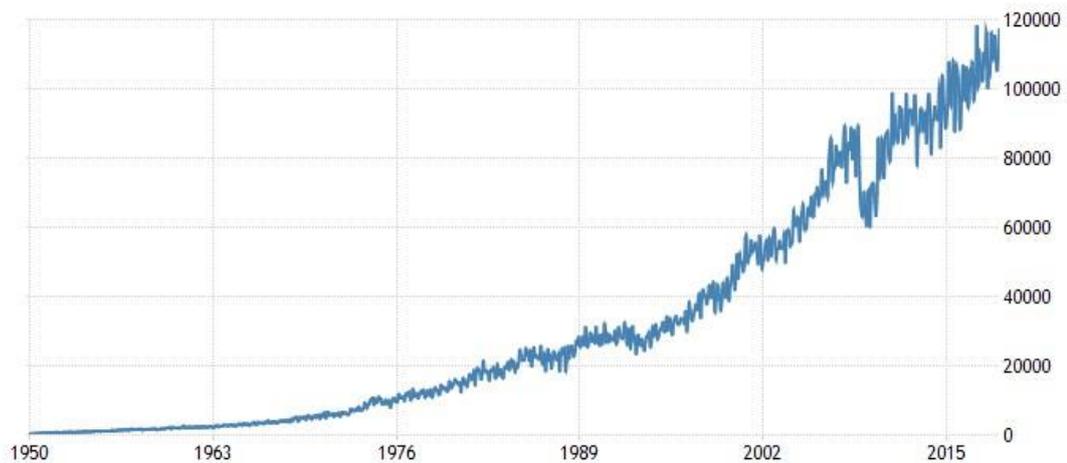
Current Account to GDP (%)	8	Dec/17
Exports (EUR Million)	117204	Oct/18
Imports (EUR Million)	98910	Oct/18
External Debt (EUR Million)	4886438	Sep/18
Capital Flows (EUR Million)	7626	Oct/18
Foreign Direct Investment (EUR Million)	876	Oct/18
Gold Reserves (Tonnes)	3370	Sep/18
Crude Oil Production (BBL/D/1K)	41	Aug/18
Weapons Sales (USD Million)	1653	Dec/17

Source: Economic Indicators of Germany 2016-2018, Federal Statistical Office, Trading Economics

2.3.1. Exports of goods and services

After the World War II, Germany, as explained in 4.b, had a lot of recovering to do and its exporting potential was quite weak which can be seen on below trend. Nevertheless, from 1976 and onwards, especially after the fall of the Berlin Wall, exporting has been going consistently up with an exception of an economic crisis of 2008 which is also visible from the Figure 1.

Figure 1: Germany Export Metrics, y coordinate is in EUR million



Source: Economic Indicators of Germany 2016-2018, Federal Statistical Office, Trading Economics

2.3.1.1. By region

Apart from fellow EU countries, Germany exports large volumes to the United States, the United Kingdom, and China, those only being in top-ten. Some other non-EU countries where Germany exports big volumes of goods and services are Russia, Japan, South Korea, Mexico, India, and South Africa (Trading Economics, 2017).

Table 2: Germany Exports by Country

Country	Value	Year
---------	-------	------

1	United States	8944178.00	EUR Billion	Jan/17
2	France	8575963.00	EUR Billion	Jan/17
3	United Kingdom	6718802.00	EUR Million	Jan/17
4	China	6272895.00	EUR Billion	Jan/17
5	Italy	5118241.00	EUR Million	Jan/17
6	Austria	4737025.00	EUR Million	Jan/17
7	Poland	4509013.00	EUR Million	Jan/17
8	Switzerland	4419887.00	EUR Million	Jan/17
9	Belgium	3504032.00	EUR THO	Jan/17
10	Spain	3408644.00	EUR Million	Jan/17

Source: United Nations COMTRADE Database on International Trade Statistics

2.3.1.2. By industry

For an industry breakdown, miscellaneous and other categories were excluded to provide a better overview of particular categories of exported goods. Some values were originally in U.S. dollars as per UN COMTRADE report and had to be re-calculated to be consistent with the rest of data as per exchange rate 0.87 as of January 7, 2018.

