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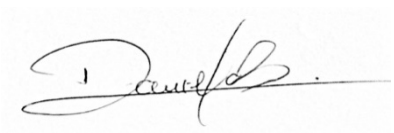

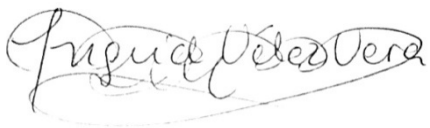

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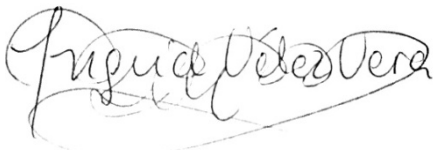

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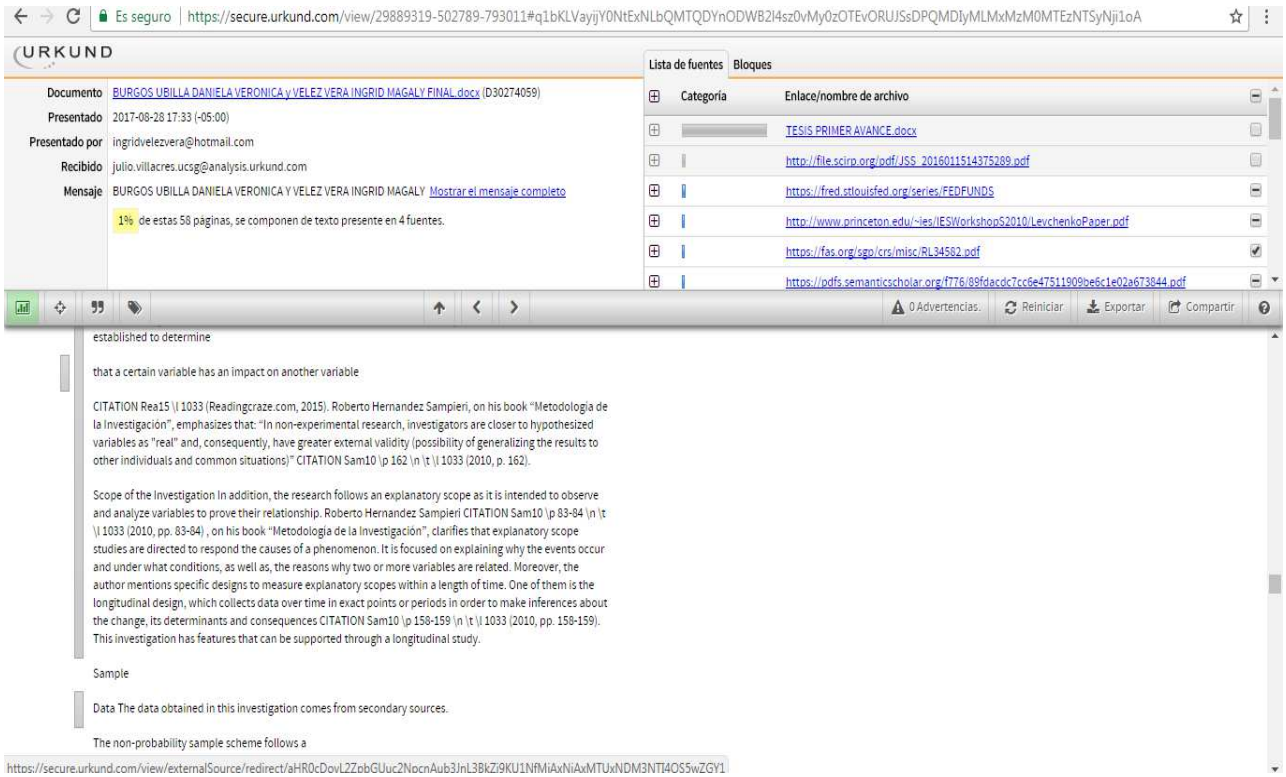

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Dedicatorias

A Dios y a mi familia…

Daniela

A Dios, porque sin Él nada es posible.

A mis padres, porque nadie en este mundo me inspira más que ellos. Porque desde pequeña los he visto trabajar con mucho sacrificio por mi futuro. Les prometo que valdrá la pena.

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To God and my Family.

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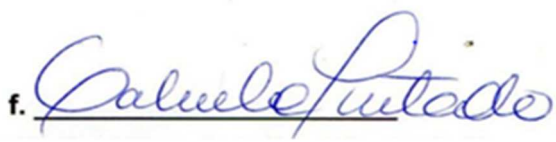
f. 

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Resumen

La presente tesis analiza el efecto de la crisis financiera mundial del 2008 sobre la industria naviera en Ecuador. Para su propósito, el impacto de la crisis financiera ha sido representado por la fluctuación de las tasas de la Reserva Federal de Estados Unidos y fluctuaciones del dólar estadounidense. De la misma forma, se tomaron en cuenta como indicadores FOB, CIF y toneladas de exportaciones e importaciones no petroleras del Ecuador. Se realizó un diseño longitudinal y un análisis de regresión simple para la prueba de hipótesis. Los resultados del análisis no encontraron relación entre las tasas de la Reserva Federal y las exportaciones e importaciones no petroleras del Ecuador, pero se detectó una relación significativa entre las fluctuaciones del dólar y las exportaciones no petroleras. Sin embargo, la relación no fue estadísticamente significativa con las importaciones no petroleras, aparentemente debido al efecto de las salvaguardias en Ecuador durante ese período. Los resultados parecen coincidir con la investigación de John B. Taylor, quien afirmó que el verdadero problema de la crisis financiera no era la liquidez sino el riesgo de contraparte. La industria naviera es interpretada como intermediario en el comercio internacional. Es por esto que se asume que de alguna manera la industria en Ecuador fue afectada por la crisis financiera del 2008. Además, el Teorema de la Telaraña puede describir el sistema financiero de la industria naviera basándose en especulaciones de fluctuación de precios, demanda y capacidad; este también se utiliza racionalmente como un modelo de *benchmarking*.

Palabras Claves: (industria naviera, crisis financiera, tasas de la Reserva Federal de Estados Unidos, importaciones y exportaciones no petroleras, fluctuaciones del dólar estadounidense, Teorema de la Telaraña)

Abstract

The present thesis analyzes the effect of the global financial crisis of 2008 on the shipping industry in Ecuador. For its purpose, the impact of the financial crisis was represented by the fluctuation of Federal Funds rates and the fluctuation of the U.S dollar; and as shipping indicators FOB, CIF and tons of Ecuadorian non-oil exports and imports were taken into consideration. A longitudinal design was carried out and a simple regression analysis tested the hypothesis. The results of the analysis found no relationship between the Fed Funds rates and non-oil exports and imports of Ecuador, but a significant relationship between dollar fluctuations and non-oil exports was detected. However, the relationship was not statistically significant with non-oil imports apparently due to the effect of safeguards in Ecuador during that period. The outputs seem to match with the research of John B. Taylor who affirmed that the real problem of the financial crisis was not liquidity but counterparty risk. The shipping industry is interpreted as an intermediary party in international trade. This is why it is assumed that somehow the industry in Ecuador was affected by the financial crisis of 2008. In addition, the Cobweb Theorem can describe the shipping financial system based on speculations of prices fluctuation, demand and capacity; and it is also used as a rational benchmarking model.

Key Words: (shipping industry, financial crisis, Fed Funds rates, non-oil imports and exports, U.S dollar fluctuations, Cobweb Theorem)

Resumé

La thèse suivante analyse l´effet de la crise financière mondiale de 2008 sur l´industrie maritime en Équateur. La présente investigation a choisi comme indicateur financier des taux variables de la Reserve Fédérale Américaine et des fluctuations du dollar. De même, des exportations pétrolières et des importations ont été considérées afin de mesurer des variables maritimes en FOB, CIF et des tonnes. Une étude longitudinale a été réalisée et une simple analyse de régression a testé l'hypothèse. Le résultat ne rencontre aucune relation entre les taux de la Fed et les exportations ou importations non pétrolières de l´Équateur. Il concorde avec l'investigation de John B. Taylor, qui a dit que le vrai problème de la crise financière n'était pas la liquidité mais le risque de contrepartie. Alors qu'il était possible de trouver une relation significative entre les fluctuations du dollar et les exportations non pétrolières mais pas sur des importations, car le gouvernement locale a imposé mesures protectionnistes par rapport la crise et la dévaluation du dollar. L'industrie du transport maritime est considérée comme un intermédiaire dans le commerce international, c´est la raison pour laquelle on suppose que d'une certaine manière elle a été affectée par la crise financière de 2008. D´autre part, le Modèle de la Toile d'araignée a permis d´interpréter le système financier de l'industrie maritime basée sur la spéculation de la fluctuation des prix, la demande et la capacité; ceci est également rationnellement utilisé comme modèle d'analyse comparative.

Mots Clés: (industrie de transport maritime, crise financière, Réserve Fédérale Américaine, exportations et importations non pétrolières, fluctuation du dollar, le Modèle de la Toile d'araignée)

Chapter 1: Introduction

The shipping industry is one of the most important and indispensable parties involved in international commerce. As one of the least expensive means of transport of massive quantities of goods, shipping facilitates approximately 90% of the global trade volume, which consequently helps open up larger markets. It has boosted the world economy, benefiting consumers and creating employment. Additionally, its efficiency minimizes impact on the environment (Heaver, 2015).

According to the World Shipping Council (2017):

> The exchange of capital, goods and services across international borders is known as international trade and in many countries it represents a significant share of the nation's Gross Domestic Product (GDP.) Liner ships transport approximately 60% of the value of seaborne trade or more than $4 trillion (USD) worth of goods annually.

Shipping processes basically depend a lot upon capital investment and daily cash flow income. Furthermore, proper planning is crucial in order to survive in a very competitive and complex market.

It is important to note that monopoly does not prevail within the industry. At the moment, there are 30 shipping companies operating in maritime transport. Alphaliner, publisher of liner shipping information, lists AP&Moller- Maersk, Mediterranean Shipping Company (MSC), CMA CGM and COSCO Shipping as owners of 50% of the market share. These are the 4 most important companies in the industry. The other 50% is divided sparely into the remaining companies (Alphaliner, 2017).

