Mendel University in Brno
Faculty of Business and Economics

Coffee Trade in Developing Countries

Bachelor Thesis

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Abstrakt

Ulbrichtová, K. *Obchod s kávou v rozvojových krajinách.* Bakalárska práca. Brno: Mendelova univerzita v Brne, 2016.
Cieľom tejto bakalárskej práce je posúdiť vplyv medzinárodného obchodu s kávou v rozvojových krajinách. Hlavným sledovaným aspektom je dopad exportu kávy na vývoj HDP. Pozorovaná rozvojová krajina je Kolumbia.
Teoretická časť je zameraná na liberalizáciu obchodu v rozvojových krajinách, ekonomický rozvoj a cenu kávy. V praktickej časti sledujeme vplyv exportu kávy a ďalších faktorov na vývoj HDP, s využitím korelačnej a regresnej analýzy.

Kľúčové slová

Obchod s kávou, rozvojové krajiny, export, cena kávy, HDP, regresná analýza.

Abstract

Ulbrichtová, K. *Coffee Trade in Developing Countries*. Bachelor thesis. Brno: Mendel University, 2016.
The aim of this bachelor thesis is to assess the impact of coffee trade on developing countries. The main aspect of the matter is impact of coffee export on the key economic indicator, GDP. The subject is specified on Colombia.
Theoretical part describes trade liberalization in developing countries, economic growth and coffee price. The analytical part determines whether coffee export and other indicators affect the GDP growth, using correlation analysis and regression analysis.

Keywords

Coffee trade, developing countries, export, coffee price, GDP, regression analysis.

Table of Contents

Summary of Figures

Summary of Tables

Abbreviations and Acronyms

A   Arabica coffee
ACP   Average coffee price
CE   Coffee export
GATT   The General Agreement on Tariffs and Trade
GDP   Gross Domestic Product
GNP   Gross National Product
ICA   International Coffee Agreement
ICE   International Exchange
ICO   International Coffee Organization
NYBOT   New York Board of Trade
OLS   Ordinaty Lears Squares
R   Robusta coffee
TE   Total export
WCE   World coffee consumption
WTO   World Trade Organization

1 Introduction

Each day, more than 2.2 billion cups of coffee are consumed in the world.

International trade has grown drastically in the last two decades in the global economy. Production and trade can offer insights into relations between wealthy and poor. Coffee trade is particularly helpful to understand these relations.

The situation in the international coffee trade is diverse. It is estimated that 92 % of total coffee production is coming from developing countries. Every year, the global coffee consumption grows. The amount of exported coffee gets bigger with increasing demand of consuming countries. However, still the main problem of the matter is the growing gap between the price of the raw material, coming from producing countries, and the final product, sold to consuming countries.

Trade is an important source of revenue in developing countries. Yet, developing countries still heavily depend on export of primary commodities. As one of many, Colombia is a developing country. It is a country that produce some of the highest quality Arabica coffee type beans. Despite the fact of being one of the biggest coffee producer in the world, Colombia still faces poverty.

Commodity trade and development has been the subject of several debates. Historically the revolution of development concern trade liberalization and export - oriented growth.

2   Objectives and Methodology

2.1   Objectives

The aim of this thesis is to assess the impact of coffee trade on developing countries.

In general, the economies of developing countries are mostly dependent on the international trade and export. Hence, both of these factors impact GDP growth.

The importance of this topic is based on the fact that many developing countries are relying on primary commodity, like coffee, as their major source of export income. However, each country has its own requirements and specificities so the issue will be specified on evaluation of coffee trade in Columbia.

In addition we further deal with price of coffee. The partial aim is to describe concept of Fair trade pricing and compare it with direct trade.

2.2   Methodology

Theoretical framework consists of relevant literature, existing theories and publications dealing with the topic.

We will start with the theoretical part. During the description we will introduce the theory of international trade and principles of trade liberalization and globalization. Then, the focus will be on developing countries and trade policies.

The next part will concern coffee trade. In particular, we start with an introduction of coffee agreements and financial liberalization and later coffee producing and exporting countries will be examined. A comparison of 4 main coffee exporters will summarize the information provided in the previous description. Also, pricing of coffee plays an important role in coffee trade. We describe the factors of pricing, follows with a comparison of coffee price change on the future markets.

In continuation, we describe Fair trade with association of coffee pricing.

The practical part is divided into correlation analysis and regression analysis. The practical part is focused on Colombia.

2.2.1   Data analysis

The analytical part analyzes international coffee trade and its impact on Colombia. Secondary data were used and obtained from official resources as are the World Bank, International Coffee Organization and Colombia Coffee Growers Federation. Data were obtained for these variables:
- Gross domestic product (GDP)
- Total export (TE)
- Coffee export (CE)
- Average Coffee price (ACP)
- World Coffee consumption (WCE)

One of the key issues in dealing with time series data is that of stationarity and non-stationarity. A stationary process in econometric is considered to be changing with time. With non-stationary data the process is opposite. Figures like GDP are usually nonstationary, however the other figures might not gain the same characteristics. Therefore, in the correlation matrixes, data are expressed in percentage of first differences and in regression analysis data are expressed in first differences pen annum. Seasonal component was extracted from the differences. GDP, TE, CE and ACP are evaluated in prices in US dollars. WCC variable is expressed in quantity. Examine time period of the indicators are from 2000 to 2014.

All the analysis were processed by using statistical and econometrical program called GRETL.

2.2.2   Correlation analysis

The correlation measures the strength of the linear relationship between numerical variables (Hindls, Hronová, Seger, 2004).

The strength of linear relationship between two numerical variables is determined by calculating a numerical measure, called the correlation coefficient. The correlation coefficient is usually expressed by *r*; as a measure of linear relationship between x and y variables. The values of correlation coefficient range between -1 to +1. A value with a negative sign means indirect linear dependence. On the contrary, positive value means linear relationship between the variables. If value of r is almost zero, the linear relationship is weak (Johnson, Bhattacharyya, c2011).

$$r = \frac{s_{xy}}{\sqrt{s_x^2 * s_y^2}}, \tag{1}$$

Where s_x^2 and s_y^2 are the sums of squared deviations of the x and y observations.

The existence of linear relationship was examined between variables, in which, based on the economic theory, the linear association is expected. The correlation analysis examined the impact of TE and CE on Colombian GDP. Then, the focus was on the impact of CP and WCC on the Colombian CE.

2.2.3   Regression analysis

Regression analysis is used for the investigation of relationships between selected variables, the dependent variable, on another variable, the explanatory variable.

The methodology used for econometrics models can be divided into 4 stages according to Adamec and Střelec (2013):

1. Specification of the model, using theoretical statements.
2. Quantification of the model, obtaining the data and estimation of the parameters.
3. Verification of the model, hypothesis testing
4. Application of the model, forecasting or prediction.

For construction of regression model, we used model from research study published by Manni, Alzal (2012). The study describes impact of trade liberalization on economy. Research is conducted from data about Bangladesh. Ordinary Least Square method is used as methodology for empirical findings.

The specification of the model using regression analysis can be simple, with only two variables. However, for testing of one dependent variable on more explanatory variables multiple regression analysis is used (Gujarati, 2004).

Multiple regression model formula is (2):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_k X_k + \varepsilon , \qquad (2)$$

where, Y is the dependent variable and X are the explanatory variables. The value of parameters are explained as β and ε is an error component, or an unobservable random variable.

However, sometimes the data range is significantly wide. In this case, to make data more manageable, typical solution is to make natural logs.

Log-log model formula is (3):

$$Ln\ (y) = \beta_0 + \beta_1 Ln\ (x) + \varepsilon, \qquad (3)$$

where, Ln (y) is logarithm of dependent variable, β is parameter and Ln (x) is logarithm of explanatory variable.

For the quantification of the model, estimated parameters of the models will be obtain using the ordinary least squares (OLS) method. The OLS method extract models with avoidable errors and offers models with high quality prediction of the values in the dataset.

Multiple regression analysis is made to examine the impact of explanatory variables on dependent variable. In total, two separate models will be provided. All used variables are associated with Colombia.

In Model 1, the explanatory variables are total export and coffee export, where the dependent variable is gross domestic product. Expectations about how the variables influences the GDP are positive. As export is an instrument of GDP and coffee export is included in the total export. Data in this model are expressed in logarithm and in annual differences

In the second model (Model 2), the depended variable is coffee export where explanatory variables are world coffee consumption and average coffee price. It is expected that with growing coffee consumption the coffee export of a country should also grow. Therefore, coffee consumption impact coffee export positively. Coffee price does not necessarily impact coffee export negatively nor positively. Data are expressed in annual differences.

Next, using OLS model, several measures are obtained, which helps with quality assessment of the model. The key measure is R^2, called the coefficient of determination. It represents the accuracy of a model, more precisely, the y variability explained by the fitted multiple regression model. The coefficient of determination ranges from 0 to 1.The closer it is to 1 the better is the fit. (Erickson, 2014).

The coefficient of determination formula for multiple regression is:

$$R^2 = \frac{RSS}{TSS} = 1 - \frac{ESS}{TSS}, \tag{4}$$

where RSS is the residual sum of squares, ESS is explained sum of squares and TSS is total sum of squares.

The model is then verified with testing of the hypothesis. The hypothesis are tested on significance level, $\alpha = 0.05$ and lower significance level $\alpha = 0.01$. If the p-value is less than α, the null hypothesis is rejected. The verification of the model should fulfill seven classical assumption of regression analysis. To generate correct analysis, we focused on those assumptions, which are often violated throughout the analysis.

These classical assumption are:
   I.   The regression model is linear in the coefficients, and it is correctly specified. (RESET test, LM test).
  II.   No perfect multi-collinearity (VIF).
 III.   No serial correlation (Durbin- Watson test).
 IV.   No heteroscedasticity (White test, Breush-Pagan test).
  V.   The error terms are normally distributed (Chi square test).

The null hypothesis can be found in the table below:

Tab. 1   Null hypothesis of econometric verification tests

Tests	H_0
RESET test	Model is correctly specified
LM test	Model is correctly specified
VIF	No (multi)collinearity
Durbin – Watson test	Serial correlation does not exist
White test	Homoscedasticity
Breush- Pagan test	Homoscedasticity
Chi- square test	The error term is normally distributed

Source: Adamec, Střelec, 2013

3   International trade

3.1   Theory of International trade

The study of international trade and finance is where the discipline of economics was established. In 1758, the Scottish philosopher David Hume published his essay *Of the Balance of Trade* which is often described as the first real exposition of an economic model (Krugman, Obstfeld, Melitz, 2012).

As the national welfare improves, international trade benefits. The evolution of modern economy is closely linked to the birth of international economics. In 1776, Adam Smith published *An Inquiry into the Nature and Causes of the wealth of Nations,* a work that turned into the first modern statement of the theory of economy. Smith proposed an attack on mercantilism, the system that was dominated in the 1700s and his main focus was access to foreign markets and stress the import over export. Imports enable a country to have goods which are otherwise more expensive to make. Additionally, to bring awareness that if no one is importing, the companies are limited by the size of national market. By contrast, mercantilism stressed exports over imports to attain revenues for construction projects or enlarging the armies. Adam Smith critically refuses trade barriers, since they decrease specialization, technological progress and wealth creation. (Gerber, 2014).

Ricardo and Heckscher, the classical theorists, pointed on a specialization in production according to countries comparative advantage. "*By stimulating industry, by rewarding ingenuity, and by using most efficaciously the peculiar powers bestowed by nature, it distributes labour most effectively and most economically. While, by increasing the general mass of productions it diffuses general benefit, and binds together society of nations throughout the civilized world*" (Ricardo, 1821, p.134). It enables country to improve its allocation efficiency because of the goods which are now shifted to the production of the goods, which produces the best. Therefore, the profit of trading nations is improved. (Bidlingmaier, 2007).

The Ricardian comparative advantage model consist of one factor input - labour. Following, the Swedish economists Eli Heckscher and Bertil Ohlin introduced the Heckscher - Ohlin theory in 1930s. The theory is based on two factors –labour and land, important resources for production. The Heckscher - Ohlin theorem is described as if one nation with rich labour factor would exports labour- intensive commodity and import capital-demanding commodity (Salvatore, 2013).