Table 3: Germany Exports by Industry/Category

	Category	Last		Year
1	Cars and vehicle	15708798.00	EUR	Jan/17
2	Chemicals	4190806.00	EUR	Jan/17
3	Power Generating Machinery and Equipment	3126074.00	EUR	Jan/17
4	Rubber & Plastic Products	3542072.00	EUR	Jan/17
5	Fabricated Metal Products	3292188.00	EUR	Jan/17
6	Plastic	2225275.00	EUR	Jan/17
7	Crude Materials, Inedible, Except Fuel	1446939.00	EUR	Jan/17
8	Pulp, Paper & Paper Products	1587249.00	EUR	Jan/17
9	Wearing Apparel	1525371.00	EUR	Jan/17

10	Mineral Oil	1141700.00	EUR	Jan/17	
11	Coke, Refined Petroleum	984998.00	EUR	Jan/17	
12	Iron Or Steel Plates	982189.00	EUR	Jan/17	
13	Textiles	894100.00	EUR	Jan/17	
	14	Agricultural Products	852251.00	EUR	Jan/17
	15	Meat & Meat Products	783294.00	EUR	Jan/17

Source: United Nations COMTRADE Database on International Trade Statistics

2.3.2. Imports of goods and services

The trend of importing (Image 2) for Germany follows a very similar pattern as that of exporting (Image 1), with consistent growth starting in 1976 and occasional ups and downs reflecting global economic state, especially with the year of 2008.

Figure 2: Germany Import Metrics, y coordinate is in EUR million



Source: *Economic Indicators of Germany 2016-2018*, Federal Statistical Office, *Trading Economics*

2.3.2.1. By region

Germany's importing is also similar to its exporting patterns. It also heavily reflects the geographical factor, which is why countries with a smaller exporting potential, such as the Czech Republic, Poland, and Austria, are in top-10 of countries from where Germany imports goods because of their proximity, same goes for export to those countries.

Table 4: Germany Imports by Country

	Country	Value		Year
1	China	8758246.00	EUR Million	Jan/17
2	France	5501262.00	EUR Million	Jan/17
3	United States	4927048.00	EUR Million	Jan/17
4	Italy	4181242.00	EUR Million	Jan/17
5	Switzerland	4023373.00	EUR Million	Jan/17
6	Poland	4017728.00	EUR Million	Jan/17
7	Czech Republic	3697712.00	EUR Million	Jan/17

8	Austria	3251521.00	EUR	Jan/17	Million
9	Belgium	3146300.00	EUR	Jan/17	Million
10	United Kingdom	2972382.00	EUR	Jan/17	Million

Source: United Nations COMTRADE Database on International Trade Statistics

2.3.2.2. By industry

Germany mostly imports raw goods with an intent to add value to it with production and processing and then export as commodities. Import categories, as observed on trends, fluctuate a lot due to ever-changing demand (Trading Economics, 2017).

Table 5: Germany Imports by Industry/Category

	Category	Value		Year
1	Crude Petroleum & Natural Gas	4849039.00	EUR	Jan/17
			Million	
2	Crude Oil	2625407.00	EUR	Jan/17
			Million	

3	Agricultural Products		2617246.00	EUR Million	Jan/17
4	Fabricated Products	Metal	2230820.00	EUR Million	Jan/17
5	Coke, Petroleum	Refined	1578283.00	EUR Million	Jan/17
6	Aluminum Aluminum Alloy	&	411726.00	EUR Million	Jan/17
7	Copper Rock		190206.00	EUR Million	Jan/17
8	Cutting Wood		96347.00	EUR Million	Jan/17
9	Fertilizer		87513.00	EUR Million	Jan/17
10	Iron & Manganese Dross		78434.00	EUR Million	Jan/17
11	Beer		26383.00	EUR Million	Jan/17

12	Cement	9189.00	EUR	Jan/17
			Million	

Source: United Nations COMTRADE Database on International Trade Statistics

3. Practical Part

The practical part will consist of thorough analysis of real GDP growth of Germany and understanding its cyclical nature through conclusions from the theoretical part of the thesis. First, we will analyze the trends of changes in economic growth that is indicated by real GDP and export and import volumes. The second part of the theoretical part will be concerned with analyzing a simple regression model where GDP will be explained by a basic formula from Chapter 1.1. The model is to be tested for multicollinearity and supported or rejected depending on its regression coefficient and the results will be interpreted for possible changes in export and import of Germany.