Several factors can influence the shipping market such as trade, consumption, production, economy, politics and technology that control the demand and supply of shipping services, raw materials and goods (Kalgora & Christian, 2016, pp. 38-39).

The industry has always been dependent on fluctuations and commodities. A suitable forecast and strategies are essential to operate in the market and keep increasing market share. Nevertheless, forecasts are

not able to predict fortuitous events such as the market crash of 2008 (Jugović, Komadina, & Hadžić, 2015).

The financial crisis turned a thriving industry into a survival war, where a drop in demand and oversupply of spaces has led to current undue stress in the shipping market.

The downturn that started in 2008 hit the global shipping line business critically in 2009. By the end of the first quarter of 2009, all companies reported records of billion dollar losses, for example, the world's leading shipping company; Maersk Line, reported a $2.09 billion (USD) loss in Q1 (World Trade Organization, 2009).

The following research will try to define if the shipping industry in Ecuador was impacted by the financial crisis of 2008 in terms CIF, FOB and TONS of non-oil imports and exports. The Cobweb Theorem will be also introduced as an implicit trend that explains how the shipping industry might work based on speculations.

An analysis of the determined variables involved in the impact of the crisis will be provided to demonstrate the extent to which it directly affected the shipping industry in Ecuador.

Background

During the great shipping boom, the industry and specially the liner shipments of containerized cargo were highly profitable. Consequently, banks were willing to lend significant amounts of money at very low interest rates to shippers (Kalgora & Christian, 2016).

Martin Stopford (2008), British economist and specialist in seaborne trade, in his paper "*The Great Shipping Boom 2003-8*", emphasizes that:

> During the 1990s the average ship generally earned $10,000/day and never more than $15,000/day. But since the new millennium started earnings moved from $24,000/day in 2000 to $39,000/day in 2004 and $50,000/day in 2008. The cash generated during these peaks drove up asset values, increasing the price of a modern Capesize bulk carrier from $24

million in 2003 to $165 million 5 years later, making shipping one of the most profitable businesses in the world (p.1).

There was also an unstoppable demand of all kinds of goods and materials, strongly promoted by developing economies such as BRIC countries (Brazil, Russia, India and China). After that, the rate of maritime trade, the main demand driver for shipping, grew from an average of 3.3% to an average of 5% per annum in the last 5 years (from 2003 to 2008) (Kalgora & Christian, 2016) (Stopford, 2008).

The demand for maritime transportation allowed shipping sector to expand aggressively and enlarge their fleets (Jansen, 2016). Between 2002 and 2004, the demand for containerized trade grew faster than the supply of container carrying capacity, so the industry ordered new tonnage. Normally, it takes from 2 to 3 years for the new tonnage to be delivered. In consequence, due to speculations by 2006 the supply of container ships in the market grew faster than the demand (Kalgora & Christian, 2016).

The United Nations Conference on Trade and Development reveals in the chart below the growth of demand and supply in container shipping from 2000 to 2010, in annual growth rates (2009).

Table 1

Growth of Demand and Supply in Container Shipping 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Demand	10.7	2.4	10.5	11.6	13.4	10.6	11.2	10.9	4.4	−9.7	5.2
Supply	7.8	8.5	8.0	8.0	8.0	10.5	13.6	11.7	10.9	5.2	5.2

Source: UNCTAD Review of Maritime Transport 2009, updated with data from Clarkson Container Intelligence Monthly January 2010. Year 2010 is a Clarkson Research Services forecasting.

Retrieved from paper written by Bomboma Kalgora, Tshibuyi Mutinga Christian from The School of Economics and Management, Shanghai Maritime University, Shanghai, China (2016). Received on December 1st, 2015; accepted on January 12th 2016; and published on January 15th.

Nevertheless, the golden age of the shipping industry did not last long. In fact, it was on the brink of a serious crisis. In 2008, the scenario changed dramatically because of the famous recession which led the world to a financial crisis. In fact, it was the most severe economic disaster since the Great Depression of the 1930s (Helleiner, 2011).

The crisis started in The United States when housing prices started to decrease gradually. By 2007, there was already a crisis in the American subprime mortgage market which ended in devaluation of housing-related securities. The U.S. Federal Reserve believed the subprime mortgage crisis would only hurt housing. Unfortunately, the damage spread as international financial institutions owned mortgage-backed securities. The securities were in pension and mutual funds as well as in corporate assets (Duca, 2013).

After that, banks resold original mortgages in tranches which made derivatives impossible to price. Not even the acquisition of insurance products called credit default swaps was enough to prevent derivatives from losing value. Therefore, banks had to assume all the losses as the insurance company did not have enough cash flow to honor all the swaps. As a result, banks stopped lending money to one another because they did not want to receive worthless mortgages as collateral interbank borrowing costs (LIBOR) rose (Amadeo, 2017).

Mistrust within the banking sector was one of the main causes of the 2008 financial crisis. The Federal Reserve and Treasury Department strived to prevent a collapse of the U.S banking system. Despite all efforts made, housing prices fell by 31, 8%. The percentage was even higher than the one registered during the Great Depression (Amadeo, 2017).

The crisis was denominated as the Great Recession which was most critical from 2008 to 2012. On September 15th, 2008, the investment bank Lehman Br others went bankrupt contributing a magnification of the impact worldwide. This represented a very critical role in the failure of businesses, declines in consumer wealth, and a downturn in economic activity involving all regions of the globe (Wearden, Teather, & Treanor, 2008). Several measures were taken by the Federal Fund Reserve such as

reducing drastically the Fed Funds rate to introduce more liquidity in order to boost the economy.

As a possible side-effect of the monetary policy imposed, a devaluation of the dollar might have occurred in order to achieve controlling inflation and stimulating the recovery of the economy (Elwell, 2012).

Therefore, the Federal fund strategy figures as unconventional monetary policy as it tend to acquired large-scale assets (LSPAs) with the purpose to support mortgage markets and promote an stronger economic recovery. Michael Joyce, David Miles, Andrew Scott and Dimitri Vayanos from the "*Economic Journal*" described this method as a common form of unconventional monetary policy, involving massive expansions of central banks' balance sheets and attempting to influence interest rates in the long-term. In this case, the purchase of several assets securities tried to provide liquidity to the market that according to the author had "dried-up" because of the financial crisis (Joyce, Miles, Scott, & Vayanos, 2012).

The World Trade Organization concludes that by the first half of 2008 commercial trades continued to increase. Nonetheless, it was not until the final quarter that the impact of the crisis became evident. Trade levels in developed economies such as the European Union fell by nearly 16%. Asian exports declined by 5% as well as in North America, by 7% with the same period in 2007 (World Trade Organization, 2009).

Moreover, main commodities such as iron ore and oil; one of the main materials used to build ships, increased to 20 times more than the previous value because of the demand of new vessels (Index Mundi, 2017). The following figure elaborated by Index Mundi shows the fluctuations of the price per Dry Metric Ton of iron ore between the years 2009-2016. In 2010 the price peaked to almost $180, 35% more than in April 2008.

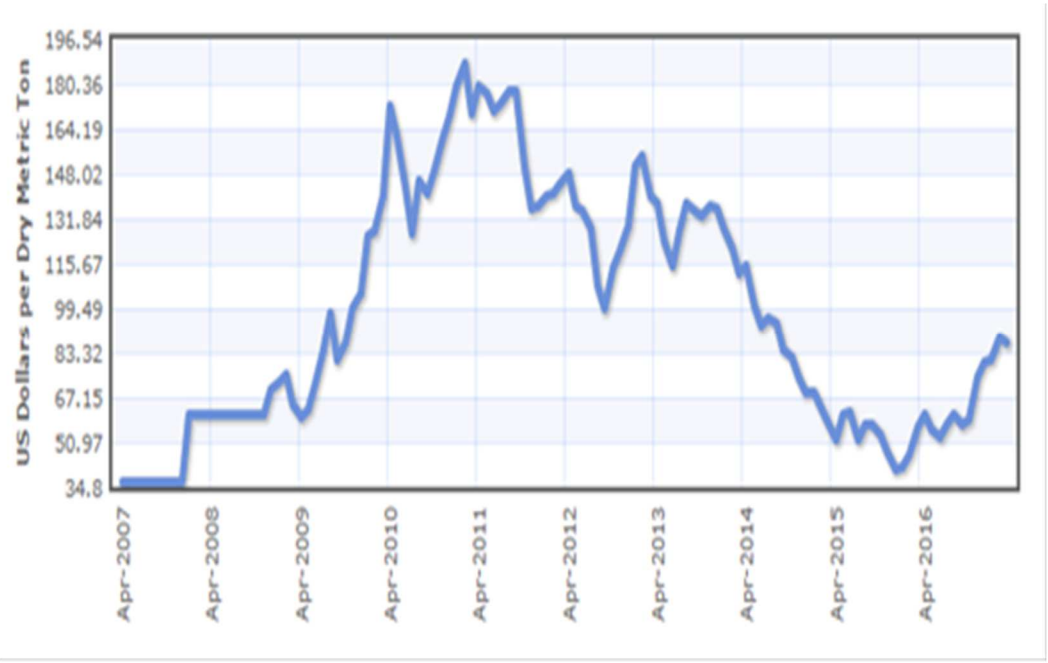


Figure 1. Iron Ore Monthly Price - US Dollars per Dry Metric Ton. Retrieved from Index Mundi, 2017.