3.2   Agricultural international trade

Agricultural trade has developed promptly for past fifty years. The expansion of agriculture trade caused by domestic price support policies in become the main focus area for analytical studies in 1960s. There were attempts for comparisons of how the trade had been affected by policies in developing countries and what the impact

for the whole agriculture market was. The price behavior of agriculture commodities has always raised question between economists. Supply is restricted by land area and the trade is based on customer preferences. (Josling et al., 2010)

Erokhin, Ivolga, Heijman (2014) stress the importance of state support in agriculture. Developed countries, the USA and the countries of EU have the possibilities to implement high quality range of tools, which affect the competitiveness of farmers trading internationally. However, developing countries are not as supported by state government as developed countries. Moreover, developing countries are limited by World Trade Organization (WTO), which restraint their foreign trade activities.

3.3 Developing countries

Developing countries have a dependent position in the global market comparing to the developed countries. Being in a competition with developed countries in global market, developing countries are concerned about the benefits of trade liberalization. Labour and land are cheaper in developing countries, and their primary effort is to specialize in production and export of goods and products of agriculture. Regarding the Hecksher-Ohlin theory, the prosperity of international trade and its liberalization must balance the production factors and integrate with wage diversity of trading countries (Erokhin, Ivolga, Heijman, 2014)

3.3.1 Trade policy and barriers in agriculture

Krugram, Obsfeld, Melitz (2010) point out on tariffs as the most influencing element of trade policy. Two types of tariffs are introduced: Specific tariffs, where each imported good has a specific and fixed charge, and Ad valorem tariffs, are taxes paid in partial value of imported goods. Nowadays, it is more common for countries to protect their industry with nontariff barriers, for instance, the import quotas. Every country has different conditions when coming to trade. Each one has different history issues, but when it comes to economy, they all have different income levels. The income range in developing countries is wide.

Tariff barriers

Tariffs on agricultural products, such as coffee, cocoa, oil and other, are higher comparing to tariffs on industrial products. Needless to say, tariffs are higher for exporting countries than for importing countries. However, tariffs in importing countries tend to increase more, as the commodity becomes more refined and taxes get higher (International Coffee Organization, 2011)

IMF (2001) analyses, that tariffs on agriculture commodities are nine times bigger, in average, than tariffs on manufactured goods. Furthermore, the examination showed, that the agriculture commodities, exported by developing countries, are often sold in depressed prices. For instance, the European Commission spends 2.7 bil-

lion euro per annum, supporting the European farmers. Meanwhile, they are keeping out the cheaper imports of sugar coming from developing countries. Therefore, it is more difficult for these countries to make profit.

Non-tariff barriers

UNCTAD (2005) classify non-tariff barriers according to the nature of the measure, whether they relate to price control, quantity control, monopolistic or technical measures.

Such barriers are often connected to potentially quantity reduction imports or price growth (Deardorff, Stern, 1997).

Non-tariff barriers or non-tariff measures refer to any measure different from tariff which restrict trade. WTO lists the non-tariff barriers in its WTO agreements. It includes participation in trade and restrictive practices by the government, customs and administrative entry procedures, technical barriers to trade specific limitations and charges on imports. Non-tariff barriers on agricultural products include parts which need to comply with EU regulations on traceability[1] since January 2005. It requires exporters to identify the origin of products. This requirement detriment exporting developing countries with additional cost. Other regulations on environment and labour standards have also been an impact on agricultural exports, especially export with agricultural commodity from developing countries (Mohan, Khorana, Choudhury, 2012).

Salvatore (2013) refers to import quotas, as the most essential non-tariff trade barrier. Import quotas are used as a protection to domestic industry, to protect domestic agriculture and to alleviate the balance of payments. This is a restriction on the volume of a commodity allowed to be imported or exported.

3.3.2   Trade liberalization and globalization

Both liberalization and globalization bring benefits but also demerits to integrated community. Globalization can be interpreted as a boarder free trade between countries and territories or country and another country. It distributes opportunities and possibilities available for the trade between different nations. Globalization make the international division of labour, technologies, intercultural exchange more accessible. Therefore, the transportation cost is reduced, facilitated by globalization, opens a way for trade liberalization in the international markets (Gaur, 2015).

Bidlingmaier (2007) stated that more recent theories suggest different effect on trade, where there are positive as well as negative effects. „*The cost advantage a first mover gains because of increasing economies of scale can prevent possible other*

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[1] Regulation EC/178/2002 defines traceability as the ability to trace and follow food products, feed and ingredients through all stages of production, processing, storage, transport and distribution (European Commission, 2015).

*producers from entering the market even though they would have a comparative advantage"(*Bidlingmaier, 2007, p.2)

Trade liberalization helps countries to realize more profitable ways of usage of their resources (production capacities). There are two effects of trade liberalization. First, resources are being reallocate towards activities in which country has its comparative advantage. Secondly, trade liberalization helps to expand the consumption opportunities of countries. If production is more efficient it leads to a bigger income and better opportunities to purchase goods and services from other countries (Hoekman, Kostecki, 2001).

Bezuneh, Yiheis (2014) argue that trade liberalization should lower poverty and power economic growth. However, they explain that if domestic commodity price, is higher than in other parts of world, increased by tariffs and barriers, it would have negative effect on a small importing country. With lowering the domestic price, the production is affected and so is the poverty of a country. Multilateral liberalization and farm and export subsidies cancelation in exporting countries could lead to growth of the world agriculture products prices.

In addition, Mohan (2007) comes to conclusion, that trade liberalization can help lowering the risks for producers from other stakeholders. Mostly, the trade risks are created by price oscillation of coffee. Terminal market, more precisely futures markets can reduce the risks.

3.3.3   Impact of trade liberalization in developing countries

After 1985, many developing countries reduced tariffs and removed import quotas. This made developing countries enable to grow their economies and open for trade. Trade liberalization in developing countries was special, because it had two effects. The volume of trade drastically increased. The other effect represented a complete change in the type of trade. Before the change, developing countries were focusing on export of agricultural and mining products (Krugman, Obstfeld, Melitz, 2012).

According to IMF (2001) countries has to be open for international trade to be able to increase the living standards for its inhabitants. In their study, it shows that developing countries, Vietnam or Uganda, happened to grew faster in economy and were capable of reducing the poverty. Developing countries tend to gain more from trade liberalization, concerning the growth of GDP, than developed countries.

McCorriston et al. (2013) concludes that some refers to the impact of trade liberalization in developing countries as negative and some as positive, reducing the barriers. The issue is being described based on evidence in their conceptual framework. In this case, trade reforms, multilateral and unilateral, have an important role of the policies. Developing countries have been using unilateral efforts to burst the trade with reducing the tariff barriers, or non-tariff barriers. Price plays a big role of the impact as well. Price of commodity is changeable and relies on factors following world price changes and exchange rate movements. For instance, in Ghana, the price of maize dropped about 20% in1987-2000, however, the change of the real exchange rate would have boost the price by 24 %.

WTO, Doha Round, promoted further trade liberalization, and the linkages between trade liberalization and poverty. The commodity price spike in 2006-2008, followed by 2010-2011 brought higher prices for commodities. As conclusion, the poverty level has increased across the developing countries.

A study provided by Ivanic, Martin, Zaman (2011) describes a "food crisis" in 2010-11. Price increase leads to poverty increase. Commodity prices are influenced by agriculture trade policies and stockholding policies. Food prices are likely to have the highest impact on the poor since it is a big expenditure for the family, whereas, the income of the poor households is based on agricultural production.

3.4   Trade organizations

GATT

After the World War II, The General Agreement on Tariffs and Trade (GATT) was established to reduce barriers among nations in the international trade. The agreement was signed in 1947. Ever since, it had made progress with lowering the taxes on coffee imports into consuming countries. Tariffs have been mostly removed for Green coffee, however, tariffs for importation are still in place. In addition, there are still couple of non-tariff barriers in place. (International Trade Centre, 2011)

Feenstra, Taylor (2011) claim that countries were negotiating under the GATT, where each negotiation had "rounds" named after the country in which the meetings took place. The next trade organization, World Trade Organization (WTO), was negotiated and established during the Uruguay Round (1986-1994).

World Trade Organization

The World Trade Organization was finally established after the Uruguay Round, on January 1, 1995, as the biggest reform of the world's trading system since GATT was created. Just after two years, WTO members had agreed to lower import duties on tropical products - coffee, which are mainly exported by developing countries (World Trade Organization, 2016b).

Hoekman, Kostecki (2001) describes the aim of the WTO in the way of simplify access to the national markets and to make it easier to implement and operate on the Multilateral Trade Agreements. To identify a country's influence, the WTO uses criteria like share in the world trade, its trade dependence, which is the ratio of exports and import to GDP.

Mahajan (2011) describes Doha Round, the latest round of trade negotiation lead by WTO, as a round of development. As to be more specific, Doha declaration promised to make it possible for developing countries to participate more in the international trade, by reducing the tariffs and eliminating domestic and export backing that mostly leads to "dumping"[2].

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[2] Dumping happens when a product or commodity is sold in lower price elsewhere rather than domestically (Salvatore, 2013).

World trade organization (2016a) declares the WTO principles as following:
- Trade equally without discrimination
- Unrestricted and more open trade
- Transparency
- Fair competition

Each year WTO, the International Trade Centre and the United Nations Conference on Trade and Development publish *World Tariff Profiles.* These statistics provide collection of data on tariffs imposed by WTO members and other economies[3]. Following the data, countries like USA. EU, Canada or Russia use the lowest duties (WTO, UNCTAD, ITC, 2015).

3.5   Economic growth and development

A major goal of poor countries is economic development or economic growth. These two terms are not identical. Nafziger (2006) refers to economic growth as an increase a production of country or income per capita. Production is measured by Gross national product (GNP) or gross national income. Then, economic development refers to economic growth followed by economic structure and distribution changes. These changes include material status of developing countries 'population. Therefore, the changes bring decline in agriculture's share of GNP and increase in GNP share of industry and services in examples like technical advances or increase in education and skills of the labour force.

Economic growth can be as well analyzed by Gross domestic Product. Henderson, Stireygard, Weil (2012) use GDP to measure within country but in the study they stress that measuring GDP of a developing country can often come to irregularities, since developing countries has smaller economy, and the degree of integration across other countries is lower.

Awokuse, O, Xie (2015) uses empirical study, using data obtained from 1980 to 2011, to prove the relationship between GDP and agriculture. In the study, nine developing countries from Asia, Latin American and Africa were selected. The analysis shows that long-run relationship between agriculture and economic growth exist, however, it does not apply to all developing countries. In some cases, agriculture is shown to rather stimulate than kick off the economic growth, therefore, in some cases investment in agriculture should be implemented.

In effect, Nobel laureate in economics, Amartya Sen, argues that poverty cannot be measured by wage or utility. What matters for well-being is not just the characteristics of commodities consumed, like in the utility approach, but to which direction the consumer uses commodities to make something out of it[4]. To put sense into

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[3] For data information visit: https://www.wto.org/english/res_e/booksp_e/tariff_profiles15_e.pdf

[4] Sen refers to this this concept as "functionings", reflecting on what person does with the specific commodities. The ability of choice and organization of one's own life is the main aspect of the understanding of well-being (Todaro, Smith, 2012).

the concept of human well-being, and particularly poverty, "*we need to think beyond the availability of commodities and consider their use*" (Todaro, Smith, 2012, p.16).

International Coffee Organization (ICO) activities and project are fully committed to the Organization's mission. The idea is to support and develop coffee value chain and most importantly, to improve living conditions of farmers in producing countries. The projects focus on poverty reduction in developing countries and sustainable development by managing the perspective for farmers' world widely. The results are always helpful information for the world coffee economy. ICO project activities allows growers to take part in pilot projects aimed to increase national sector competitiveness. However, small producers, like most of the growers in developing countries are, have to face challenges and deal with policies. The challenges include lack of infrastructure, poor market access, disproportionate financial services and limited transfer of technology at country level (International Coffee Organization, 2013).

3.5.1   Impact of export on economic growth

Economic development is the main focus of all the nations. Economic growth is fundamental and inseparable to economic development. Economic growth can be explained by several contributions, where export is one of them (Anwer, Sampath, 1997)

The debate on relationship whether export leads to economic growth had have considerable interest among economics. Several empirical studies analyzing this issue.

Vohra (2001) examined relationship between export and economic growth in India, Pakistan, Malaysia and more. The study concludes if a specific level of development is achieved export then have impact on GDP growth.