3.1. Analysis of correlation between foreign trade and economic development

3.1.1. Mid-20th century and post-war Germany

During World War II, fascist Germany turned entirely away from the market economy and towards an industrialized militarized economic system. Nevertheless, even with a huge militarization, the German economy was not able to fully meet the needs of the front. From the end of 1943, Germany began to experience serious difficulties in all industries. The country lacked raw materials, fuel, human resources and financial resources. From the second half of 1944, industrial and agricultural production began to fall sharply (Vonyo, 2018).

Military defeat in 1945 led the country to a complete economic collapse. In 1946, industrial production in Germany fell down to 1/3 of the pre-war level (Vonyo, 2018). The volume of steel production decreased by 7 times, the volume of coal production fell more than twice. In the early postwar years, the Allies countries joined forces to limit the industrial potential of Germany. By 1950, 706 large industrial enterprises were completely dismantled. The potential steel production was reduced by 6.7 million tons (Vonyo, 2018). The trade potential of Germany back then was almost non-existent since the country was unable to meet its own production needs. For some perspective, Table 6 compares the GDP in international dollars in 1990 prices as a base year of allies and axis (attacking) countries. The table shows how, after seven years of war (1938-1944), Germany's GDP fell by more than 100 billion almost overnight.

Table 6: GDP of the countries directly involved during wartime (WWI-WWII), 1939-45, in 1990 prices (billions international dollars)

	1938	1939	1940	1941	1942	1943	1944	1945
Allied powers								
USA	800	869	943	1094	1235	1399	1499	1474
UK	284	287	316	344	353	361	346	331
France	186	199	82	...	...	...	...	101
Italy	...	...	...	...	...	...	117	92
USSR	359	366	417	359	274	305	362	343

<i>Allied total</i>	1629	1721	1757	1798	1862	2064	2325	2342
Axis powers								
Germany	351	384	387	412	417	426	437	310
France	...	...	82	130	116	110	93	...
Austria	24	27	27	29	27	28	29	12
Italy	141	151	147	144	145	137	...	...
Japan	169	184	192	196	197	194	189	144
<i>Axis total</i>	686	747	835	911	903	895	748	466
Allies:Axis	2,4	2,3	2,1	2,0	2,1	2,3	3,1	5,0

Source: based on the data obtained from The Economics of World War II. Cambridge University Press, 2009, by Mark Harrison.

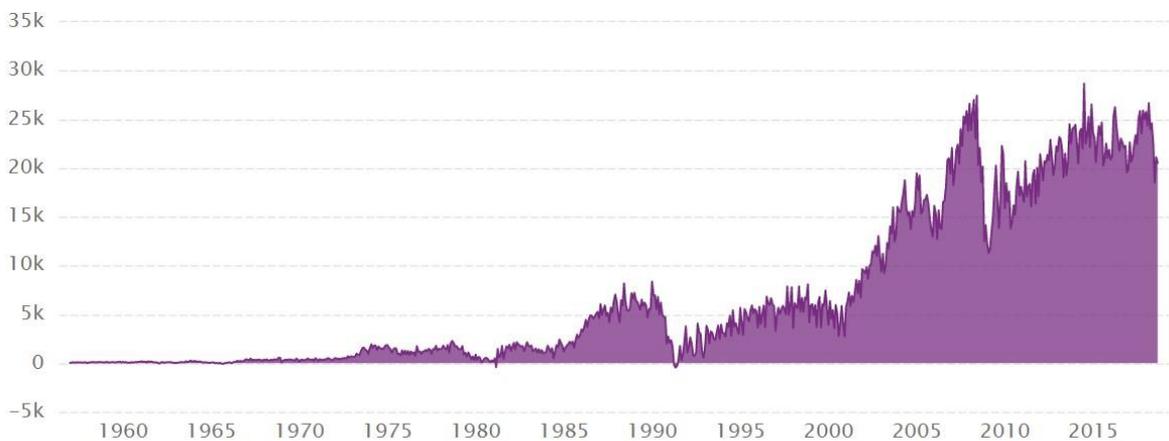
However, within the framework of the "Marshall Plan," the United States and the Allies came to the conclusion that the restoration of Germany as the leading industrial base of Europe is a crucial part of further global economic development. As a result, Germany also began to receive post-war assistance from the United States and was included in the Marshall Plan. In total, Germany received approximately \$3.1 billion in financial aid (Mauk, 2017).