The demand of iron ore peaked between the years of 2009 and 2012. This was due to China's growing demand which was specially for the new and biggest containerized cargo vessel construction. However there was a decrease in domestic production (United Nations Conference on Trade and Development, 2009). Growth in other goods presented a severe downfall during the first quarter of 2009 in comparison to the last of 2008, as it is shown in the figure:

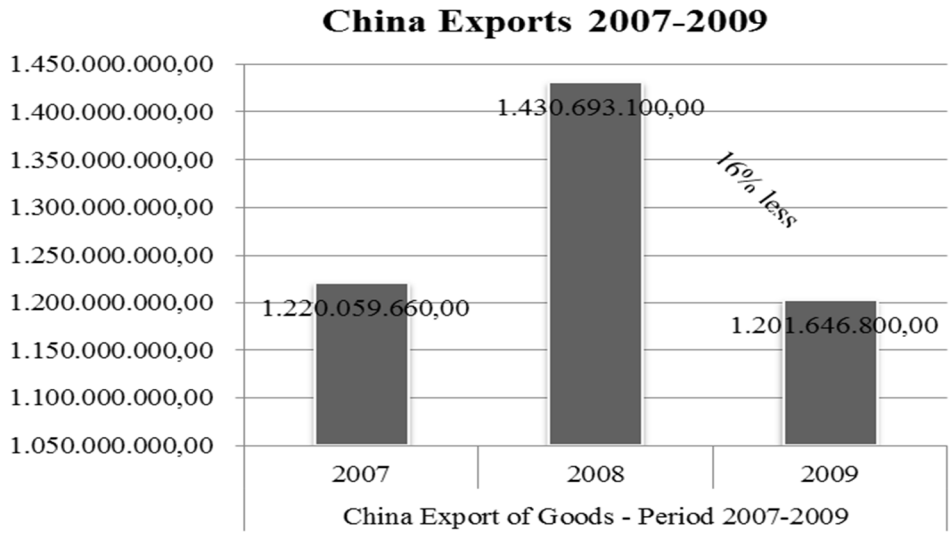
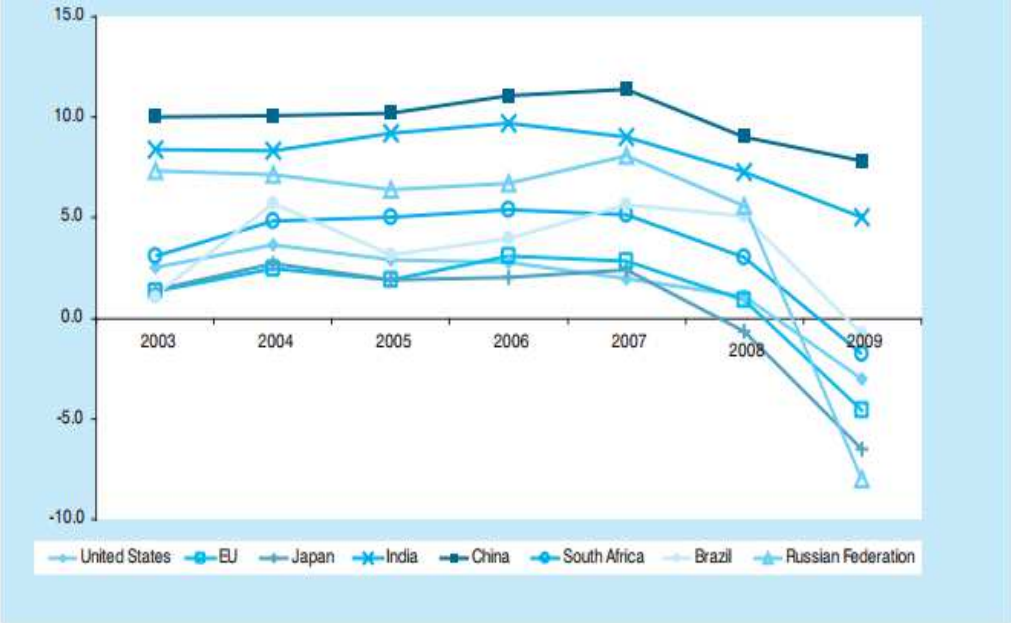


Figure 2. China Exports of Goods – Period 2007-2009. Retrieved from ITC (International Trade Centre), 2009

The deceleration of China's economy was another consequence of the market crash of 2008 as it is considered one of the most important nations in the globe and it notably contributes in trade and commerce. In general, Asia had a drop in demand of up to 18% since the end of the quarter in 200, which came subsequently with one of the lowest economic increase since the Asian crisis in 1997-98 (Chan, 2009).



Source: UNCTAD secretariat calculations, based on the United Nations Department of Economic and Social Affairs (UN-DESA), National Accounts Main Aggregates Database, and the World Economic Situation and Prospects (WESP) 2009: Update as of mid-2009; Organization for Economic Cooperation and Development (OECD), Economic Outlook No 85, Preliminary Edition, June, 2009, Economic Commission for Latin America and the Caribbean, Economic Survey of Latin America and the Caribbean 2008-2009, July, 2009; and national sources.

Figure 3. World GDP growth, 2003–2009, selected countries**.** Retrieved from United Nations Conference on Trade and Development, 2009.

The impact of both; deceleration of major economies and trading of goods, worsened the shipping-market crisis. Undoubtedly, the shipping industry was not was not immune to the exempt of the effects of this crisis. In addition other factors aggravated the climate to Container-Ships Market. There was an abundance of available cash at low interest rates and investors did not miss the opportunity to boost profitable container shipping businesses.

Bomboma Kalgora and Tshibuyi Mutinga Christian (2016) revealed in their recent investigation, *"The Financial and Economic Crisis, Its Impacts on the Shipping Industry, Lessons to Learn: The Container-Ships Market Analysis"* that:

> Consequently, many companies in this market sector have heavily invested in new ships building at the height of the economic boom in 2006 and 2007. By the time these ships were delivered, demand for shipping goods had crashed, leaving the market with a surplus of very modern, very large vessels, and a greatly reduced order book (pp. 38-39).

By 2009, ship owners were facing the worst market crisis of all time. Banks debts, commodity prices up to the roof and a severe decline in transportation were just the start of what the shipping sector is currently struggling to overcome. Several actions were taken after the market collapsed, including cooperation alliances as well as mergers and even bankruptcies. Through partnerships, shipping liners expected to increase leverage, reduce costs and stabilize freight rates (iContainers.com, 2016).

In 2012, the volume of imports in Europe dropped and caused an even larger overhang of capacity. The excessive order book of ships led the market to an oversupply of tonnage and a decline in vessel prices (Kalgora & Christian, 2016). In such instances, the shipping companies are hardly even solvent. Slow growth can produce depressed rates for shipping. Low freight rates do not allow these companies to generate higher revenues in order to cover debts or provide essential maintenance to ships. However, the low rates are an advantage for exporters who are looking to cut costs and deliver more tons (Slater, 2017).

Looking for a prompt and desperate solution, the majority of the fourteen largest shipping companies belong now belong to alliances. 2M (Maersk Line, MSC, HMM), Ocean Alliance (CMA CGM, China Shipping, APL, OOCL, Evergreen), the alliance (K Line, Yang Ming, HANJIN, MOL, Hapag-Lloyd, NYK Line, UASC), among others that are the most famous within the industry (iContainers.com, 2016) (Mundo Marítimo, 2017).

At first, consolidations between shipping companies might have been a good decision in order to cut up the over-supply brought by new vessels. The idea of sharing ships, networks and ports was a very useful way to reduce operating costs as well as sharing global demand.

Unfortunately, not all liners succeeded. Hanjin Shipping reported bankruptcy in August 31st, 2016, after months of attempts to increase

liquidity and restructured their debts. Considered the biggest bankruptcy in maritime history, Hanjin shipping collapse brought severe consequences and a massive market destabilization in terms of operations and capacity (Statista.com, 2016).

Nowadays, financially strong shipping companies are in a price war to gain more market share. Because of a lingering overcapacity, analysts at The United Nations Conference on Trade and Development (UNCTAD) predicted that there will be a lot of pressure on markets in coming years. The industry is influenced by a very volatile climate which mostly depends on trade trends (Kalgora & Christian, 2016).

Emergent nations such as countries in Latin America significantly depend on exports of raw materials and basic commodities (petroleum, iron, among others). Due to the precipitate fall in demand in developed countries and low prices in basic commodities, these economies were also impacted by the shipping crisis that worsened because of the Great Recession (Sanchez & Perez Salas, CEPAL, 2009).

As stated in a bulletin from The United Nations Economic Commission for Latin America and the Caribbean (ECLAC or UNECLAC), Latin-American exports were expected to decrease by 11% in 2009, the worst figure since 1937. Main basic commodities exporters presented a severe fall down of 50.7% as well as agricultural goods exports that fell 17% during the first quarter in 2009 (Sanchez & Perez Salas, CEPAL, 2009). The information provided by the ECLAC shows a dramatic downfall in imports of 14%, the worst shown in 27 years. (Sanchez & Perez Salas, CEPAL, 2009)

Ecuador is a country known for its agricultural products and petroleum extraction. Nevertheless, Ecuador import consumption also has a significant impact on the economy as well as on maritime business. According to the information provided by the Department of Trade and Industry by 2015 Ecuador had imported a total of 16.3 Million dollars in products with a negative growth of 17% (Sistema Nacional de Información, 2015).

Currently, there is no information regarding the impact of the financial crisis of 2008 in the Ecuadorian shipping industry, which makes an interesting topic to investigate considering that almost 90% of exports and imports use maritime services (Heaver, 2015).

Purpose Statement

The aim of this investigation is to analyze if the financial crisis of 2008 that started in The United States affected the shipping industry in Ecuador.

It introduces the Cobweb-theorem as a dynamic economic model which supports with concrete understanding the shipping industry.

For the purpose of the investigation, the impact of the financial crisis is represented by the fluctuation of Federal Funds rates and the fluctuation of the U.S dollar and as shipping indicators FOB, CIF and tons of Ecuadorian non-oil exports and imports are also analyzed.

Nature of the Investigation

This investigation has a quantitative approach as it involves numerical and statistical data to understand the phenomenon (Creswell, 2014). Fluctuations and variations of the sub variables are analyzed over a determined period of time in order demonstrate the causal co-relationship between the main variables of the hypothesis. Therefore a methodological quantitative design is the tool used in this thesis.

Objectives

General Objective.

To determine the impact on the shipping industry in Ecuador as a consequence of the financial crisis of 2008.

Specific Objectives.

The specific objectives of this investigation are the following:(a) to describe the crisis of 2008 through an analysis of the behavior of the Fed Funds rates and the fluctuations of U.S dollar, (b) to define the situation of Ecuador's non-oil exports and imports, by analyzing the figures of the period 2007-2016 and support its relationship with the shipping industry, (c) to perform a statistical analysis of the relationship between Fed Fund rates, U.S dollar fluctuations and non-oil Ecuadorian exports and imports; (d) to associate the Cobweb Theorem with the results of the analysis of the financial statements of a shipping company as a case of study in order to explain the dynamics of the shipping industry.