Manni, Alzal (2012) analyzed the impact of trade liberalization on Bangladesh economy. His research includes growth, export and import. The quantitative analysis suggests that both import and export increased with greater trade openness. He added that with liberalization policy, export improved, which lead to higher economic growth.

Another study provided by Dreger, Herzer (2013) challenges the fact, whether export is the factor generally contributing growth in developing countries. The authors came to a conclusion that GDP is affected by export growth, however, only in the short-time period. They added that several correlations showed different results, noting that each of the developing country goes thru different stages of development, and some are more or less development compare to each other. The differences of the correlations occur because of some countries large-level of primary export dependence compare to the others.

3.5.2   Economic importance of coffee in developing countries

Many of developing countries have comparative advantage in their agriculture, such as Colombia has comparative advantage in Coffee and it is focusing on production of the commodity. The integration with international markets, exporting the goods, trade liberalization may increase employment and wages in there agricultural sectors (Gaur, 2015).

The coffee tree can only be grown in areas with warm climate, without frost or changeable weather forecasts. Countries producing and exporting coffee can be found all around the world. However, 90% of the world's coffee production comes from the developing countries (Milford,2004).

After oil, coffee is the most traded commodity world widely. The trade of green coffee is by Twenty-five percent made by exporting countries, which are African countries. Coffee from Uganda or Kenya are widely known. Therefore, these Sub-Saharan African countries, expanded their export in order to increase the prices and demand. For instance, at the same time, Colombia put limitation over the supply of coffee, to keep the prices high. (Crumley, 2013).

4 Coffee trade

Until 1989, coffee was trade on a regular global market governed by the International Coffee Agreement (ICA). Coffee production is the mainstay of 100 million people worldwide, the majority of who are found in the poorest countries of the world. The structure of coffee trade is very similar to each and every nation such as Japan or part of Europe or America. The process of coffee purchase is being held through international trade houses, dealers or traders. Coffee is most commonly sold free on board[5]. Needless to say, many coffee roasters still prefer to buy in-store or ex-store delivery basis. Traders and dealers are the responsible people for discharging the coffee from the containers and for making all the arrangements towards the roasters. Coffee trading is in many ways a various process. An individual parcel of coffee can be traded several times. Physical coffee is trading within coffee contract on the future exchanges and terminal markets (International Trade Centre, 2011).

4.1 Coffee agreements and worldwide financial liberalization

Sixty-six countries successfully created ICA in 1962 at the United Nations headquarters in New York. Within the agreement, the export quotas were set on every coffee exporting country, as a tool to restrict coffee trade. The result come to an increase and stabilization of coffee prices. ICA then disintegrated in 1989. Obviously, without a control over coffee supply, the coffee industry was on blossom. Industry experts estimated that the price of coffee in the early 2000s did not cover productions costs of growers. Even thought, the farmers have to still maintain the best quality beans despite the minimal earning or losses because the roaster's cost of switching suppliers is low. Additionally, industry experts argued that coffee industry consolidation has, as the matter of fact, increased the price spreads between the retail and farm gate levels of the value chain (Chaddad, Boland, 2009).

Meantime, World Bank structural adjustment programs required governments of producing countries to control industries, where coffee industry was one of them, and open them for possible competition with other private trades. As a result of this action, the world coffee prices decreased by half to less than 80 cents a pound. The price continued to be low for five years until in 1994, Brazil hit the production and prices increased above 200 cents. Three years later, prices increased to 270 cents a pound which meant a stronger demand and lower stock (Fairtrade foundation, 2012).

Further coffee agreements were signed in 1968, 1976, 1983, 1994, 2001 and 2007. The 2007 Agreement was agreed on September 2007 in London and will last for 10 years. 77 members of International Coffee Council agreed to this agreement. The innovations come with this agreement include a new part focus on development

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[5] Free on Board means that the goods are delivered by the seller, at the specific container chosen by the buyer, or the goods has been already delivered. From the moment the goods are in the container, the risk of loss and all costs are carried by the buyer. (International Chamber of Commerce, 2010).

and funding's of coffee development projects. This agreement also strengthens the role of ICO, who has the post of intergovernmental consultation. Therefore, their idea is to increase transparency and promote sustainable coffee economy for the benefit of farmers of coffee in producing countries (International coffee organization, 2015).

4.2   Coffee production and export

Coffee is one of the world's most valuable trade commodity. There are two different types of coffee. Arabica (A) is considered as a higher quality beans type of coffee. Arabica makes about 60 % of the world production. Robusta, is a lower quality coffee, but with a higher content of caffeine (Chaddad, Boland, 2009).

4.2.1   Coffee producing countries

The main coffee producing countries are Brazil, Vietnam, Indonesia, Colombia and Ethiopia. Brazil is the largest producer of coffee and make over 40% of the world's coffee supply. Brazil produces both coffee types, Arabica and Robusta. The next producer, Vietnam, makes 16 % of global coffee production and it is the biggest Robusta producer. This provides jobs for more than 1 million workers in the country. Second largest producer of Arabica coffee is Colombia. More than 2.4 million Colombians work in coffee production. Indonesia is the second largest Robusta producers. About 1.5 million farmers produce Indonesian coffee. African biggest coffee producer is Ethiopia. Europe is the primary market for Ethiopia, since Ethiopia has the most favoring position to Europe (European coffee report, 2014).

The share of roasted coffee in developed countries is 96.7 %, however, almost no coffee is produced in developed countries. It is caused by the re-export. According to ICO, the EU is the largest re-exporter of coffee followed by the US and Japan Mohan, Khorana, Choudhury (2012).

Tab. 2   Coffee producing countries for Arabica and Robusta in thousands 60kg bags

|	Coffee type	2011/12	2012/13	2013/14	2014/15	2015/16
Brazil	A/R	43 484	50 826	49 152	45 639	43 235
Vietnam	R/A	26 500	23 402	27 610	26 500	27 500
Indonesia	R/A	10 644	11 519	11265	11 418	12 317
Colombia	A	7 652	9 927	12 124	13 333	13 500
Ethiopia	A	6 798	6 233	6 527	6 625	6 400

Source. International Coffee Organization

According to the Table 1, the production of coffee has been growing strongly for Indonesia and Colombia, where other countries, Brazil, Vietnam and Ethiopia, have

been producing around the same amount of coffee each year. Brazil, Vietnam and Indonesia produce both coffee types, Arabica and Robusta. Some countries are not only focused on quantity but also quality. In fact, Colombia is known as a producer of the highest quality Arabica coffee.

4.2.1 Coffee export

For many countries, especially developing countries, export is a key contributor of tax income and gross domestic product. A strong dependence on a commodity export has in general harmful consequences for growth of a country. Coffee provides a particularly important share of the earnings in developing countries and large number of growers depend on coffee as their main income (International Trade Centre, 2011)
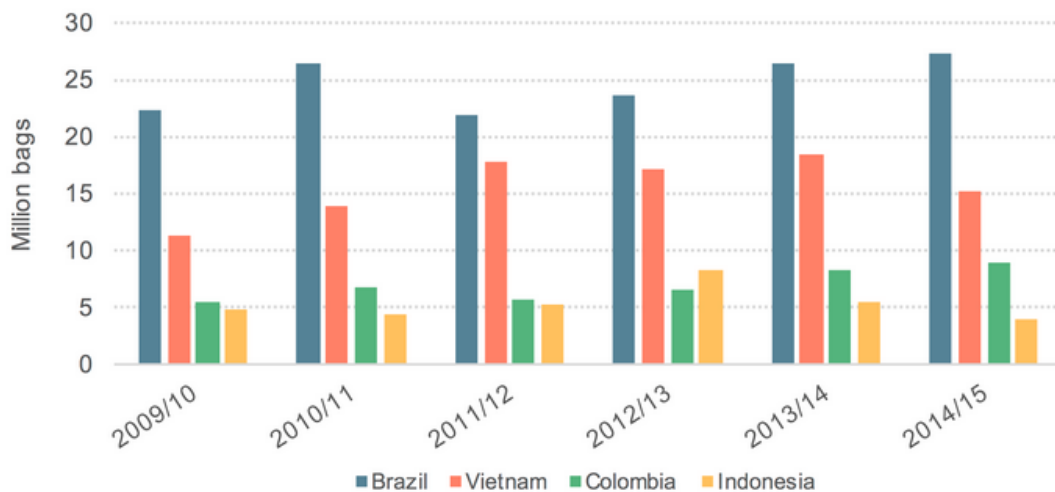
Img. 1   Total export by the largest producers of coffee
Data source: International Coffee Organization, 2016

Brazil, Vietnam, Colombia, Indonesia are all developing countries and the biggest coffee producers in the world. Viewing the export development throughout the years (Img. 1) we see that Brazilian export has escalated since 2011/12. In 2014/2015 Brazil reached 27.4 million bags. Colombia's export has been on increase as well. The 2014/15 year show over 8 million exported coffee bags. In contrast, Indonesia, has been struggling with on-going lower export since 2013/14, where the export reached less than 5 million bags. Export in Vietnam is ranged between 15-20 million bags since 2011/12.
Needless to say, the strong export from Brazil and Vietnam can be found difficult to maintain indefinitely and supply shortages in the future, therefore it is likely for the prices of coffee to be higher.

4.3   Coffee prices

Price of coffee is very depending on weather and geological location. Therefore, the coffee price, has been historically instable. Since coffee market is on the boom, new emerging paradigms are likely to influence coffee future and therefore effect the livelihoods of the people who are depended on it (Lewin, Fiovanmucci, Varangis, 2004).

Coffee is a world widely known as commodity traded on everyday bases. Therefore, the most important thing, concerning economy, is to set a currency which will be used for all the trade transaction globally. The reason for this is simple, such as to restrict currency differences in coffee prices. In 1992, the London Robusta market moved from using British pound sterling to United States dollars for that reason, by that also facilitating arbitrage between the New York and London future markets. In the economic theory, price risk management would become difficult if market would deal with both price movement and currency movement at the same time for each transaction. Not to mentioned, that most currencies are linked to the United States dollar (International Trade Centre, 2011).

4.3.1   Factors contribute to changes of coffee price

Trends in agricultural production and consumption leads to price raise in 2002-2006 and even higher price development in 2010-2011. The sudden price growth is referred as price spike. Both short-terms and long-terms shocks are influential for price spikes. Short-term shocks are weather, stock change or changes in policies in countries. For instance, Brazil 2010/2011 coffee crop was afflicted by bad weather conditions, so the price was of commodity was almost doubled to price in 2008. Long-terms factors cover growth of population and growth per capita incomes, deflation of the U.S. dollar and slower growth of agricultural production in general (Trostle et al., 2011).

Weather and climate change affect the coffee price change heavily. In Brazil, the coffee output is two years cycle, a good crop is followed by less successful crop the year after and therefore, it sums up to a 900 000 tones or 30 % output difference. The future markets will then react with prices escalation and therefore motivate the growers for higher production. On the contrary, these are only short-time changes and when the weather and conditions get stable and the stock recovers, it is leading to oversupply which means a comeback to lower prices (Fairtrade foundation, 2012).

4.3.2   Coffee pricing guide

Pricing of coffee at the international scene can be divided as follows:

- Physicals – prices for green coffee (coffee's raw material form) or physical coffee;

- Indicators – prices of 4 main groups with comparable coffees;
- Futures – prices standing for the future demand of standard qualities coffees;
- Differential – system associating physical prices to future prices;
- Premiums – producers and growers negotiate for positions for higher quality, origins and certifications (CBI, 2012).