The "economic miracle" which Germany demonstrated in the 1950s was largely due to country's participation in the international division of labor. Starting from the second half of the twentieth century, Germany is among the leading trading nations of the world, and the country's exports and imports have grown at an unprecedented high rate over the past fifty years.

3.1.2. Post-Berlin Wall era: 1991 and onwards

The German reunification followed almost immediately after the Berlin Wall fall (Halligan, 2014). It is difficult to estimate economic indicators of both Western and Eastern Germany before the unification, and that is why the trade balance illustrated on Image 3 up to January 1990 only accounts for West Germany. From the trade balance trend it can be seen that reunification was quite expensive and the nineties were characterized by a gradual, slow growth due to extensive costs spent on restoration of Communist Eastern half and living through the consequences of the war.

Figure 3: Trade Balance of Germany, 1957 - 2018, USD mm



Source: International Monetary Fund - World Economic Outlook, CEIC

With an exception of a 2008 global crisis, the trade balance has been consistently growing and is positive, with a trade surplus increasing with small fluctuations. Positive trade balance indicates that the country exports more goods and services than it imports. However, some

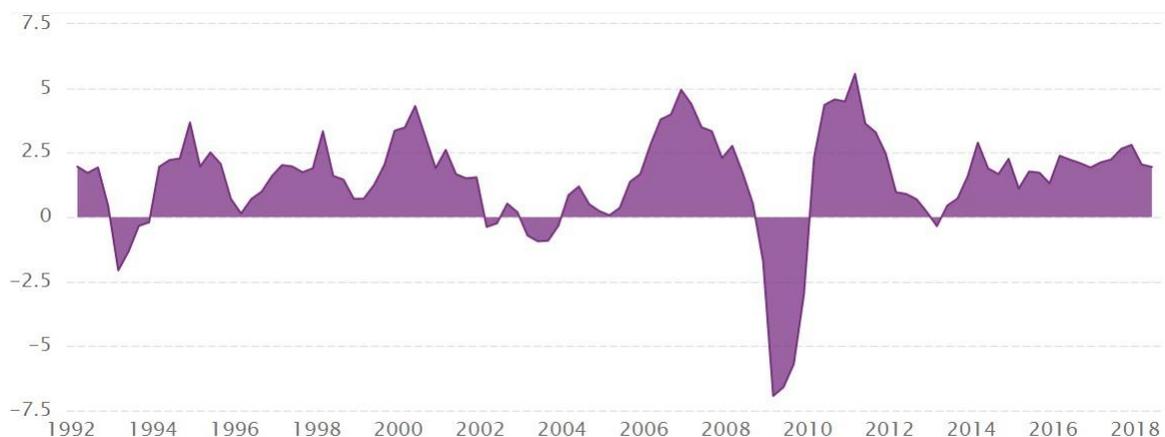
modern economists argue that such trend is not beneficial to global economy. To sum up, the trend is that after almost ten years of economic restoration that Germany had to do to integrate its Easter part, 2000 and onwards the country's exports have been significantly outgrowing its imports.

3.1.3. Trend analysis

From 1950 to 2000, German imports increased almost 90 times, and exports more than 150 times, while the growth of foreign trade outpaced GDP growth and its share in the indicator increased (Vonyo, 2018). Germany's foreign trade is characterized by an ever-increasing trade surplus, as per Graph 3.

To conduct trend analysis, data for real GDP was collected from the International Monetary Fund. The same time series data was collected for YoY total export and import growth (Graphs 5-6). What we can see from them is an almost identical trend of development on all three, which already suggests that there is a direct connection between the three variables and thus between economic growth and foreign trade activity. Import growth rate has the most fluctuations, and all three graphs reflect the crisis influence between 2008-2010.