Hypothesis and Interrogations of the Investigation

The results of the investigation intent to prove the hypothesis: “There is a significant impact of the financial crisis of 2008 over the shipping industry in Ecuador, considering Fed Funds rates as a financial indicator”; and the following interrogations: (a) were the non-oil exports and imports directly affected by the crisis?,(b) is the U.S dollar fluctuation related to non-oil exports and imports of Ecuador as an effect of the crisis?, (c) did the financial crisis affect the shipping industry in Ecuador?; and (d) does the Cobweb Theorem explains the shipping industry behavior?

Limitations and Delimitations of the Study

There are specific constraints or limitations that can make the investigation more difficult such as: (a) time, because the investigation has an approximate length of 4 months, (b) lack of prior research studies on the topic, as there is no other investigation found like the present one, and (c) the lack of availability and reliability of secondary sources, since there are a lot of high-quality papers, investigations and specific information that cannot be shared easily and cost money while some others tend to be from unknown authors.

On the other hand, the established delimitations that narrow the scope of this investigation are the following: (a) it is almost entirely focused on the shipping market in Ecuador; and (b) the investigation considers CIF, FOB and tons of non-oil exports and imports provided by the Department of Trade and Industry and The Central Bank of Ecuador.

The financial crisis is assessed in terms of two indicators: (a) the fluctuation of the Fed Funds rates from 2007 to 2016; and (b) the fluctuation of the U.S dollar from 2007 to 2016. The Cobweb Theorem is explained through the analysis of: (a) the average freight rates in FFE (Forty Foot Equivalent Units), (b) the transported volume in TEUS (Twenty Foot Equivalent Units) from Maersk Line’s 2010-2016 financial statements; and (c) and the total demand of non-oil Ecuadorian exports from .

Definition of Terms

The most important terms to be analyzed for main purposes of the present thesis are the following: (a) Financial Crisis, (b) Shipping financial system, (c) Cobweb-Theorem, (d) Fed Funds Rate; (e) FOB (Free-on-Board); and (f) CIF (Cost, Insurance and Freight).

Financial crisis.

The term “Financial Crisis” has been analyzed from the perspectives of the following authors:

Benjamin Cohen (2009) considers the financial crisis as a “grave case of myopia”. In his opinion the crisis could have been predicted by U.S scholars. Nevertheless, they were affected by disaster myopia. The author based his reflection in the narrowness of expanding in broader issues of structural stability and development from the “American School” of International Political Economy as well as the lack of a more methodologic research.

Sebastian Fadda and Pasquale Tridico in their book “*Financial Crisis, Labour Markets and Institutions*” mentioned that besides the irresponsibility and greedy behavior of speculators, the principal problem falls into the category of lack of sufficient regulations and institutions able to manage and limit speculation and avaricious actions from banking institutions (Fadda & Tridico, 2013).

Albert Halm-Addo (2010) remarks the abolition of the Glass-Steagall as an indicator in the abuse of banks and insurance companies that brought the housing bubble. He also highlights as important, the decisions taken by the Federal Reserve in the extreme decline of interest rates.

For investigation purposes, explanation made by the author Halm-Addo (2010) is the one used in this thesis since he analyzes the financial crisis as a misuse of the monetary policy which harmed economy from the period 2001-2008.

Shipping financial system.

The term “Shipping Financial System” was analyzed from the perspectives of the following authors:

Martin Stopford on his book *“Maritime Economics”* differentiates three cycle periods related to shipping financial system: “This perception of the cycles suggests a sequence of three events, a trade boom, a short shipping boom during which there is overbuilding, followed by a “prolonged” slump” (2009, pág. 2.1).

Goulielmos (2017) described the shipping financial system based on Kondratieff “long wave” theory. According to the author long waves represented the shipping financial system by arguing that commodity prices make a peak every 48 to 60 years. He explained the process as the following: “Interest rates fall; people disinvest from land and natural resources and invest in financial assets. Cash goes into bonds, and then into equities. Profits are made much easier from trading shares, and this attracts many people” (pág. 311).

Kondratieff also believed that a 48- to 60-year cycle affects all aspects of (capitalistic) economy: prices, production, innovations, and major wars. (Goulielmos, 2017).

Even though both authors; Stopford and Goulielmos, worked under a same theory path, the one proposed by Stopford (2009) suits better in the present investigation.

Cobweb theorem.

As many economists and specialists have been studying the Cobweb Theorem, definitions are very similar. The term “Cobweb Theorem” has been analyzed from different perspectives and also adjusted to the present thesis for specific purposes.

For Modecai Ezekiel (1938) : “The classical Cobweb Theorem is based on a discontinuous adjustment on the supply side and an instantaneous reaction to price changes on the side of demand”. It is believed, the theorem has been held to apply only under certain conditions; when production is determined by the producer’s response to price, under

conditions of pure competition or when price is set by the supply available. Ezekiel defined the supply curve as the number of units of the commodity which producers will sell within a specific period at volatile prices (Buchanan, 1939).

Arnold B. Larson (1967) wrote in his paper *"The Quiddity of the Cobweb Theorem"* about The Criticism of the Traditional Cobweb Theorem, being the supply curve the center of it. There are significant alterations of prices and production that may increase, decrease or remain the constant, depending on the slopes of the demand and supply curves.

For John Muth (1961), the theorem is more based on a rational expectations model, the mean price in time is equal to the expected price, predicted by relevant economic theories; and consequently reaching market equilibrium price. Muth considered the theorem as a benchmarking model for certain industries.

Additionally, from Norman S. Buchanan's point of view the Cobweb theorem would be valid in special circumstances and economic agents would forecast upon rational expectations based on learned experiences (Larson, 1967).

Meifeng Luo, Lixian Fan and Liming Liu (2009) also studied the Cobweb Theorem related to freight rates and predicted that the shipping industry will continue facing a reduction in freight rates as demand increase. The dynamic-economic model proposed by these authors in their paper "*A dynamic- economic model for container freight market*" can be linked to the Cobweb Theorem.

The definitions that adjust better to the present investigation are taken from Muth and Buchanan's studies as they adapt the theorem to rational expectations in regard to prices as it is believed suppliers base prices and supply decisions on the market price of the preceding period. However, it is important to include the paper of Meifeng Luo, Lixian Fan and Liming Liu that related the Cobweb Theorem to fluctuations in freight rates and predicted, based on speculations, that the industry would reduce freight rates as demand increased.

Fed funds rate.

The Federal Reserve Bank of Saint Louis describes the Federal Funds rate as the following:

> The Federal funds rate is the interest rate at which depository institutions trade Federal funds (balances held at Federal Reserve Banks) with each other overnight. When a depository institution has surplus balances in its reserve account, it lends to other banks in need of larger balances. In simpler terms, a bank with excess cash, which is often referred to as liquidity, will lend to another bank that needs to quickly raise liquidity (2017).

The Federal Funds rate plays an important role in credit loans and interest rates offer by banks. If the Federal Reserve lowers its interest rate people will have more access to borrow money from external resources. The opposite will happen if the Fed decides to increase their rates making it more difficult for banks to offer a lower interest rate for short-term investments (Federal Reserve Bank of Saint Louis, 2017).

FOB (Free-on-Board).

As the term FOB is be used in imports as an indicator of the variables in this thesis; it is consider the statement under the *"Export and Import Price Index Manual",* Chapter 4, Valuation, Timing, Coverage and Classification:

> Fob values can be applied to imports, but they exclude the transport cost of the imported goods to the port or place of importation; the cost of insurance while in international carriage; and the cost of loading, unloading and handling charges associated with the transport of the imported goods to the port or place of importation (International Monetary Fund, 2010, pág. 5).

To define exports the definition of FOB is considered from The International Chamber of Commerce (2010):

> "Free On Board" means that the seller delivers the goods on board the vessel nominated by the buyer at the named port of shipment or procures the goods already so delivered. The risk of loss

of or damage to the goods passes when the goods are on board the vessel, and the buyer bears all costs from that moment onwards.

CIF (Cost, Insurance and Freight).

For the term CIF, the investigation takes as reference the main description of the Incoterm provided by the International Chamber of Commerce:

> Cost, Insurance and Freight means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. The seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination. The seller also contracts for insurance cover against the buyer's risk of loss of or damage to the goods during the carriage (2010).

Chapter 2: Theoretical Frame/State of Art

Introduction to the Financial Crisis in 2008

The author Albert Halm-Addo in his book *"The 2008 Financial Crisis: The Death of an Ideology*" introduces the Financial Service Modernization Act as the stage for unregulated derivatives market. He states the following:

> In 1999, the United States Congress passed the Financial Service Modernization Act, Public Law 106-102, and President Clinton signed into law on November 12, 1999. The legislation did not only revoke the Glass-Steagall separation of commercial investment banking but also the 1956 Bank Holding Company Act, which limited the services commercial banks could offer to clients. On the other hand it permitted the creation of financial holding companies (FHCs) that may hold commercial banks, investment banks, and insurance companies as affiliate subsidiaries. Those subsidiaries may sell each other's products. Within a year of the passage of the new Law, five hundred bank holding companies formed FHCs (2010, pág. 2).

The Glass-Steagall Act, or Banking Act of 1933, was introduced as a response to the Great Depression. It obligated banks to choose between being a commercial bank or an investment facility (Crowford, 2011). Therefore, the Financial Service Modernization Act or Gramm-Leach-Bbilley Act, repealed restrictions of banks partnering with security firms allowing national banks to engage in new financial activities as well as the development of FHCs (Financial Holding Companies) (U.S. Senate, 1999) .

The Gramm-Leach Bbilley Act, also known as GLB, promoted a structural organization for expanded financial activity. FHCs were authorized to engage in "merchant banking" investments in any kind of company and any amount, without prior Board approval (Gup, 2003).

Unfortunately, the 9/11 attacks threatened the United States financial system in an indirect manner. Gail Makinen; specialist in Economic Policy, explains in detail how the Federal Reserve System immediately forestall any chance of a possible financial breakdown (Makinen, 2002). The Federal Reserve continued lowering the interest rate for the next 5 years. By 2007, the target went from 5.25% to 2% in April 2008 (Friedman, 2011).