Day to day physical coffee prices are determined by supply and demand. The price setting criteria are quality and availability of a specific type of coffee is offered. This shows that each and every coffee is special, has characteristics, quality and flavor different from one another. Therefore, by grouping more or less comparable coffee types together, an average price can be used and traded. ICO indicator prices, set daily by International Coffee Organization in London, represents 4 main coffee types available in the international market: Colombia mild Arabica, Other mild Arabica, Brazilian and other natural Arabica and Robusta. ICO uses these categories to calculate market prices, and also to follow the price development[6] of each (International Trade Centre, 2011).
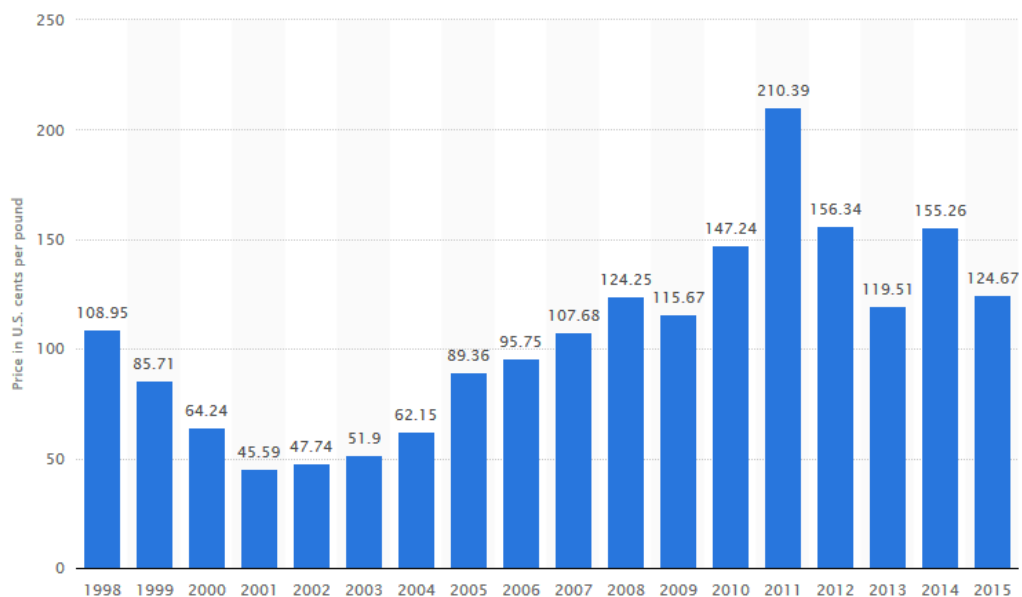
Img. 2   ICO composite price of green coffee worldwide from 1998 to 2015
Source: Statista, 2015

The graph above (Img. 2) the ICO composite price indicator are presented. The time range of price development is from 1998 to 2015.
Among the ICO price we see the price was on constant increase since 2001, when the annual price of coffee amounted to 45.59 US cents per one pound of coffee. Only

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[6] For current ICO Indicator coffee prices see: http://www.ico.org/coffee_prices.asp

5 years later, in 2006, the price climbed to 95.75 US cents per pound which is almost double the price from the 2001.

The highest price per pound, 210.39 US cents, was reached in 2011. The reason for such a price shock was affected by degraded weather and adverse production conditions. Commodity prices almost tripled from previous years. Therefore, with a higher price paid for coffee, the growers are expected to be paid more than previous period. In addition, concerning all the mention, the overall GDP of coffee exporting country is expected to raise.
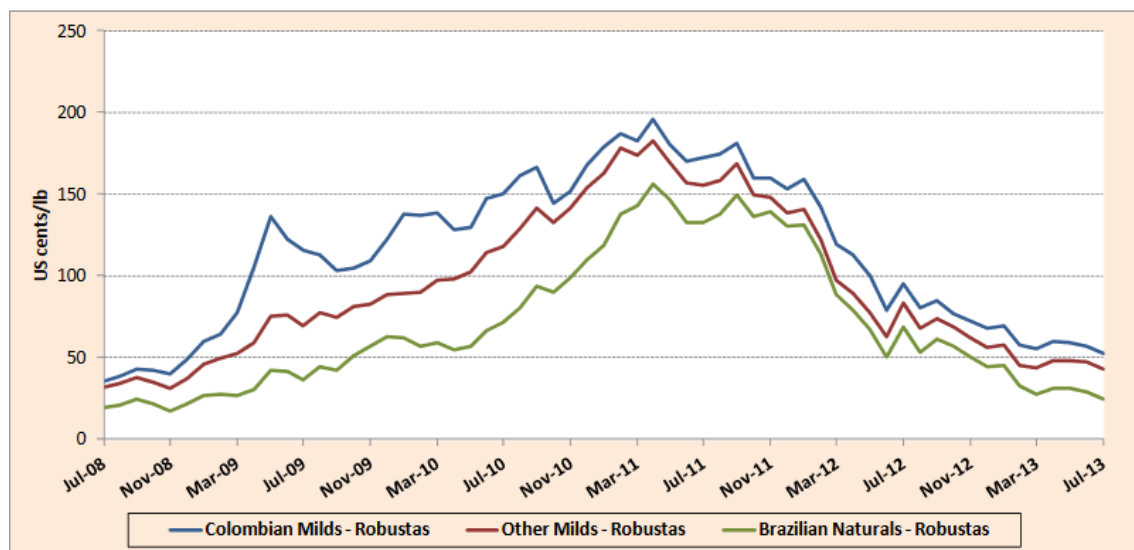
Img. 3   ICO price differentials between Arabica and Robusta indicators
Source: International Coffee Organization, 2013, p. 2

The graph shows the price movement of coffee from July 2008 to July 2013. These price developments show the highest price level was in 2011. In this period, the major coffee producing countries had higher production and the market was well supplied. However, the prices later fell to 18-months minimum. It could be affected by depreciation in Brazilian exchange rate occurring at the time.

4.3.3   Futures markets

There are two ways of trading coffee. At first, coffee can be traded physically on the spot markets, secondly, traded on the international futures markets. (Fairtrade foundation, 2012)

In the coffee spot markets, coffee is being sold and bought in physical, green form of different qualities that are delivered immediately. The cash transaction involves the transaction of a specific coffee lot with a particular quality of physical coffee. The price is the current and final price for the specific coffee to be transferred.

On the other hand, in the coffee future markets, standard quality coffee is being purchased or sold. The price of coffee in determined in open audition- future markets. The future price is the price, one is expected to pay in the future (International Trade Centre, 2011).

Future markets exist for the purposes of price discovery and risk transfer. The price discovery pushes both seller and buyers to meet in a competitive marketplace. Coffee futures have been traded in New York since early 1880's. Intercontinental Exchange (ICE) then took over the New York Board of Trade (NYBOT) and became the center of global trading in commodities including cotton, cocoa, sugar or Coffee "C", a contract based on Arabica and Robusta coffee. This is the coffee market in the United States. Coffee is also being traded internationally, most commonly in London, at the London coffee future market (ICE, 2012).

The prices difference of Arabica coffee on the futures market in New York and Robusta coffee in London Nyse Liffee future market are shown on the figures below (Img. 4, Img. 5).
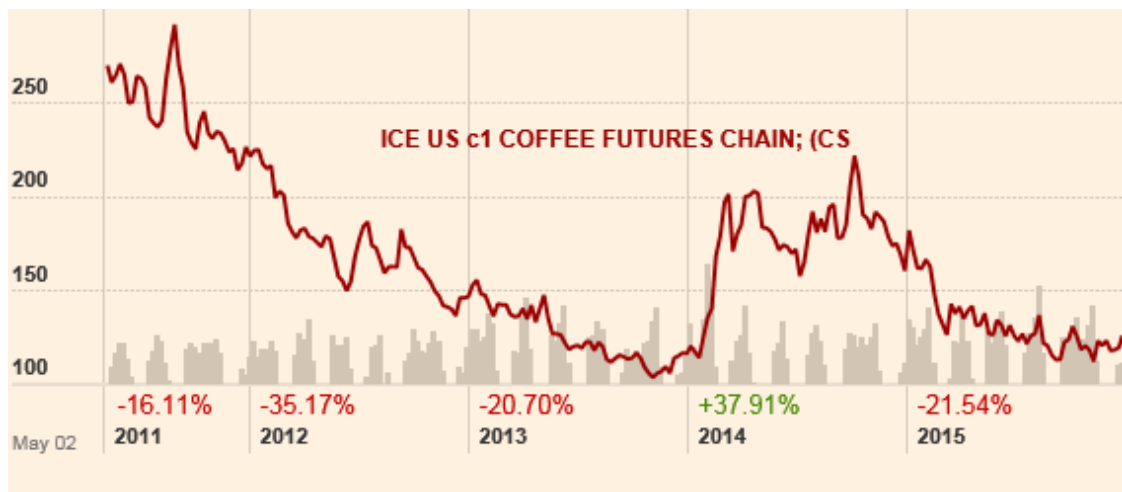
Img. 4   Arabica coffee prices on the ICE futures market in New York[7]
Source: ICE future market in New York, 2016

The graph of the Arabica coffee prices on the ICE future market shows the price change from 2011 to 2015[8]. In 2011 coffee has been traded in range of $250 to $300, however it was then followed by a massive price drop to as low as $102[9]. In 2014, the coffee price recorded +37.91% difference compare to previous year. In 2015 prices of coffee declined by 21.54 % in New York. In July, 2015, the Arabica coffee averaged at $116.02 cents a pound which was an 18-month low. This was caused by the depreciation of Brazilian exchange rate. As Brazil is the top producer of Arabica beans, it has a strong effect on the overall price.

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[7] For real time US coffee C futures visit: http://www.investing.com/commodities/us-coffee-c

[8] The coffee future contract trading months are March, May, July, September and December

[9] The interpretation of future contract in this case is as following: $102.0 is equal to $1.02 per pound
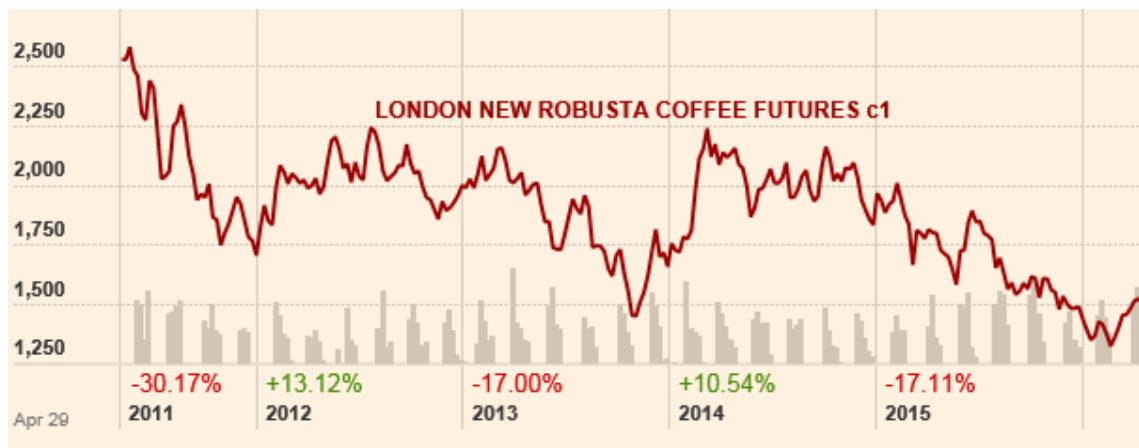
Img. 5   Robusta coffee prices on the Nyse Liffe futures and option market in London[10]
Source: London Robusta coffee future, 2016

Following with the graph of Robusta coffee price change in London futures and op-
tion market from 2011 to 2015. After price fall in 2011, prices increased by 13 % in
2012. However there was a significant price fall in 2013 when Vietnam has har-
vested recorded amount of coffee[11] and the oversupply Vietnam was pushing down
the prices of global market.

4.3.4   Price volatility

Prices of coffee are volatile and uncertain. Coffee farmers face highly volatile com-
modity revenues each year (Rutten, Youssef, 2007)

The concept of volatility can be explained as „how much a price changes either
with regard to its constant long-term level, or to its trend. Volatility measures dis-
persion about a central tendency "(Algieri, 2012, p. 7).

Volatility increases more when factors as GDP and short-term interest rates oc-
cur and therefore are more volatile, also, with high inflation and low output gap, the
same matter results (Huchet, Fam, 2016).

Price volatility significantly impact lives of those, who depend on coffee, making
it hard for growers to anticipate their future income, and set the right budget for
their farming activities. With low coffee prices there comes low income for the grow-
ers, who have no revenue nor supplies to invest in new maintenance, by applying
pesticides, replacing trees or hiring new staff. Thus, when the prices of coffee drops
below what the cost of production is, farmers come to struggle with maintaining
good living conditions for their families. These circumstances make them unable to
feed their families, pay bills or school fees. One of the main reason, kids are taken

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[10] For real time London Robusta coffee futures visit: http://www.investing.com/commodities/lon-
don-coffee

[11] For more information, see Chapter 4.2.1

out from school, is because coffee farms are usually run by a small family business. Therefore, it is cheaper for the family to have their children work on their farms to make more income (Fairtrade foundation, 2012).