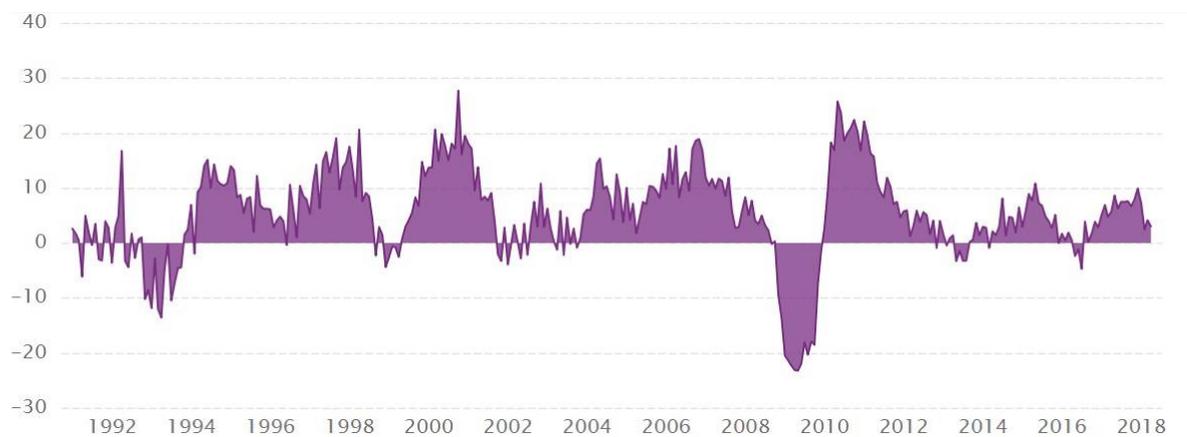
Figure 4: Germany's Real GDP Growth from 1992-2018 | % |



Source: International Monetary Fund - World Economic Outlook, CEIC

The three graphs replicate most of the small fluctuations, too, such as recess between 2002-2005 and sudden recovery growth in 2010-2011. From the graphs, it is clear that real GDP and export/import growth are closely correlated.

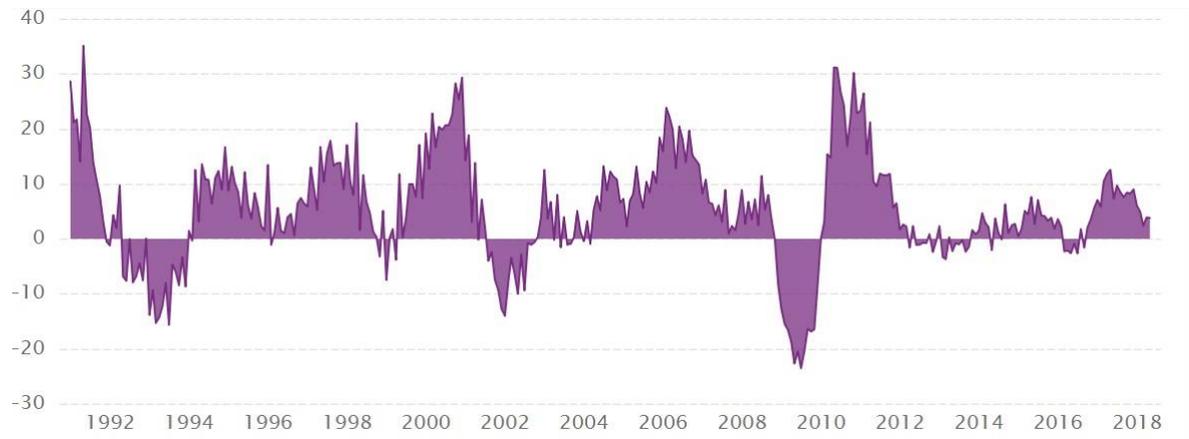
Figure 5: Germany's Total Exports Growth 1991-2018, year-over-year (YoY)



Source: International Monetary Fund - World Economic Outlook, CEIC

What is considered to be a strength of the German economy — its high competitiveness of goods on the world market and a high export share in GDP — is also a weakness in some sense. High economic growth dependency on export growth rates limits the influence of other factors and makes an economy one-sided. This will be later examined in a regression model.

Figure 6: Germany's Total Imports Growth 1991-2018, year-over-year



Source: International Monetary Fund - World Economic Outlook, CEIC

3.2. Regression analysis

As it was explained in 1.1., the simplest GDP formula is the following:

$$\text{GDP} = \text{C} + \text{I} + \text{G} + (\text{X}-\text{M}), \text{ where}$$

C...private consumption

I...gross investment

G...government spending

X... exports

M...imports

These variables will be at the foundation of the model structure which we will use for regression analysis, yet C, I, and G are out of scope of this thesis and have only been slightly

discussed throughout the thesis. That is why, we will eliminate these variables and only focus on export and import and their influence on Germany's GDP. The main aim of this calculation is to prove or reject the assumption that the GDP of Germany is greatly depending on its foreign trade operations, specifically export.