To reassure the need of liquidity in banks, the Federal Government lowered the key Federal Funds rate to 0.5% (Makinen, 2002). By that time it looked like a good short-term decision. The constant decrease of interest rates motivated Americans to borrow money. Undoubtedly, it stimulated the economy after the dot-com bubble started collapsing in 2000s (Halm-Addo, 2010). At this point, the GLB implementation and the aggressive downfall of Fed Funds rates had already harmed the financial sector (Halm-Addo, 2010).

In terms of banking strategies, it is speculated that the Credit Default Swaps was the reason for the 2007-2008 financial crisis. Halm-Abdoo remarked that Credit Default Swaps (CDS) are by far "the most widely traded credit derivative product", which might have led to a global crisis as companies, banks, and even citizens from around the world where benefiting from the housing bubble (Halm-Addo, 2010).

Another notable effect caused by the Federal Funds rates was the sharp depreciation of the dollar and increasingly high oil prices (Friedman, 2011). The author determined in his book *"What caused the Financial Crisis"* a close correlation between the Federal Fund rates and the price of oil (Friedman, 2011).

Important economic sectors were affected by the financial crisis in 2008. Since then, several market sectors have been studied in order to understand the impact of the crisis. Prior markets such as real-estate, banking and insurance companies were severely affected by mid-2008. Analysis from the Federal Reserve of San Francisco defined the effects of the financial crisis in bank lending (Kwan, 2010). Financial trend markets (Schich, 2009) studied the insurance sector and their decline in investment portfolio due to the crisis. The real-estate sector was investigated after the housing bubble collapsed, in *"The Evolution of the Financial Crisis of 2007-2008"*, Ray Barrell and E.Philip Davis discussed, over the build-up of the crisis by analyzing the complex assets structure (Barrell & Davis, 2009).The theories might explain how markets were affected by the financial crisis in 2008, especially for those that are easily influenced by commodities fluctuations and prices.

John B. Taylor, Professor of Economics at Stanford University and a Senior Fellow at the Hoover Institution, suggested after several statistical

analyses that the mismanaging of monetary policy of the Fed, financers and traders was the core problem of the global financial crisis. By measuring the spread between 3-months Libor and 3-month overnight index swap, he observed an unusual behavior in high levels that has remained ever since (Taylor, 2009).

For Taylor this approach was important in order to determine the type of necessary policy that should have been used during the years of crisis. He stablishes two theories: liquidity and counterparty risk. The Fed demonstrates that the problem was the lack of liquidity and that is why took the decision to reduce interest rates to inject money into the market.

The historical data, tell us that it was possible to define the problems at that time as a liquidity issue, which is why the Fed started to reduce interest rates and inject money into the market (Taylor, 2009) .

Taylor (2013) also points out in his paper "*A Review on Monetary Policy*" that:

> The Fed's near-zero interest rate also creates problems. It increases incentives for retirees and pension funds receiving miniscule returns to take on risky investments as they search for higher yields. The near-zero rates makes it possible for banks to roll over rather than write off bad loans, locking up unproductive assets. And the low interest rate policy reduces fiscal discipline, which increases the risk of an exploding federal debt (p. 6).

This is why Taylor's analysis might define these regulations as a major mistake. Taylor interviewed traders that deal with the interbank market in order to look for measures of counterparty risk. The idea of establishing a relationship between the crisis and risk was important to find the reasons of the quick spread of the crisis (Taylor, 2009).

To prove a relationship between the economic spread and risk, Taylor subtracted the interest rate from Libor and by using regression methods; he looked for an impact that explained the variation of risk and economic spread. Based on his results, it seems that the market disorder was not a liquidity problem that can be control by using central banks liquidity tools but it was inherently a counterparty risk issue that was mainly linked to the global financial crisis. Investors did not trust in banks at all. Apparently printing

money that provided liquidity was not the solution. Rather due to fundamental problems in the financial sector related to risk (Taylor, 2009) .

In several papers and studies of John B. Taylor, monetary policy is considered as the main problem during the financial crisis. In the book "*Across the Great Divide: New Perspectives on the Financial Crisis*" (2014, pp. 51-64)**,** he comments how the monetary policy imposed before the crisis worsened the American economy to end up in the global crisis.

By the years 1960s and 1970s monetary policy was not working very well and inflation started picking up in the late 1960s. The federal funds rate was only 4.8% when the inflation rate was about 4% (Hoover Institution, 2014). In the 1980s the Fed moved to a better monetary policy. In 1989, for example, the federal funds rate was higher than the inflation rate as in the late 1960s. And that policy continued through the 1990s. In 1997 the Federal Funds rate was 5.5 % when the inflation rate was 2 % (Hoover Institution, 2014).

It is believed that in the period before the crisis—especially around 2003–2005—monetary policy was not appropriate for the circumstances. The Federal Funds rate was only 1% in the third quarter of 2003 while the inflation rate was about 2%. The Fed's Federal Funds rate was below the inflation rate, completely unlike the policy in the 1980s and 1990s and similar to the 1970s. So it was a shift to a much different policy. Not coincidentally, at this time there was an inflection point in housing price inflation. The monetary system helped accelerate the housing boom (Hoover Institution, 2014).

As a result, changes in the Federal Fund affected the U.S dollar performance in the market during those years. The U.S dollar depreciated towards other important currencies such as Euro and Yen in 2008-2009. Changes in the Fed Funds rate will always affect the U.S dollar. If the Fed decides to increase the interest, an inflationary effect and appreciation of the currency might occur. As the economy in the U.S was not growing as expected, the Fed decided to apply an expansionary policy to encourage borrowing and business expansion (Downey, 2007).

The uses of conventional and unconventional monetary policies on the dollar were analyzed by Reuven Glick and Sylvain Leduc (2013). Since the end of 2008, they examined the effects of the monetary policy over the value

of the American dollar. By that time, the monetary policy was presenting several and drastic changes in the federal fund target rate. They also analyzed the co-movements of the Federal Fund and long term rates on the same period. It was no possible to identify monetary policy surprises at a short-term rate because it was always nearly zero (Leduc, 2013).

The changes in the value of the dollar were illustrated by an intraday behavior of bilateral exchange rates on selected days. By a panel data analysis, they were able to observe a sharply depreciation of the dollar against four currencies in December 16, 2008 after the FOMC announcement of the strategy in keeping the Fed Funds interest rate low (Leduc, 2013).

On a trade-weighted basis, the authors observed a depreciation of the dollar by an average of 62.64 and a 14 basis after announcements. They emphasized that it might not have been as drastic because markets might have anticipated these announcements and priced them into asset prices. As a result, the research made it possible to examine the effects the Federal Funds monetary decisions toward the dollar effect into the market (Leduc, 2013).

As the dollar was devaluating, oil prices increased, the risk from investors attempting to weaken currency through the years produced an elevated rise in oil prices and other commodities as they are all priced in American dollars. Therefore, a weak currency reduced the attractiveness in dollar assets. Nevertheless, it would be unusual that the Fed would want to use a monetary policy to target the exchange rate, but it can be considered as side-effect of policies to control inflation and stimulate the economy recovery (Elwell, 2012).

Introduction to the Shipping Industry System

The shipping industry has become indispensable for international trading. It facilitates approximately 90% of the global trade volume. Its efficiency also minimizes impact on the environment as well as being the least expensive way of transporting massive quantities of goods (Heaver, 2015).

Severe international shipping competition started during the closing years of the nineteenth and opening years of the twentieth century (Fayle, C. Ernest;). Containerization has been the most dynamic physical component of globalization (Guerrero & Rodrigue, 2013).

Market cycles have played an important role in the shipping industry by managing the risk of shipping investment where there is uncertainty about the future. In fact, the shipping industry is pervaded by the market cycles. Martin Stopford in his book *"Maritime Economics"* differentiates three cycle periods related to shipping:

> This perception of the cycles suggests a sequence of three events, a trade boom, a short shipping boom during which there is overbuilding, followed by a "prolonged" slump (Stopford, pág. 2.1).

Stopford categorizes the shipping industry as the "world's biggest poker game" as business turns highly unpredictable. To win the game, ship liners must depend on probability, strategies, psychology and luck. It was highly surprising that shipping cycle was so prominent (Stopford, Maritime Economics, 2009).

An important stage in the shipping cycle, also known as "shipping risk", is when ship liners decided to invest in important assets, such as new vessels. When shipping companies plan to enlarge their fleet, they are supposing a good scenario in the freight rate market that will provide as a result an increasing demand (Kavussanos, Manolis G.; Visvikis, Ilias D., 2016). In other words the "shipping risk" is the core of the shipping cycle.

Stopford makes reference to the cycle of booms and slumps as a cyclical event that defines the shipping market. By being cyclical, several economic theories can also describe the market performance, such as the Cobweb Theorem. To conclude, the shipping market is very sensitive towards unexpected economic events as well as basic commodities cycles and volatiles freight rates (Stopford, 2009).

The Situation of Shipping Industry as a Result of the Financial Crisis of 2008

Zhang, Podobnik, Kenett and Stanley studied by a correlation network and casualty measures the structure and dynamics of the shipping industry. By using casualty analysis based on Granger Causality and Brownian distance correlation the authors where able to determine the connections between the physical market and the financial market in the shipping industry during the same period of time (Zhang, Podobnik, Kenett, & Stanley, 2014).

The Granger Causality considers if variable A has been incidental to variable B. The approach must be tested in two time periods in order to determine the possible behavior of one variable over the other. The method was used in monthly returns of indices of the new ship market, second-hand ship market, freight rates and the stock market prices in the same period of time talked above. The authors found that a bi-rational causal relationship was strongly linked during the crisis period. They concluded that all variables were highly influenced by freight rate fluctuations (Zhang, Podobnik, Kenett, & Stanley, 2014).

The Brownian distance correlation was studied to explore a non-linear directional connection among market sectors. After running the test, the author observed a more significant bi-correlational effect between building new ship market and freight rates. They concluded that both methods determined that the impact of all three variable were more substantial during the crisis period, indicating that the financial crisis impacted the shipping industry in a global perspective (Zhang, Podobnik, Kenett, & Stanley, 2014).