Price volatility at national level causes inflation in developing countries. Automatically there comes failure for Balance of Payments and political and food insecurity for the countries. These are common problems in coffee producing countries (Bigirwa, 2004).

4.3.5   Coffee farmers' price risk exposure

For coffee farmers, each season is different. Every year farmers have to deal with a period of low prices for their commodity which result in lower use of inputs and of course, reducing the amount of workers. Historically, the falls in prices are reflected in prices paid to producers but price increase is only seen to be absorbed into marketing chain. Coffee price risk does not only affect farmers as producers, but also it can influence them as processors and traders in the coffee market. The process of coffee trading is time consuming and so is the time for coffee to move down the supply chain, from farmers to export. (Rutten, Youssef, 2007).

Coffee farmers in developing countries often receive only a small amount of the export price of green coffee. This problem is explained by government regulations of the domestic markets. The producer price shares are distinguished among the developing countries which seems to have similar export system. According to Baffes (2003), Tanzania only 42% of the export price of Arabica coffee and 30% of the price in Robusta in 1998-1999, where Uganda received 75% of the export price at the same time (You, Bolwig, 2003).

Crumley (2013) argues that farmers are exporting even though the price of coffee has dropped. Therefore, incomes do not cover the basic needs. In conclusion, the retail prices in developing countries are not sufficient for the farmers. There is a missing organization in between the farmers, weak connections among the producers and traders and not fully developed infrastructure. All of a mentioned about has a negative effect on famers and makes it very challenging and risky for the coffee growers to trade. They are seeking help and support from institutions to further coffee export.

In the following graph we can see the prices of coffee paid to growers, from 3 specific exporting countries, from 2000 to 2013 (Img. 6) and retail prices of coffee from 2000 to 2014 (Img. 7).
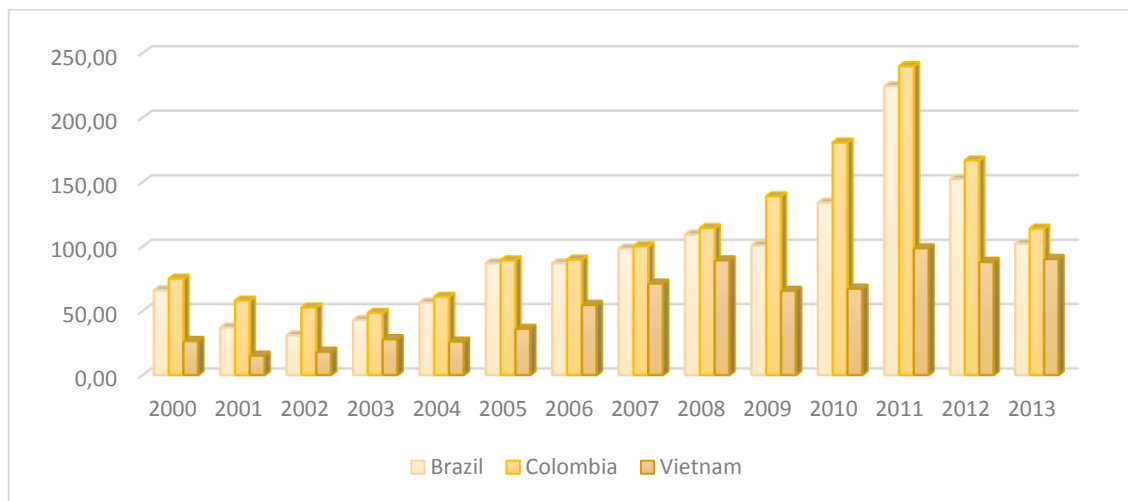
Img. 6   Prices paid for coffee to farmers in selected exporting countries in US cents/lb in the pe-
riod from 2000 to 2013.
Data source: International Coffee Organization, 2016

Prices paid to the growers are visibly different to the prices of coffee sold on the
futures markets[12]. We can say that relatively smaller price is paid to the growers
compare to the price, for which is coffee sold on the futures markets. Prices paid
each year are dependent on factors like weather and production sufficiency. Most of
the prices the growers get paid are lower than the production costs.
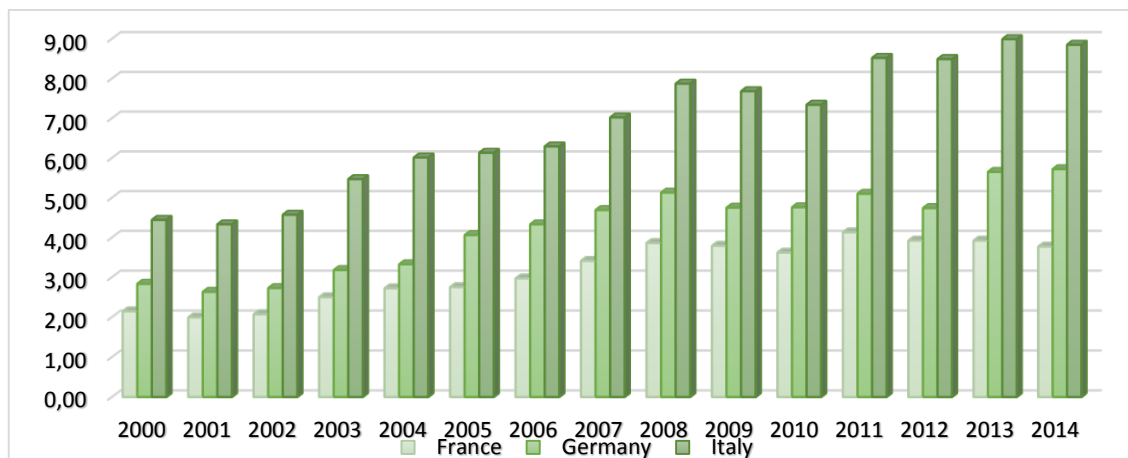
Img. 7   The retail prices of coffee in importing countries in US dollar per pound
Data source: International Coffee Organization, 2016

As a comparison, we see in the figure above (Img. 7) the retail prices of coffee, paid
in US dollar for pound, in top three European importing countries which are Ger-
many, France and Italy.

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[12] For more information see, Chapter 4.3.3

   The retail coffee price is significantly higher than the price paid to the coffee farmers. Most of the coffee sold by retailers is controlled by big corporations. Fairtrade foundation (2012) pointing out on big coffee corporations, such as Kraft, Nestlé and Tchibo, that are managing fifty percent of the global retail coffee market.
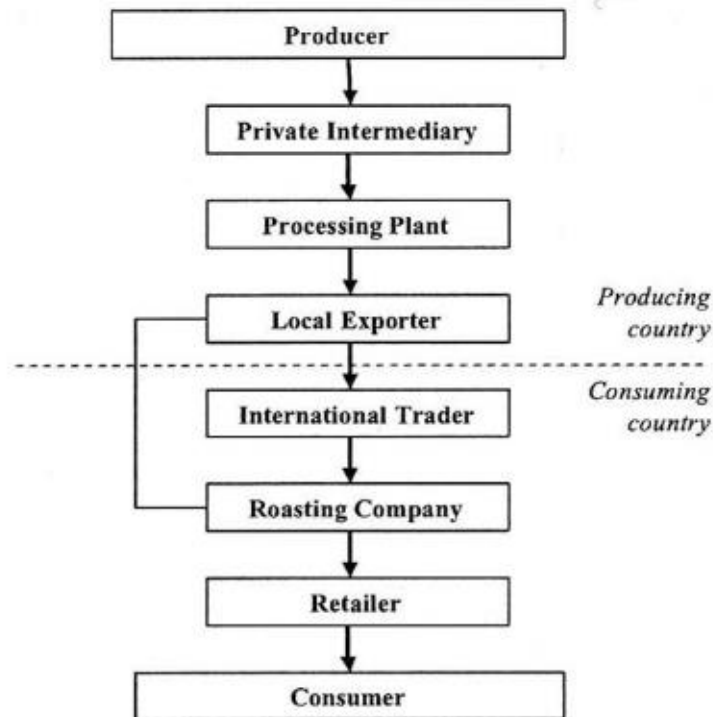
Img. 8   Coffee trade structure
Source: Milford, 2004, p.6

A summary of key player of coffee supply chain presented in the figure above
 (Img. 8) shows, where producers sell their unprocessed coffee, green coffee, to private intermediaries, who then take care of the transportation of coffee to the processing plant. Next, the coffee is being processed and later sold by local exporter to international trader. Finally, roasting companies usually buy coffee from the traders and later on the coffee is sold to retailers, such as markets or restaurant where coffee finds its way to the customers (Milford, 2004).

5   Coffee trade and economic growth of Colombia

Colombia is a country of diversity. Not only geographically but also climatically and culturally. It is estimated that more than 563 000 families work on coffee farms producing coffee. Most of the growers own small farms with cultivation plots of 2 hectares in average. Only 5 % of total coffee growers in the country own plantation bigger than 5 hectares. The existence of more than 500 000 coffee growers show the importance that coffee has for the economic wellbeing of Colombians. The work that implies growing and bringing quality, in which Colombian coffee is distinguished, requires commitment. The structure of poverty and with given average size of farms it is difficult for the farmers to benefits from the production. As it was previously explained, the price of coffee which is paid to the growers is low compare to the price in which coffee is being trade on the market (Café de Colombia, 2010).

5.1   Colombia export
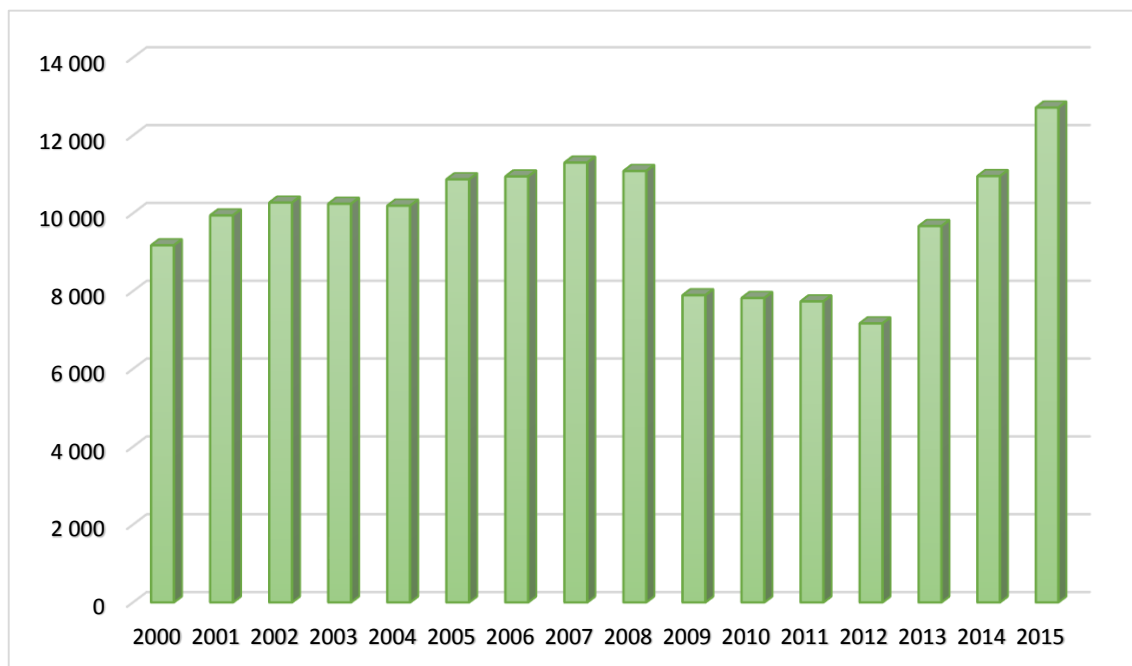
Img. 9   Total Colombia's coffee export in thousands of 60 kg bags
Data source: International Coffee Organization, 2016

In the figure above (Img.9), the total Colombia's coffee export can be seen, in time period from 2000 to 2015. Since 2010, Colombia's export of coffee was around 9 million bags per year, making it the third largest coffee exporting country. In 2009,

the export decline to about 8 million bags per year, however, since 2009, the export is growing again. Total export in 2015 was 12 176 000[13] bags of 60kg coffee bags.