3.2.1. Data sets for GDP, import and export volumes

Given the above, “y” will be an indicator of export of Germany over 1991–2019 in USD. x_1

- Gross Domestic Product (GDP) of Germany in USD.

x_2 - import of goods and services in % of GDP

The reverse formula will then be **$X = GDP + M + \text{error term}$**

Table 7: The dynamics of selected variables in Germany from 2000–2018 in chained 2010 euros

Year	Exports (y)	GDP (x_1)	Imports (x_2)
2000	158,307,600,000.00	2,500,060,000,000.00	155,341,410,000.00
2001	175,517,390,000.00	2,476,060,000,000.00	167,583,660,000.00
2002	177,595,510,000.00	2,510,000,000,000.00	157,049,750,000.00
2003	183,870,080,000.00	2,610,025,000,000.00	169,633,070,000.00
2004	201,413,810,000.00	2,513,515,000,000.00	177,717,060,000.00
2005	212,975,370,000.00	2,713,985,000,000.00	182,610,820,000.00
2006	236,657,450,000.00	2,826,000,000,000.00	209,407,850,000.00

2007	265,183,820,000.00	2,513,230,000,000.00	226,639,430,000.00
2008	282,822,560,000.00	2,561,740,000,000.00	235,775,080,000.00
2009	232,678,650,000.00	2,460,280,000,000.00	215,914,630,000.00
2010	253,390,250,000.00	2,580,060,000,000.00	225,324,970,000.00
2011	289,070,000,000.00	2,703,120,000,000.00	250,706,280,000.00
2012	301,572,030,000.00	2,758,260,000,000.00	255,474,220,000.00
2013	304,603,700,000.00	2,826,240,000,000.00	258,837,970,000.00
2014	317,814,280,000.00	2,938,590,000,000.00	268,822,140,000.00
2015	335,316,870,000.00	3,048,860,000,000.00	285,300,970,000.00
2016	343,138,240,000.00	3,159,750,000,000.00	297,358,220,000.00
2017	358,610,710,000.00	3,277,340,000,000.00	308,841,710,000.00
2018	372,018,780,000.00	3,386,000,000,000.00	319,674,530,000.00

Source: FRED Economic Research, Federal Reserve Bank of St. Luis, Review of German economics 2000-2018.

3.2.2. Correlation between variables

In order to construct a model, a table of correlation will be built to see if any variables have highly paired correlation coefficients. As expected, all three variables are highly correlated.

Normally we would exclude some variables because of multicollinearity but in this case it is expected and explained since we have already established from the trend that y , x_1 and x_2 in this case follow a very similar pattern. The correlation coefficients in this case only support this case. However, multicollinearity does make a final model less reliable.

Table 8: Correlation coefficients of variables

	<i>Exports (y)</i>	<i>GDP (x₁)</i>	<i>Imports (x₂)</i>
Exports (y)	1		
GDP (x ₁)	0.843504894	1	
Imports (x ₂)	0.994474215	0.856423829	1

3.2.3. Regression model

The summary output of regression analysis is as follows. First of all, the R squared and adjusted R squared — coefficient of determination — are almost 99% which is extremely high and it indicates that a model is by 98% explained by the variables of export and import.

Table 9: Summary statistics

<i>Regression Statistics</i>	
Multiple R	0.994600627
R Square	0.989230408

Adjusted R Square	0.987884209
Observations	19

Table 10: Output of parameters

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-15901466173	21265520346	-0.74775815	0.46545522
GDP (x ₁)	-0.7184511	0.011754852	-0.61119533	0.54965594
Imports (x ₂)	1.300565572	0.064026619	20.31288835	7.53E-13

	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-60982355445	29179423099	-60982355445	29179423099
GDP (x ₁)	-0.032103685	0.017734663	-0.032103685	0.017734663
Imports (x ₂)	1.164835203	1.436295942	1.164835203	1.436295942

Given the above, we can build the following model, the level of significance in input was

$$95\%: y = 0.7184511x_1 + 1.300565572x_2 - 15901466173$$

3.2.4. Interpretation of the model

The interpretation of the model that we built is as following:

- If both GDP and import were to equal 0, the export volume would go down by 15,901,466,173 EUR in value (almost 16 billion EUR).
- When GDP of Germany goes up by 1 EUR, country's total export volume increases by 0.71 EUR in monetary value.
- When import of Germany goes up by 1 EUR, its export increases by 1.3 EUR in monetary value.