Goulielmos studied freight rates by the Kondratieff Cycles, relating it to long waves followed by a period of difficult times with similar durations. To explain the Kondratieff cycle, the author described with figures that upon 266 years (1741-2015-8 years of no data) freight dry market index demonstrated secular maritime waves. By measuring risk, the author based a simple alpha and beta analysis; being alpha volatility and beta freight rate correlation degree of the market overall. The outcome was a fair risk between periods and one included the 2008 financial crisis. He concluded that freight rates

can be related to long wave theory because it is mainly affected to global economic due to its high volatility that increases risk (Goulielmos, 2017).

De Monie, Rodrigue and Nottebom exposed in a global perspective how the financial crisis directly influenced the maritime sector. By an evaluation of the cycle of credit, the authors determined that a significant portion of debt went into consumption. They mentioned that both, financial and shipping were always close and that their relationship turned around credit and liquidity (De Monie, Rodrigue, & Notteboom, 2011).

According to their analysis, economic bubbles usually give wrong approaches about the growth of the economy and misguide investment and capital accumulation, generating an overcapacity associated to a false peak in demand. Therefore, as it was apparently increasing, several economic sectors leveraged their assets. For ship liners, new investments in fleets were linked with an apparent growth in demand in years 2007-2008. The throughput of traffic of 6 important ports from 1997 to 2008 was taken into consideration. Apparently, the current method to forecast container volumes was leading to an overestimation of future growth potential. When using the compound annual growth (CAG), a common method in finance and business, an unreal scenario in the business was observed (De Monie, Rodrigue, & Notteboom, 2011).

The conclusion of the investigation was that global recessions have important impacts on freight rates as well. De Monie, Rodrigue and Nottebom revealed a significant decline in future indexes (freight rates) as well in consumption of durable goods. Both variables are represented in the same global value chain. They stated that stock markets valuations and freight rates tend to lead forces in the decline of international trade, followed by income, spending and seaborne freight (particularly container volumes) (De Monie, Rodrigue, & Notteboom, 2011).

Moreover, I .Samaras and E.M Papadopoulou analyzed the global effects of the financial crisis in the shipping industry and listed the strategies chosen by both shippers/consignees and carriers. The financial crisis of 2007-2008 was crucial in the collapse of global trade flows. After the implemented exploratory scope they identified that the most affected markets where the ones that depended significantly on the financial system and bank

credit, in which the shipping industry is mainly identify (Samaras & Papadopoulou, 2010).

They concluded that the recession brought positives and negatives effects into the industry. As negative, they mentioned banks financial instability, high oil prices, volatility of exchange rates and more importantly a severe decline in freight rates. According to their investigation, the arrival of new vessels produced an overcapacity that deepened the crisis as well as being influenced by the economic crisis in manufacture companies that brought as consequence a weak export demand (Samaras & Papadopoulou, 2010).

Jan Hoffmann wrote about the shipping industry in a bulletin from The United Nations Conference on Trade and Development (UNCTAD). He determined that maritime business is, in fact, cyclical. He defined that in austerity periods ship-owners have enough cash flow to order new vessels, once again focusing on capacity. Usually, new constructions will start 2-3 years after being ordered. Thus, in spite of an economic crisis, fleet is still expanding when demand tend to go the opposite way (Hoffmann, 2010).

Hoffmann interprets the market by relating it to the Cobweb Theorem. Therefore, his approach considers the relationship of time versus overcapacity. He determined that production of new vessels responds to changes in price, but because of time, the forecast that was at first prosper might become something different. Hoffmann identified that investment in increase capacity follows the theorem (Hoffmann, 2010).

David Chor and Manova Kalina examined the effect that the insufficient credit had on international trade during the periods of 2008-2009 global crises. They compared monthly U.S imports trade patterns from November 2006 to October 2009 by using the variation of interbank lending rates. Countries with higher interchange rates and consequently restricted credit access exported less to the United States. The crisis period exacerbated the effects, especially in sensitives sectors where external financing is required, concluding that credit conditions contributed in the evolution of trade flows when the global crisis started (Chor & Kalina, 2010).

Andrei Levchenko, Logan T. Lewis and Linda L. Tesar researched about exports and imports in the United States, between the periods of 2008-

2009. This research was based on historical data. During that determined period of time, there was a sharp drop in trade of automobiles, durables industrial goods and capital products (Levchenko, Lewis, & Tesar, 2010).

Another exercise was applied to define if the collapse in trade was “extraordinary” as they mentioned. The authors used the canonical international real business cycle model of Backus, Kehoe and Kydland. The real business cycle theory identifies business cycle fluctuations as macroeconomics and movement in the balance of trade. The results revealed a shortfall in imports associated with the pace of economic activity at that time and relative prices. It made them understand how difficult it is to predict the market and fluctuations (Levchenko, Lewis, & Tesar, 2010).

Yifu Lin analyzed the impact of the financial crisis in developing countries. By an explanatory study, he pointed out a rapid reduction in exports as well as less portfolio investment. Lin stated that the International Monetary Fund (IMF) projected in 2009 a 4.1% growth in world trade volume down from 9.3% in 2006 (Yifu Lin, 2008).

Lin emphasizes how commodity exporters suffered declines in terms of trade as non-oil commodities prices fell by 1.5% in 2009. Credit rates were also a main concern in developing countries. In order to get access to external capital higher interests were paid. In effect, it was deduced that deflation was an impact of the financial crisis on developing countries as well as a slow growth for dependable countries in external investment (Yifu Lin, 2008).

Wim Naudé (2009) described the domino effect that brought the financial crisis of 2008 to developing countries. He explains the effect as the following:

> Reductions in bank lending will have the impact of reduced investment, lower growth, and an increase in unemployment. The latter will lead to reductions in demand which, in turn, will reduce economic growth further. Bearing in mind that government revenue depends on growth, this will translate into less government revenue, and consequently less means for governments to fight poverty (págs. 4-5).

The reduction in demand affected developing countries as their economic growth depends on exports. According to Naudé, the expected decline would come through a combination of commodity prices downfall as well as a demand of goods in advanced economies. For example, he explained the situation in South Africa, major exporter of the platinum, and how the country is facing balance of payment-deficits because of the commodity prices (Naudé, 2009).

Through a descriptive methodology, Naudé explained how exports from developing countries would suffer as a global recession emerged. He emphasized that the United States and the countries of G7 are important destinations for developing countries exports. Therefore, The World Bank revised an estimate growth from 6.4% to 4.5% for 2009. The most affected countries would be the ones located in Africa, as they depend on exports and commodities (Naudé, 2009).

As other researchers, the author concluded that credit and foreign investment affected the economy of developing countries. Investors decline more risks; as a result, they reduced their portfolio investment in developing countries (Naudé, 2009).

The United Nations Economic Commission for Latin America and the Caribbean (ECLAC) published a report regarding the financial crisis and the maritime sector. The following publication explained through historical data the effect of the crisis in the Latin American economy. The maritime sector in Latin America suffered significant effects as a consequence of the severe downfall in exports. They were prognosticated to suffer a drastic decline of 11%, while imports would drop by 14% in 2009. The major cause of the economic contraction was due to a fall in commodity prices, external financing and the pro-cyclical nature of trade particularly in South America (Sanchez & Perez Salas, 2009).

Additionally, the study explained the disregard of the maritime business cycle. In fact, it is a key point in the development of the maritime crisis because of overcapacity, freight rates decrease considerably. The cycle works this way due to a lack of synchronization in the production of vessels in an exaggerated demand framework. To evaluate the behavior of the market, supply and demand related to freight rates were studied. In a

global perspective, by 2008 prices experienced a considerable increase because demand exceeds supply. Nevertheless, by the second trimester of 2009 the trend began to change, where freight rates dropped abruptly. By this time, new order of vessel where arriving (Sanchez & Perez Salas, 2009).

In conclusion, the investigation defined the market as cyclical. The lack of knowledge and information management accelerated the maritime crisis. In Latin American economies, the drastic downfall of freight rates in exports significantly impacted the economic development of these countries; nonetheless, a possibility of a positive growth in 2010 of only 3.1% was evaluated (Sanchez & Perez Salas, 2009).

In addition, the paper "*The Financial and economic crisis of 2008-2009 and developing countries*" published by the United Nations Conference on Trade and Development (2010) remarks the following:

> The (small) group of dollarized economies, including countries such as Ecuador, Montenegro and Panama, managed the crisis relatively well: their GDP growth fell by only 0.6 % points, and growth continued at an average rate of 3.7 % in 2008–2009 – above average in the overall sample. None of these countries had to seek IMF support.

However, countries which lacked a legal tender of their own had been growing less rapidly in the years prior to the crisis than other countries of similar income levels (United Nations Conferece on Trade and Development, 2010).

The Cobweb Theorem

The Cobweb Theorem is a well-known economic model which explains the irregular fluctuations that might occur in some markets. Time is the main factor of this model because of the way expectations of prices adapt which determines fluctuations in prices and quantities. Expectations about prices are forecasted and based upon observations of previous scenarios and prices. Cobweb models have been analyzed before by recognized economists like Ronald H. Coase, Wassily Leontief and Nicholas Kaldor. *"A Classificatory Note on the Determinateness of Equilibrium"*, paper written by

Kaldor in 1934, led and motivated further studies on the model. The economist Mordecai Ezekiel, who published his paper *"The Cobweb Theorem"* in 1938, made the theorem gain more popularity (Policonomics.com, 2017).

Mathematicians believe the theorem comes from a normal distribution of errors as an empirical law. On the other hand scientists distinguish it as a mathematical theorem. Many economists assumed that the model was empirically demonstrated in agriculture; being its archetype the hog cycle (Larson, 1967). The Cobweb Theorem was basically developed to clarify the cyclical phenomenon in the agricultural industry as it is commonly applicable to the markets where production takes time and the quantity produced relies on anticipated price and supply at time of sale. This determines the actual market price (Pashigian, 1991). According to B. Peter Pashigian (1991) on his book *"The World of Economics"*: "Cobweb theory was first developed under static price expectations where the predicted price equalled actual price in the last period" (pp. 58-61).