5.2   Colombian GDP

The economy of Colombia is fourth most developed in Latin America. The country has been growing in average rate about 1 percent on quarter since 2001. The GDP grows due to the commodity export, mainly coffee, coal and oil. To secure higher growth of the GDP, the country needs to improve infrastructure and lower the income inequality.

After the first years of economic recession, from 2003 the Colombian economic has been on constant growth. The maximum GDP value was reached in 2014 when the total value about $377 million USD[14]. Since 2014, the GDP of Colombia has been ranged in about the same values.

Colombian GDP has been significantly growing in long-time period. Therefore, it is more convenient to use the annual differences of the growth it the following analysis.
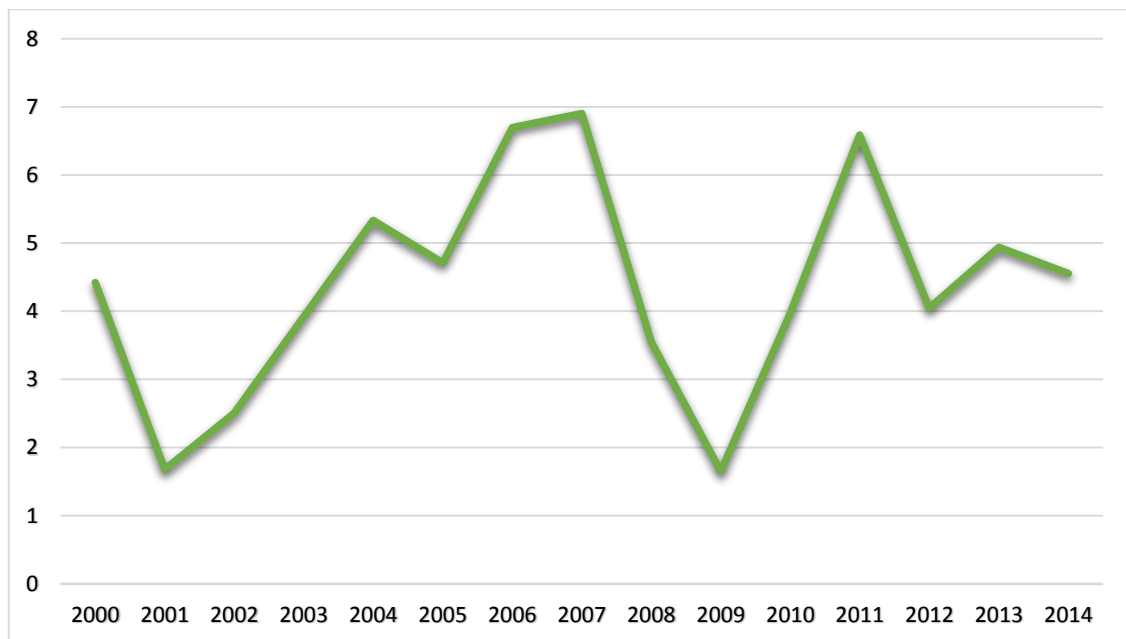
Img. 10   GDP change in per cent
Data source: The World Bank, 2016

In 2001 the GDP growth rate reached second highest value, 6.6 % growth annually. The GDP of Colombia slowly started to raise from 2003. In 2007, the highest growth rate of GDP in the selected time period was reached. In the following years, 2008-2009 the growth rate was on decrease however, in 2009 the GDP shows the lowest

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[13] For specif Coffee export values from 2000-2015, please visit Appendix 1

[14] For specific GDP values from 2000-2014 please visit in Appendix 1

growth rate in the whole monitor period, only 1.65 % annually. The decline in GDP growth is a result of the weakening of Colombian peso and the world economic crisis occurring in 2008. Since that, the growth rate was ranged around 4% annually.

5.3   Fairtrade and Direct trade

Fairtrade and Direct trade are two specific ways how coffee can be traded. Fairtrade set a minimum coffee price for which coffee is bought from the farmers. Direct trade uses the potential of farmers who grows high quality beans to explore new tastes, and are focused in specialty coffee.

5.3.1   Idea and benefits of Fair trade

In the late 1990s the coffee price was significantly low. It leads to a situation, when farmers were not able to cover their production cost. Hence, Fair Trade propose an idea of a guaranteed minimum price paid to the growers (Locke, Reavis, Cameron, 2010).

One side argue that Fair Trade benefits farmers by providing them with higher incomes and better economic stability. Raynolds (2009, p. 1083) writes that Fair Trade "offers farmers and agricultural workers in the global South better prices, stable market links and resources for social and environmental projects, and provides consumers with product options that uphold high social and environmental standards."

On the other hand, Paul Collier (2007, p.163) writes: "They [Fair Trade –certified farmers] get charity as long as they stay producing the crops that have locked them into poverty."

Dragusanu et al. (2014) explain that Fair Trade primary goals is to provide farmers with reasonably prices to allow them better live conditions. Other goals are to maintain long-term partnership, improve working conditions and develop better work conditions. Fair Trade is not the only certification standards occurring in the industry. For instance, other certification labels are Organic[15], and UTZ Certified[16]. The evidence used in the study sums to a conclusion, that Fair Trade achieve many of their goals, and the growers receive higher prices in average. However, some aspects of Fair Trade are still misunderstood. Evidence shows that some farmers are not well informed about the vision of Fair Trade.

The idea of certified coffee emerged in the late 1980s. The certification was based on the production process. Fair Trade labels were established to help the customers distinguish between normal coffee and Fair Trade coffee. (Locke, Reavis, Cameron, 2010).

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[15] For more information, visit: http://www.ifoam.bio/

[16] For more information, visit: https://www.utz.org/

Fairtrade[17] certified coffee producer organization grew from 176 in 2002 to 329 organizations in 2011. The organization represents more than half a million of coffee growers and farmers from countries like Brazil, Colombia, Tanzania, Thailand and more. In fact, Colombia covers 14% of total producer organization upon 2011 (Fairtrade foundation, 2012).

5.3.2   Fairtrade price

As previously mentioned, Fair Trade certified growers were promised minimum price for their coffee. Table below indicates the minimum prices paid valid to from April 1st, 2011 for conventional coffee in Colombia.

Tab. 3   Prices for Fair Trade coffee for Colombia, Valid from April 1st, 2011

Type of Coffee	Fair Trade minimum price (In USD/pound)
Washed Arabica	1.35
Non-washed Arabica	1.40
Washed Robusta	1.01
Non-washed Robusta	1.05

Data Source: Fairtrade international, 2011

Fairtrade foundation (2012) provides us with a comparison of coffee prices paid to the growers pointing on the average producer priced in 1970s, about 20 per cent of the retail price. However, following the trend, nowadays, the growers are only getting 7-10 % of the actual retail price.

Valkila (2014) comments on the Fairtrade prices and its impact of reducing inequalities in his study. The analysis is based on the Fair Trade coffee growers in Nicaragua. Fair Trade not only provide farmers with higher price paid for their coffee but also develop better control over the chain of coffee. Fairtrade has introduced minimum priced paid to the coffee growers which we can see in the table above (Tab. 2). The minimum price reduced some risks for the farmers, however it is still challenging for them to be beneficial.

In 2009/10, Fairtrade export of Colombia covered 11 000 tons of coffee. In comparison to Colombia total coffee export in 2009/10, which reached almost 470 thousands of tons we can say, that the coverage of Fairtrade export of coffee in Colombia is only 2.34 % of total coffee export.

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[17] "Fair trade", "Fair Trade" refer to the general concept without pointing on concrete certification. However, "Fairtrade" refers to specific certification system run by Fairtrade International(Dragusanu et al., 2014)

5.3.3 Direct trade

Holland, Kjeldsen, Kerndrup (2016) explain direct trade in their recent study as a specific method focused on delivering the quality. Direct coffee trading is a way to get a high quality specialty coffee. Direct trade involves the farmers and the cooperatives. Also, direct trade involves exporters.

Direct trade means to buy straight from the farmer. The original mode of direct trade was first published by Geoff Watts, who explained direct trade as a collaboration between roaster and farmer, where both partners are mutually beneficial and in the same time, they create great taste of coffee. (Intelligentsia coffee, 2013)

Direct Origin Trading (2016), a Colombian company providing direct trade, point out the benefits of direct trade. The roasters are able to follow the process of coffee making

Direct trade method is relatively new and there is not enough data available yet to deal with the problematic more deeply. As it was explained, direct trade works as a collaboration between farmers and roasters. Usually, the roaster is interested in specialty coffee. As Direct Origin Trading (2016) states, both roasters and farmers are beneficial. One of the specification of direct trade is transparency. Roasters know exactly what is happening at the farm and farmers know where their coffee is specifically used. Traditional supply chain of coffee trade goes from farmer through consolidator, exporter to importer and finally to roaster. The growers usually grow and harvest coffee in lower quality, for lower prices in order to sell it quickly. In contrast, direct trade presents fair price for the coffee.

However, because of lack of data, we are unable to estimate whether these statements are truthful and undeniable.

6 Statistics and econometrics analysis of Colombian coffee trade

6.1 Correlation analysis

Correlation analysis is often used to verify the existence of possible linear relation between variables. The correlation coefficient values ranged from -1 to 1. The results of correlation coefficient are presented in relation to variables that will be included in the following regression analysis among the explanatory variables. Firstly, the correlation between GDP, total export and coffee export will be made. Next, the correlation between coffee export, average coffee price and total world consumption will be presented. All variables are about Colombia.

6.1.1 Impact of total export and coffee export on Colombian GDP

Below in the figure (Img. 11) we can find development of Colombia GDP over the years of 2000-2014, and Colombian total export. The value of the indicators are in million USD.
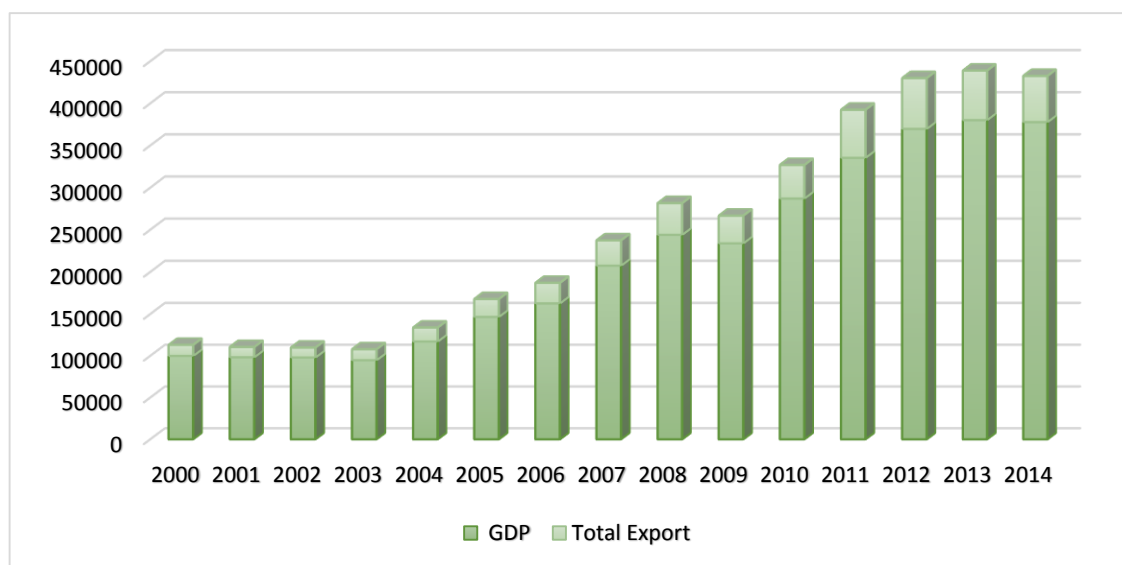
Img. 11   GDP and total export of Colombia (in million USD)
Data source: The World Bank, 2016

A comparison of Colombian GDP and the country's total export shows important connection between the indicators. Since 2000, export has a major role raising the country's GDP. The average rate of export, shown in a per cent value of GDP, is established to 16.7 %. As the world economic crisis occurs in 2007-2008 significant decline of GDP can be seen. In 2009, the annual rate of growth dropped from 3.5%

in 2008 to 1.7 %. The highest value is seen in 2011, when the export reached 18.7 % of country's GDP. The estimated value of export was 56 954 million US dollars. The GDP, in 2011, reached 335415 million US dollars. Since 2000, GDP of Colombia was growing 4.36 % annually in average. So far, the absolute highest GDP was reached in 2013, in total value of 380 063 million USD

Tab. 4   GDP growth and total export (percentage differences)

Year	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
GDP growth	0.98	0.99	0.97	1.24	1.25	1.11	1.28	1.18	0.96	1.23	1.17	1.10	1.03	0.99
Total export growth	0.9	0.97	1.1	1.28	1.27	1.15	1.23	1.25	0.87	1.2	1.43	1.05	0.98	0.9

Data source: The World Bank, 2016

 To support the statement about relationship between GDP and export a correlation between these two variables had been made using the correlation matrix:

Corr (GDP, Total_export) = 0.83674651
Under the null hypothesis of no correlation:
t (12) = 5.29333, with two-tailed p-value 0.0002

Based on the correlation matrix, a positive correlation in association between GDP and export of Colombia was found. Therefore, we can say that export has a significant effect on country's GDP growth.