These are just the three examples of how the model can be implemented for interpretation.

It is important to keep in mind that there is an error term present and there was multicollinearity detected, but the overall statistical trend aligns with economic assumptions in theoretical part of the thesis.

a. Prospects of economic development in the framework of trade

If the trend of GDP growth continues with the same cyclical fluctuations as ever since Germany overcome recession in late nineties, the 5-year trend would be as follows:

Table 11: 5-year GDP forecast based on Graph 4



Source: International Monetary Fund - World Economic Outlook, CEIC

After a gradual fall in GDP in 2023, it would slowly recover according to a cycle and go up back to current value and potentially even more up.

4. Conclusion

Over the past couple decades, Germany has managed to turn from an economy in progress into an absolute leader of the EU economy. If compared to other European countries, the German economy stands out in the best light. In August 2018, the number of unemployed people in the country decreased to a minimum level since its reunification and amounted to 2.545 million people. The unemployment rate in Germany fell to 5.7% when the EU average unemployment rate in the same reporting period was 7.8% (WITS, 2018).

The country has achieved outstanding success in the field of foreign trade. Despite its rather modest size, Germany has the world's largest current account (trade) surplus in the world, estimated at 266 billion EUR in 2016, the peak value since 1991. Last year, exports from Germany rose to a historical record of 1.207 billion EUR, and the balance of foreign trade of Germany rose to a historical record level of 252.9 billion EUR (WITS, 2018). The trend seems to continue and will most likely be increase in 2019, too.

After the fall of the Berlin Wall, Germany has spent a decade recovering and then began developing its international relations in hopes to boost the economy. EU integration and WTO membership have been crucial to reducing the trade barriers and signified an increase in economic growth. Export mostly goes to the U.S., China, and EU countries (France, UK, Italy, Austria, Poland) and is in categories of chemicals, food products, and machinery and equipment. The pattern of imports in terms of countries is very similar — top three importers to Germany as of 2019 are China, France, and the U.S. followed by other EU countries. Natural gas, oil and agriculture products are the most important. Given a huge amount of trade channels with EU countries, Germany is currently benefiting from lack of tariffs on their production. Similarly, bilateral agreements with the U.S. and China, along with WTO partnership, guarantee Germany a sustainable sales market.

It is no surprise that one of the key roles in German economy growth is played by its exporting and importing activity. This thesis' objective was to understand how the international trade contributes to sustainable economic growth of Germany. The short conclusion is that international trade has greatly helped German economy to establish and maintain its positions, but the finding of the thesis also show just how large German economy is dependant on foreign trade and the extreme numbers call for reconsidering the idea of relying on foreign demand.

From the trend analysis of correlation between foreign trade (imports and exports) and economic development we established that all three follow an almost identical trend. From the regression model we can conclude the following. Germany's GDP is highly correlated and dependent on its exports and imports and it retains strong risks regarding crisis of overproduction and low internal purchasing power of the population, since, even, with a zero level of production of goods and services during the year (GDP), Germany would have a positive trade balance. While the German authorities claim that the high trade balance is simply a reflection of a strong economy, not all share that opinion — current president of the United States, Donald Trump, for example, has voiced his concern on Germany's dependance on outside demand for goods and services (Deutsche Welle, 2018). In fact, he is not the only one concerned with the trade surplus of Germany — International Monetary Fund has also requested Germany to regulate and reduce its trade surplus because it poses a threat of economic tension and disruption of currency price adjustments. A requirement to not strangle domestic demand is outlined in EU legislation and this has been brought up to Germany on multiple occasions — since the 1990s, Germany has artificially restrained wage growth, which limits domestic consumption and, accordingly, imports. (Deutsche

Welle, 2018). Such economic imbalance caused by trade surplus can be reduced if Germany boosts domestic demand instead of relying on foreign one, increases government spendings, raises the wages, and invests in infrastructure. This is an especially interesting finding — although the standard of living in Germany is high, it differs only slightly from that, for example, in France or other EU neighbors, while the German economy is much more efficient and generates a huge trade surplus.

While Germany has clearly benefited from its international trade over the years and it has been a crucial part in the boost of German economy and post-war restoration, such trend will probably not stand strong in the current constantly changing economic arena. The export orientation of the German economy is so great that any turmoil on world markets can cause irreparable damage to Germany. This is a yet another argument in favor of stimulating domestic demand.

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