Furthermore, Arnold B. Larson (1967) wrote on his paper *"The Quiddity of the Cobweb Theorem"* about The Criticism of the Traditional Cobweb Theorem, being the supply curve the center of it. There are significant alterations of prices and production that may increase, decrease or remain the constant, depending on the slopes of the demand and supply curves. Larson explains how several specialists considered the theorem. He indicates that Ezekiel defined the supply curve as the number of units of the commodity which producers will sell within a specific period at volatile prices. Ezekiel's curve has been always related and compared with Marshall's short-run supply curve.

On the contrary, Norman S. Buchanan pointed out that the Cobweb Theorem has a reversible supply curve and it is expected to be more long-term directed. In the book "*Economics, Economists and Expectations: From Microfoundations to Macroapplications*", written by William Darity, Robert Leeson and Warren Young (2004), it is concluded in detail that Buchanan is also criticized the theorem from the perspective of its efficacy about expectations. The theorem seems to be valid if the producers or suppliers are not rational at all. There is always a group of new producers willing to rush

and invest. According to Buchanan, rational behavior implied profit maximization and the Cobweb Theorem inevitably makes losses exceed profits. Obviously, rational businesses will not act according to the theorem. Buchanan's point of view remarks that the Cobweb Theorem would be valid in special circumstances and economic agents would forecast upon rational expectations based on learned experiences (Larson, 1967).

Gustave Akerman assumed the short- run supply curve is not perfectly inelastic and it shifts to new positions reached by levels of output. He still considers that the previous prices are equal to the expected prices. The theorem was also used by John F. Muth as a benchmark in certain industries (Larson, 1967).

It is known that the theorem gets its name from the set of horizontal and vertical lines which represent the supply and demand curves. There may be alterations in price as it increases, decreases, or remains constant, depending on the relative slopes of the demand and supply curves. Hence, a number of studies have shown that change in quantity produced is the variable associated with price. The study of the theorem left by Ezekiel remained as a tool to explain price cycle and oscillations. It points out the convergent, divergent or perpetual oscillations and shows how static expectations could generate cycles of different lengths (Larson, 1967).

Supposing the quantity supplied of certain product is quite small (Q_t, see figure below, first diagram), there will be an excessive demand or shortage that causes prices to be unusually high (P_t). Consequently producers will try to produce more in order to supply more the following year. Nevertheless, supply turns out to be very high the following year (Q_{t+1}) that prices decrease to meet the consumers' demand (P_{t+1}). Now that prices are low, producers will lower their supply the following year ($Qt+2$), making the prices increase again (P_{t+2}).

This cycle of fluctuations continues until equilibrium is reached. As it is shown below in the first figure, convergent fluctuation happens because of the elasticity of the demand curve that is higher than the elasticity of the supply curve. On the other hand, when elasticities in supply and demand are equal to each other, a continuous fluctuation occurs between the equilibrium, as it is represented in the second figure. The last figure explains a steeper,

the demand curve in a divergent fluctuation (Policonomics.com, 2017). These oscillations and expectation factors that are commonly present in the theorem are also related with uncertainty in markets.

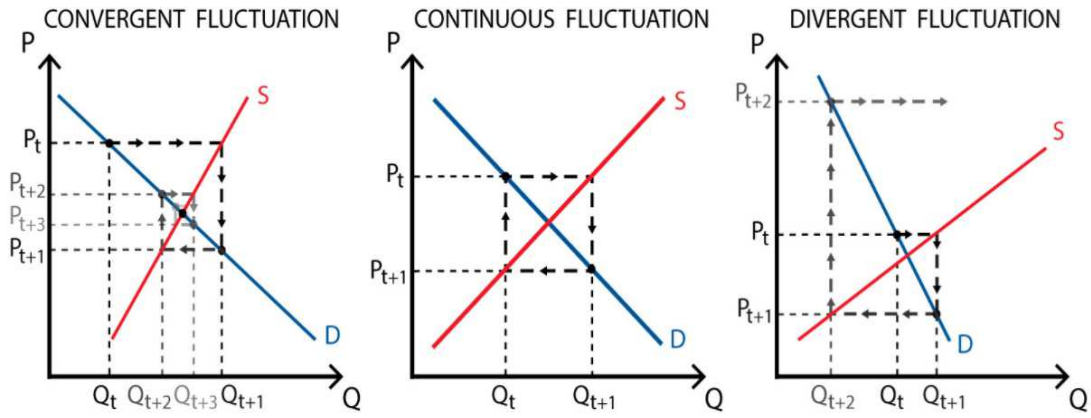


Figure 4. Fluctuations that generate the Cobweb Theorem. Retrieved from Policonomics.com, 2007.

There have been several investigations and studies that adapted the Cobweb Theorem to different purposes. Simon Glöser and Johannes Hartwig (2015) on their paper "*The classical Cobweb Theorem and real commodity market behavior: Modeling delayed adjustment of supply in industrial metals' markets*", drew on the classical Cobweb Theorem to prove how it can be implemented into the System Dynamics approach, throughout understanding the dynamics of raw material markets and commodity price fluctuations caused by the adjustment of supply curve. The authors developed a simple model to understand better the dynamic market behavior that may be used as a flexible forecasting tool. They concluded that System Dynamics Approach enables the combination of physical material flows with market dynamics in a single model, enhancing the analysis of raw material markets in the mid or long term.

There is also another investigation, "*Genetic algorithm learning and the cobweb model*", written by Jasmina Arifovic (1992) for McGill University in Montreal, Canada, that describes how the Cobweb Model is used in firms, that in a market for a single good and uses an algorithm to update their decision about next-period production and sales. The results of simulations in this investigation show that the genetic algorithm converges better to rational expectation equilibrium than other algorithms studied before in relationship

with the cobweb model. The genetic algorithm generates price and quantity patterns that are compared to the data of experimental cobweb economies.

Md. Shahidul Hoque, Mohammed Farid Uddin and Muhammad Alamgir Islam (2015) published the paper "*A market model for watermelon with supply under rational expectations: an empirical study on Bangladesh*" with the objective of knowing the cultural practices and market model of watermelon in Bangladesh. The paper also identifies the best model that may be used to forecast watermelon crops, considering series of agricultural data from 2001 to 2013.

They explain and compare 3 models: Naive, Cobweb and Rational Expectations. The Cobweb Theorem has been compared with the Naive and the Rational Expectations models to predict future business scenarios and operations. As result of this investigation made, the Rational Expectations model was considered the best model, because according to the authors, most of the signs are expected and the results are plausible (Hoque, Uddin, & Islam, 2015).

Martin Anokye and Francis T. Oduro (2013) also used the Cobweb Theorem for the agricultural sector, as it is stated in their paper "*Cobweb Model with Buffer Stock for the Stabilization of Tomato Prices in Ghana*". They aimed to analyze the phenomenon of commodity price fluctuations and discuss demand and supply functions during production of tomatoes in Ghana.

The authors developed a linear cobweb and discovered, based on assumptions, that fresh tomatoes have no equal substitutes, there is lack of foreign competition and that the slope of the demand was smaller than the slope of the supply, implying that the price and quantity supplied of fresh tomatoes would fluctuate around fixed prices and quantities (Anokye & Oduro, 2013).

"*Dynamics of the cobweb model with adaptive expectations and nonlinear supply and demand*" by Cars H. Hommes (1993) presents a realistic geometric explanation of the price-quantity fluctuation in an independent market where curves of supply and demand can be monotonic. Hommes concludes how chaos or any dynamic behavior may occur even under simple and reasonable economic assumptions based on a non-linear

cobweb model. The price can be altered as a result of the combination of nonlinear, monotonic supply and demand curves.

Moreover, Paul Bedford and Chris Bloor (2009) built a cobweb pricing model in order to depict the Reserve Bank of New Zealand's assessment of financial stability. To build the cobweb pricing model, 3 dimensions were designed to pick up the major shocks and macroeconomic vulnerabilities that would trigger difficulties for domestic financial institutions. These are captured through financial market conditions, domestic and global environment. The results of this model attempted to provide a graphical representation of financial stability for New Zealand and it was included for the first time in the November 2009 Financial Stability Report.

However, investigations related to the Cobweb theorem have not only been directed to the agricultural and commodity industries. Robin Greenwood and Samuel G. Hanson (2013) for Harvard Business School, in their paper "*Waves in Ship Prices and Investment*" suggested a behavioral model to show how price and investment dynamics are connected to return predictability in the dry bulk shipping industry.

Their model is based on rational expectations and on Kaldor's Cobweb Theorem who remarked that the model suggested that economic fluctuations could arise from rules of thumb. In contrast, Mulk supported the idea that rule-of-thumb behaviors are not fully rational or forward looking (Greenwood & Hanson, 2013). In their model, positive shocks to demand curve generate excessive investment responses and this leads prices to overshoot their rational-expectations levels.

"*A dynamic- economic model for container freight market*", another paper, written by Meifeng Luo, Lixian Fan and Liming Liu (2009) for the Hong Kong Polytechnic University, presents a dynamic-economic model that analyzes fluctuations of container freight rates due to the interactions between the demand for container transportation services and the container fleet capacity.

Variations in prices and rates are studied through the Cobweb theorem. The model proposed in this paper is estimated throughout the world container shipping market statistics from 1980 to 2008. A three-stage least square method is used and the parameters of the model have a highly-

statistical significance. The short-term sample prediction made replicates the fluctuations in the container shipping industry market in terms of fleet size dynamics and fluctuations of freight rates in the last 20 years (Meifeng Luo & Liu, 2009).

As reported by the authors in 2009, results of predictions reveal that the container freight rate will continue decreasing in the next 3 years if the demand for container transportation services increases less than 8%. In conclusion, this model can contribute information for public and private businesses and maritime agencies can follow to help stabilize the market freight rate (Meifeng Luo & Liu, 2009).

"*What drives the stock returns of maritime companies*" by Vasiliki Tsitziloni (2009) demonstrates the factors that determine the stock returns of maritime companies to provide investors enough and accurate information to interpret the shipping stocks returns framework. The Cobweb model is analyzed as the industry is a highly volatile market where fluctuations of prices, demand, supply and freight rates are very likely to change within a significant timing gap. The findings obtained were thanks to a multifactor model that includes 21 Greek shipping companies and 8 foreigners. There is an existing correlation between global economic growth and growth in tonnage demand, as well as a positive relation over returns with regards to the Exchange Market Indices (Nasdaq and Nyse). Some other factors were studied through a multi- regression model. Authors conclude that no significant relationship was found with regards to freight rates variable.