Another correlation matrix is provided for variables GDP and coffee export. A positive relationship is expected between these two variables. In previous correlation matrix, with variables as GDP and total export, we have come to a conclusion that there is a positive relationship between these two variables. Coffee export is fundamental component of total export and therefore, the expected positive dependency is reasonable.
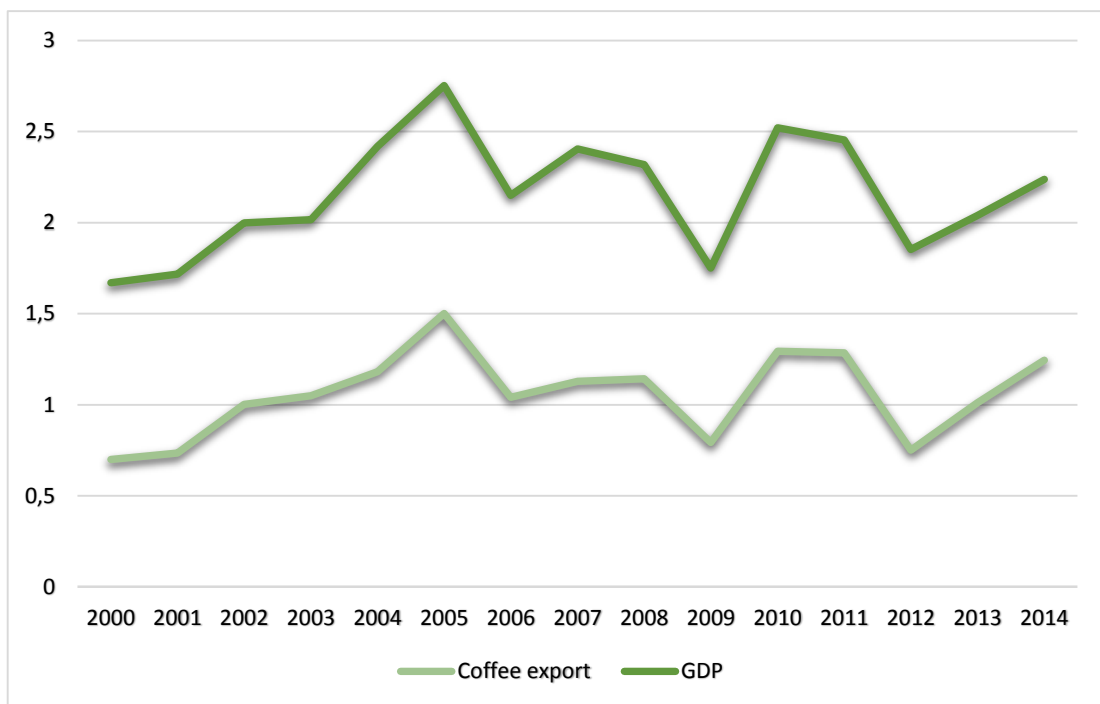
Img. 12   Percentage differences of GDP growth and growth of Colombian coffee export
Data source: The World Bank, 2016

The correlation matrix between GDP and coffee export was made to see the association.

Corr (GDP, Coffee_export) = 0.63242703
Under the null hypothesis of no correlation:
t (12) = 2.82821, with two-tailed p-value 0.0152

The correlation matrix confirms the expectations. A positive dependency was found between GDP and coffee export. Coffee export impacts the growth of GDP. Consequently, export is one of the components contributing the GDP indicator.

6.1.2 Impact of world coffee consumption and average coffee price on coffee export

Statistically, the highest value of world coffee consumption was reached in 2014 (150 209 thousands of 60 kg bags). In the same year, Colombian coffee export was worth 2 685.2 million USD, and the coffee price was settled on 194.48 US cents per pound. In the monitored time period, from 2000 to 2014, the variables as coffee export and world consumption reached the highest values. The coffee price was among the highest in the selected time period as well. As it was stated before, coffee price is a changeable variables where several factors have impact on. Similar tendency can be seen throughout the selected time period.

Following, we will be analyzing the relationship between world coffee consumption and Colombian average coffee price and their impact on Colombian coffee export.
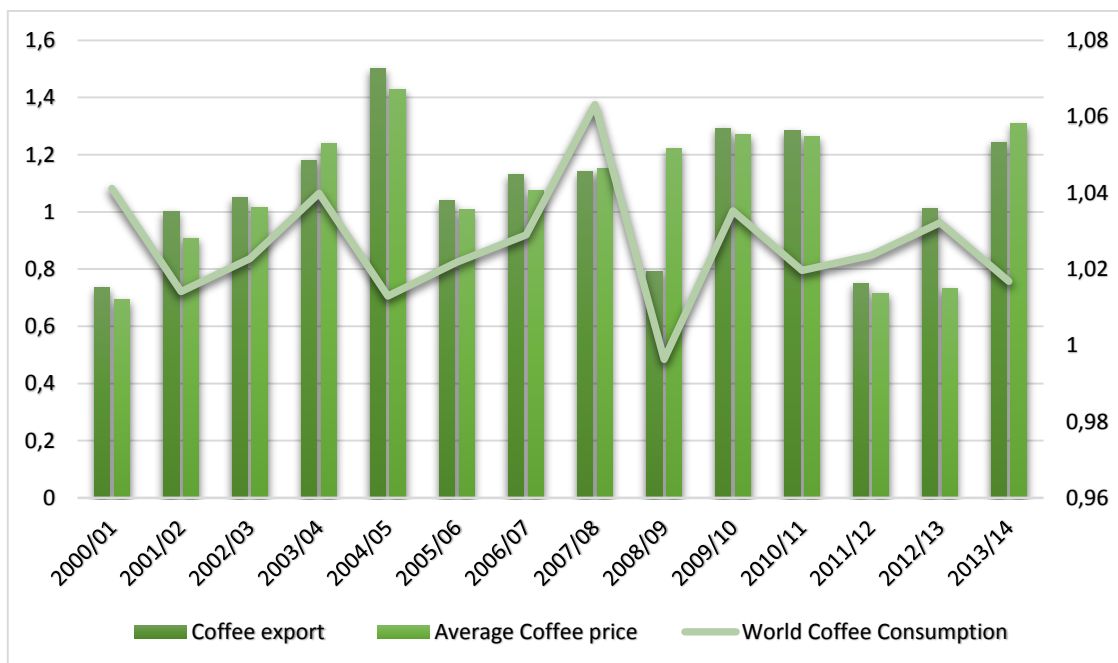
Img. 13 Percentages differences of coffee export, coffee price and world coffee consumption
Data source: The World Bank, 2016, Colombian Coffee Growers Federation, 2014

As it was previously proven, export, mainly because of coffee export, significantly affects Colombian economy growth presented by GDP. Further, we will examine another variables which have an overall impact on coffee export. These variables are average coffee price in Colombia and world coffee consumption.

We can say, that with increasing consumption of coffee the coffee export will similarly increasing, therefore a positive dependency is expected.

Price of coffee can be affected by many circumstances, however, it is important to also include this variable as it is strongly connected to coffee export. For instance,

when price of coffee grows, the farmers are motivated to produce more coffee in a vision of making more money. However, if the consumption and export of coffee does not increase there is a significant surplus of coffee on the trade. Therefore, the farmers are selling coffee for lower prices just to cover their production costs. This conditions occur regularly and a positive dependency is expected between coffee export and coffee price.

Lastly, we expect a negative dependency between average coffee price and total consumption of coffee explained by elasticity.

In connection, 3 correlation matrixes were made to see the associations between previously mentioned variables.

Tab. 5   Correlation matrixes

Variables	Coffee export	Average coffee price (p-value)	World coffee consumption (p-value)
Coffee export	1.0000	0.79 (0.0008)	0.39 (0.1633)
Average coffee price		1.0000	-0.20 (0.4878)
World coffee consumption			1.000

Source: Gretl, own elaboration

The variables in the first correlation matrix are Colombian coffee export and world coffee consumption. Each variable is explained in differences. The correlation matrix confirmed the expectation of positive dependency r= 0.39.

Following correlation matrix was made between Colombian coffee export and average coffee price in Colombia. The variables are expressed in percentage differences. The correlation matrix supported the expectation of a positive dependency r= 0.79 between variables.

The last correlation matrix shows the dependency between average coffee price in Colombia and world coffee consumption. Inaccurate results may occur using total rates, which grows historically, of each variables. Therefore, to avoid it, the variables are expressed in percentage differences

As expected, negative dependency r=-0.20 was found between average coffee price and world coffee consumption, this effect is explained with elasticity. The quantity of demand of coffee changes with a price change.

In conclusion, with the correlation analysis we were able to prove the dependency of the variables. For further examination of its impact on Colombian economy growth a regression analysis will be used.

6.2 Regression Analysis

In regression analysis we observe the relations between dependent variable and explanatory variable

6.2.1 Regression analysis of GDP (Model 1)

In the first model, we use variables such as GDP, total export and coffee export. In this case, dependent variable is GDP and explanatory variables are total export and coffee export. Data are already converted into annually differences to be able to monitor the relationship better. As the original study suggested, all variables are in logarithm. Logarithm variables are often used to express the relationship between variables in regression model. GDP is expected to be affected by TE, which also includes CE. Therefore, a log-log regression model is presented.

Tab. 6   Model 1: OLS, Dependent variable: GDP

	Coefficient	SE	t-ratio	p-value	
Const	0.0351476	0.0199303	1.764	0.1055	
Coffee export	0.0387038	0.104707	0.3696	0.7187	
Total export	0.565149	0.148814	3.798	0.0030	***
	values			**values**	
R²	0.7304		R^2_{adj}	0.6814	
F(2, 11)	14.9042		**P-Value(F)**	0.0007	
Akaike criterion	-36.5692		**Durbin-Watson**	2.5227	

Source: Gretl, own elaboration

Based on the analytical framework explained in the methodology the equation is estimated. The equation represents model in which GDP is expressed as a function of Total export. Using OLS method the equation is as follows:

$$Ln\ \text{GDP} = 0.0351476 + 0.565149 Ln\ \text{TE}\quad,$$

$$\text{S.E}\quad (0.0199)\quad\quad (0.1488)$$

Table 6 shows that the only significant parameter is total export because of it p-value= 0.0030. The value is less than $\alpha = 0.05$. Therefore, the null hypothesis is rejected and the parameter (TE) is considered as statistically significant. Even if

parameter coffee trade is tested on lower significance level $\alpha = 0.01$, the results do not reject the null hypothesis.

Another important value in the model is R^2. Coefficient of determination expresses the quality of the model. $R^2 = 0.7304$, therefore, 73 % of the model was explained. The result of statistically significant variable can be interpreted as if we increase total export by 1% we can expect the GDP to grow by 0.565%.

In the table below (Tab. 7) test statistics of each econometric verification tests can be found. According to the p-value we can evaluate whether the null hypothesis are rejected or not, and then estimate, if the classical assumption of the model were fulfilled.

Econometric verification

Tab. 7   Econometric verification testing

	Test statistic	p-value
LM test (squared terms)	2.518	0.284
RESET test	1.758	0.227
White test	2.651	0.754
Breusch – Pagan test	2.429	0.297
VIF	1.813	
Chi-square test	3.044	0.218
Durbin-Watson test	2.523	0.815

Source: Gretl, own elaboration

LM test is used for model specification. The p-value=0.284 is higher than $\alpha = 0.05$, therefore we assume the model is specified correctly.

RESET test evaluates the model specification. In this case, p-value= 0.227, it is significantly more than $\alpha = 0.05$ therefore, the null hypothesis is not rejected and the model is correctly specified. Both LM test and RESET test were not rejected, therefore classical assumption I. is accomplished.

Heteroscedasticity can be explained as non-constant variance of the errors. *White test* and *Breusch-Pagan test* are usually used to detect heteroscedasticity. Both tests show p-value higher than significance level $\alpha = 0.05$. Heteroscedasticity does not occur in the model and the null hypothesis is not rejected. IV classical assumption is fulfilled.

If the value of Variance *VIF* is less than 10, collinearity does not occur in the model. The value is 1.813 < 10. II. Classical assumption is fulfilled.

Test of normality, *Chi-square test*, also shows p-value=0.218, higher than $\alpha = 0.05$. In conclusion, the error term is normally distributed. V. classical assumption is fulfilled.

With *Durbin- Watson test*, we can estimate, whether serial correlation occurs in the model. The p-value= 0.815 confirms no serial correlation in the model. Therefore III. Classical assumption of regression analysis is fulfilled.

6.2.2   Regression analysis of coffee export (Model 2)

As it was previously tested, total export affects the GDP growth. In the next model, the dependent variable is CE. It is logical, to expect lower effect on GDP. Therefore, the following regression analysis will deal with variables possibly influencing the coffee export. The selected explanatory variables are ACP and WCC. Variables are explained as annually differences. The model is conducted in linear function form of regression analysis.

Tab. 8   Model 2: OLS, Dependent variable: Coffee export

	Coefficient	SE	t-ratio	p-value	
Const	-152.884	133.129	-1.148	0.2752	
Average coffee price	8.0366	1.7131	4.691	0.0007	***
World coffee consumption	0.0637	0.0349	1.825	0.0953	*
	Values			**Values**	
R²	0.6775		R^2_{adj}	0.6188	
F(2, 11)	11.5521		**P-Value(F)**	0.0019	
Akaike criterion	196.1692		**Durbin-Watson**	1.6801	

Source: Gretl, own elaboration

Using OLS model, the estimated equation is,

$$CE = -152.884 + 8.0366\,ACP + 0.0637\,WCC$$

$$\text{S.E}\quad(133.129)\quad(1.7131)\quad(0.0349)$$

In the statistical verifications the significance of parameters are examined. In our model, both of the parameters are significant besides the constant.

Parameter ACP is significant on $\alpha = 0.05$ and parameter WCE is significant on $\alpha = 0.01$. However, we include both of the parameters into consideration.

According to the estimated model, we see positive signs on both of the parameters. Coffee export, average coffee price and world coffee consumption can be closely linked together.

Average coffee price significantly impact coffee export, which was previously proven in correlation analysis. It is expected that export will be affected by coffee prices. As described in the theoretical part, price of coffee is volatile and changeable. Coffee price usually grows in the vision of worst growing season in the future. The changes of export can be explained by price changes. The coffee export raises with the growing coffee price. Needless to say, average coffee price raises with growing demand. If there is a deficit on the coffee market with low stock the price is highly influenced and tent to raise.

The coffee export relies on the coffee consumption. Therefore, with the increasing coffee consumption the coffee export is expected to raise. The positive sign of the parameter supports the statement. However, as Colombia being one of many producing countries, it is unlikely for the world coffee consumption to have extremely high impact on the Colombian coffee export.

In this model the value of coefficient of determination $R^2 = 0.6775$. This points out that 67 % of the model was explained.

In the following table (Tab. 9) an econometric verification testing was provided. The results evaluate the accuracy and functionality of the model. The classical assumption of regression analysis will be confirmed or refused.

Tab. 9 Econometric verification testing

	Test statistic	p-value
LM test (squared terms)	5.62	0.06
RESET test	0.06	0.95
White test	12.88	0.07
Breusch – Pagan test	3.02	0.22
VIF	1.03	
Chi-square test	2.68	0.26
Durbin- Watson test	1.68	0.32

Source: Gretl, own elaboration

As in previous model, an econometric verification is made. The test statistics are examined to find, whether the model is specified correctly, with no collinearity or

serial correlation and if heteroscedasticity does not occur in the model. The last component tested is whether the errors are normally distributed. According to the p-value we will decide, if the classical assumption of the regression analysis were fulfilled.

LM test and *RESET test* are used to verify the correct specification of the model. In both tests, the p-value was higher than the significance level $\alpha = 0.05$. The null hypothesis is not rejected. The model is specified correctly.

White and Breush – Pagan tests examine the heteroscedasticity of the model. The null hypothesis means homoscedasticity in the model. P-value of both tests was higher then $\alpha = 0.05$. The null hypothesis is not rejected.

Collinearity is tested using *VIF*. If the value of VIF is less than 10, collinearity does not occur in the model. Table 7 shows value lower than 10. Collinearity does not occur in the model.

Using *Chi-square test* we found that error terms are normally distributed. P-value is higher that $\alpha = 0.05$. The null hypothesis is not rejected.

The p-value of *Durbin- Watson test* resulted into not rejection of null hypothesis. No serial correlation is presented in the model.

All five selected classical assumption of regression analysis were fulfilled

7   Discussion

Theoretical part of the thesis is based mainly on foreign literature, scientific articles and reports.

The specification of this work restricted us to use only secondary data obtained from statistical databases of world indicators or coffee trade. The work is aimed to present the results about international coffee trade in developing countries with a case study of Colombia.

First section of analytical part consists of correlation analysis of selected variables. The strengths of relations between variables were explained by calculation of correlation coefficients.

The results shows positive association between Colombian GDP growth and Colombian export. The resolution supports the empirical study Vohra (2001), who stated that GDP is affected by export growth.

Dreger, Herzer (2013) described the association between a GDP and export in their empirical study on developing countries. They used several correlation coefficient to state the relations.

For deeper examination within the correlation analysis, we observed relationship between Colombian coffee export, Average coffee price and world coffee consumption. However, because of the specific choice of the variables, we were unable to compare the results with some other empirical researches.

Following, the data obtained about Colombia were analyzed in regression analysis which was adapted to empirical study obtained by Manni, Alzal (2012). Regression models used in the study were applied on the regression analysis models used in the thesis. Variables used it the models were selected logically, in order to get valuable results.

Empirical evidence in the study by Manni, Alzal (2012) analyze the impact of trade liberalization on economy in developing countries. Data used in the study were about Bangladesh. As Bangladesh being one of many developing countries, we found similarities with our case about Colombia. The conclusion of this study terminate that both export and import have positive effect on economy growth.

First regression analysis model (Model 1) examined the impact of Total export and Coffee export on GDP growth. Theoretical background supports the idea that export leads to growth of GPD. To determine parameters of variables we used OLS method. Statistical significance of coffee export was not proven. Coffee export is a fundamental component of total export. The value of coffee export is already included in the variable of total export. Therefore, the elimination of this variable from our model is reasonable. The goal of this regression analysis was to examine the relationship of explanatory variables on dependent variable.

The results of the model shows that total export of Colombia impacts the growth of GDP, which corresponds with the results found in the study about Bangladesh. If increase of export means economy development growth, we conclude, that Colombian growing export leads to growing national GDP. With higher GDP the economy of a country becomes more stable and developed.

Data used in the regression analysis were adjusted, and season component was extracted. Development of variables is expressed in differences per annum, in time period from 2000 to 2014.

Statistical significance of coffee export was evaluated in the second regression analysis. Multiple linear regression model was made in order to point on influential of explanatory variables of coffee trade. The regression analysis examines impact of Average coffee price and World coffee consumption on Coffee export.

For Colombia, being 3rd biggest coffee exporter of the world, it is reasonable to assume, that the demand, coming from growing world coffee consumption will affect the export of the country.

The theory of coffee price and indicators was closely described in the theoretical part. Price is a substantial factor to keep the farmers motivate. With the growing coffee consumption we expect increasing production. However, as we described in Chapter 5, most of the coffee farmers are limited in the plantation area. The average price of coffee is affected but the supply status of the coffee market. Over – supply in the market means decrease in coffee prices. The over – supply of the market is due to several factor such as, rapid expansion of production in another producer country, increased efficiency or even trade liberalization. Therefore, to get higher price for coffee the producers have to add value to the coffee. Colombia is known for its high quality Arabica coffee. We suggest that Colombian coffee export if partially affected by changes is coffee price.

Despite the effort it was challenging to access data for the analysis. The time periods for selected data had to be adjusted because of lack of data. It is possible, with more data available the research could be more precise and the results could differ. Methodology used in the thesis demonstrate that correlation and regression analyses can be used in order to find relationship between the selected variables.

8 Conclusion

The objective of this thesis was to evaluate the impact of coffee trade on developing countries. Concerning the matter of impact, the focus was on coffee export. The observation was focused on coffee trade in Colombia.

The bachelor thesis contents theoretical part which defines the main terms connected to international coffee trade, developing countries and economic development.

The impact of coffee trade on developing countries was tested using secondary data. The data analysis found that during the selected time period, from 2000-2014, all concern observations showed increase. Colombian GDP was increasing for about 4.36 % per annum in average. However, with an economic crisis occurring in 2007-2008 the GDP showed the lowest growing rate, 1.65 % annually in the monitor period. The highest annual growth rate was observed in 2013. The rate climbed 4% annually from previous year.

Coffee export showed similar trend of growing during the selected time period from 2000-2015. Before 2009, the average coffee export in Colombia covered around 10 thousands of 60kg bags of coffee. After the global financial crisis, the export significantly decreased. In 2009, the export decline to about 8 million bags.

In 2013, we observed massive increase in total coffee export. As in 2012, coffee export was about 8% in less in quantity compare to 2011. In 2013, the annual growth in quantity of export reached 25% compare to the quantity of coffee exported in 2012.

In addition, according to recent statistics, the coffee export in 2015 was more than 12 million coffee bags.

Furthermore, we see similar trends between both of the factors, GDP and coffee export. In fact, the correlation outline suggests the same. The correlation coefficient found positive association between the variables.

Finally, applying the variables in regression analyses, it was tested and proven that GDP and coffee export impact on each other.

To summarize the finding of this bachelor thesis correspondingly with the aim of this thesis we analyze the impact of coffee trade on developing countries. The observation found that coffee trade, represented in this case as coffee export, impacts the economic development, explained as GDP, of Colombia.

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Appendix

Appendix 1

GDP of Colombia in million US (2000-2014)

Year	GDP
2000	99886,576
2001	98203,545
2002	97933,392
2003	94684,583
2004	117074,866
2005	146566,266
2006	162590,146
2007	207416,495
2008	243982,438
2009	233821,671
2010	287018,185
2011	335415,157
2012	369659,7
2013	380063,456
2014	377739,623

Total export of Colombia in million US (2000-2014)

Year	TE
2000	13158
2001	12301
2002	11897
2003	13092
2004	16730
2005	21190
2006	24391
2007	29991
2008	37626
2009	32853
2010	39820
2011	56954
2012	60274
2013	58822
2014	54795

Coffee export of Colombia in millions US (2000-2014)

Year	CE
2000	1178,3
2001	865,5
2002	866,3
2003	909,4
2004	1074,4
2005	1611,7
2006	1676,5
2007	1893
2008	2162,6
2009	1713,8
2010	2215,7
2011	2847
2012	2134,3
2013	2158,3
2014	2 685,2

Coffee export in thousands of 60kg bags (2000-2015)

Year	CE
2000	9 177
2001	9 944
2002	10 273
2003	10 244
2004	10 194
2005	10 871
2006	10 945
2007	11 300
2008	11 085
2009	7 894
2010	7 822
2011	7 734
2012	7 170
2013	9 670
2014	10 954
2015	12 176

Average coffee price in Colombia in US cents/pound (2000-2014)

Year	ACP
2000	102,29
2001	71,01
2002	64,45
2003	65,45
2004	81,13
2005	115,87
2006	116,82
2007	125,56
2008	144,60
2009	176,67
2010	224,53
2011	283,67
2012	203,03
2013	148,44
2014	194,48

Tab. 10   World coffee consumption in kg (2000-2014)

Year	WCE
2000	104570
2001	108870
2002	110410
2003	112920
2004	117422
2005	118 942
2006	121 540
2007	125 061
2008	132 955
2009	132 462
2010	137 131
2011	139 826
2012	143 130
2013	147 730
2014	150 209