When describing the seller's expectations and behavior in supply in markets, there are 5 important models applied to the cobweb theorem: (a) the traditional cobweb model, (b) an extrapolative model, (c) an adaptive model, (e) a moving average rational expectations model, (d) and Muth's (1961) original rational expectations model (Johnson & Plot, 1989). For purposes of the present thesis, the traditional and the rational expectation models are the ones needed in order to study the shipping industry system.

According Meifeng Luo, Lixian Fan and Liming Liu (2009) who studied the Cobweb Theorem related to freight rates predicted that the shipping industry will continue facing a reduction in freight rates as demand increase. The dynamic-economic model proposed by these authors can be linked to

the Cobweb Theorem. Economic dynamics is considered as a study of economic phenomenon in preceding and succeeding events. It also studies the path of change or the movement towards equilibrium. The figure below is resembles the Cobweb Theorem.

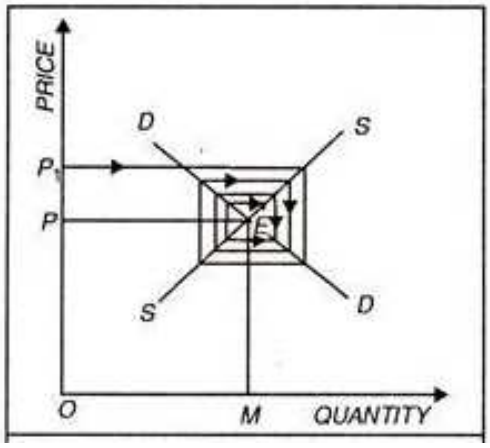


Figure 5. Dynamic Economic Model- The process of adjustment in a competitive market for arriving at equilibrium. Retrieved from Economicsdiscussion.net, 2017

Interest Rates

The American economist, Irving Fisher (1930) remarks on his book "*The Theory of Interest*" the following:

> I shall usually confine the concept of the rate of interest to the rate in a (humanly speaking) safe loan, or other contract implying specific sums payable at one date or set of dates in consideration of repayment at another date or set of dates (pp. 34-35).

In other words, interest rates are the amount of money expressed as a percentage of principal (typically on annual basis) that is charged by a lender to a borrower for the use of assets. Interest rates are also considered as rental or leasing charge to the borrower. On the other side of the coin, interest is the compensation for bearing risk of lending money (Investopedia.com, 2017).

Interest rates are constantly fluctuating due to several forces such that affect them directly as supply and demand, inflation and government in terms of monetary policy. Fluctuations might occur because interest rate levels are

a factor of the supply and demand of credit. Hence, interest rates will rise when there is an increase in the demand for credit. A decrease in the demand for credit makes interest rates decrease. As a counterpart, interest rates will reduce if the supply of credit increases; while a decrease in supply of credit increases them. Deferring payment of loans causes an increase in the amount of interest and a decrease in the amount of credit available in the market (Investopedia.com, 2017).

Additionally, inflation rate plays an important role when it rises because interest rates are more likely to rise too. Banks demand higher interest rates as compensation for the decrease in purchasing power in the market. The government also can control how interest rates are affected. The Federal Reserve announces how monetary policy affects interest rates (Investopedia.com, 2017).

High interest rates usually represent a strong economy. If the economy is strong, banks and lenders understand that people and businesses are in a good financial position as they are willing to borrow more money with a higher interest rate. When the economy grows too much, inflation also increases. That is why it is necessary to raise interest rates, so that the Federal Reserve manages to slow the speed of economy's growth and bring inflation back under control (Financeqa.com, 2017).

There are 3 types of interest rates: (a) Nominal Interest Rate, (b) Real Interest Rate; and (c) Effective Interest Rate. The differences among them are based on economic factors. The nominal interest rate is the simplest interest rate of a given loan for fixed income investments. It is the monetary price that lenders pay to borrowers. If the nominal interest rate on a loan is 6%, borrowers expect to pay $6 of interest for every $100 that has been loaned (Cussen, 2017).

In contrast, the real interest rate states the real rate that an investor receives as it factors in and considers inflation. If the nominal interest rate on a loan is 5% and the inflation rate is 4%, the real interest rate is 1%. (Nominal interest rate – inflation= Real interest rate). Real interest rates can be higher or lower than nominal rates depending on the inflation. If the inflation rate is positive, nominal interest rates exceeds real rates. However during deflation periods, real rates can exceed normal rates (Cussen, 2017).

The effective interest rate is the interest rate on a loan that is restated from the nominal rate. It has an annual compound interest payable in overdue payments. It is also known as annual equivalent rate (AER), or effective annual interest rate (Cussen, 2017).

There are very important entities that play crucial roles in the economy of a country. The Federal Reserve System, the Fed, is the Central Bank of the United States. It manages monetary policy in order to promote stability of the financial system by controlling prices, fostering employment and moderating long-term interest rates in U.S economy (Board of governors of the Federal Reserve System, 2017). In December 2008 the Fed settle interest rates at 0% to boost the collapsed housing market and economy (Gillespie, 2017).

According to the Federal Reserve Bank of Saint Louis, the Federal Fund rate is state as the following:

> The Federal funds rate is the interest rate at which depository institutions trade Federal funds (balances held at Federal Reserve Banks) with each other overnight. When a depository institution has surplus balances in its reserve account, it lends to other banks in need of larger balances. In simpler terms, a bank with excess cash, which is often referred to as liquidity, will lend to another bank that needs to quickly raise liquidity (2017).

The Federal Funds rate plays an important role in credit loans and interest rates offer by banks. If the Federal Reserve lowers its interest rate people will have more access to borrow money from external resources. The opposite will happen if the Fed decides to increase their rates making it more difficult for banks to offer a lower interest rate for short-term investments (Federal Reserve Bank of Saint Louis, 2017).

FOB – Freight on Board

INCOTERMS were developed by the International Chamber of Commerce (ICC) and released in 1936. Incoterms are supposed to harmonize maritime trade worldwide; reduce disputation between trade

partners and specify the responsibilities between buyers and sellers (Stapleton, Pande, & O'Brien, 2014).

For years, the trade term FOB has been stated as the most use trade agreement. By 2010 the ICC reformed the INCOTERMS in two specific rules: (a) for any mode or modes of transport and (b) for sea and inland waterway transport, as a solution of misunderstandings of responsibilities between sellers and buyers.

According to the ICC the term FOB mainly refers for “sea and inland waterway transport”. It is defined as the following:

> “Free On Board means that the seller delivers the goods on board the vessel nominated by the buyer at the named port of shipment or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel, and the buyer bears all costs from that moment onwards” (International Chamber of Commerce, 2010).

Several authors determined the term FOB as a riskier practice in modern transport. For example, Bergami (2013) defines FOB usage in trade companies as a potentially risk management tool. He states that it is not recommended for ship-owners to use of the term FOB in international contracts because of transport risk considerations.

Using FOB in a contract limits risks as soon as the container is on the hands of the carrier believing it passes to the buyers care. Nonetheless, if FOB is the designated Incoterm, the responsibility of the seller on the cargo ends when the container has passed the boarding point to the ship. As a result, FOB is misused as a multi-modal transport and its erroneous use puts sellers into a risk gap (Stapleton, Pande, & O'Brien, 2014).

“The Export and Import Price Index Manual” in the Chapter 4, Valuation, Timing, Coverage and Classification remarks that:

> FOB values can be applied to imports, but they exclude the transport cost of the imported goods to the port or place of importation; the cost of insurance while in international carriage; and the cost of loading, unloading and handling charges associated with the transport of the imported goods to the port or place of importation (2010).

In this case the usage of FOB imports is principally for the balance of payment calculation.

CIF (Cost, Insurance and Freight)

The Incoterm CIF is also considered by the International Chamber of Commerce (ICC) as a rule for *Sea and Inland Waterway Transport.* According to the ICC (2010) the terminology CIF represents the following:

> Cost, Insurance and Freight means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. The seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination. The seller also contracts for insurance cover against the buyer's rise of loss of or damage to the goods during the carriage.

In the book *"CIF and FOB Contracts" vol.5* explains that the Incoterm CIF is mainly used in order to reduce the risk of fluctuations of effectively risk markets (Lorenzon, Sassoon, Baatz, Skajaa, & Nicoll, 2012). In other words, a CIF contract involves an all-in by the seller. By saying "all-In", it includes the cost of carriage, insurance and freight.

Theoretical Framework Conclusion

The previous investigations were selected for the development of the theoretical framework of the present thesis. Nevertheless, some premises were chosen as primary sources as they seem to be more related to the analysis.

The domino effect described by Wim Naudé in his book "*The financial crisis of 2008 and the developing countries*" explained how big economies can be related with developing economies financial crisis in terms of demand, employment and bank credits. The author associated developing countries economic growth with exports of goods and basic commodities. As the global recession emerged, developing countries were severely affected by a downfall in commodity prices and exports of goods (Naudé, 2009).

In fact, the report released by The United Nations Economic Commission for Latin America and the Caribbean (ECLAC) prognosticated a drastic decline in exports by 11% in 2009, which confirms the statement made by Naudé. The commission also found a relationship of economic contraction with the downfall of commodity prices and financial credit (Sanchez & Perez Salas, 2009).

Credit and foreign investments were reduced as investing in developing countries was considered riskier. In terms of external credit conditions, for the author Yifu lin credits rates are a main concern for developing countries as they will have to pay higher interest in order to get access to external capital or investment. However, these countries were not the only ones affected by the new credit conditions provoked by the crisis. Very sensitive industries such as the shipping sector were also involved. (Yifu Lin, 2008).

De Monie, Rodrigue and Nottebom revealed a relationship between the global financial system and the maritime sector. They used the cycle of credits to expose the financial situation of the maritime industry with credit and liquidity. The authors explained how the economic bubble acted in such a way that provoked a wrong approach in global economic growth. They pointed out that a false peak in demand generated an overcapacity. Probably, the maritime industry misread the numbers and leveraged their assets. Apparently, the method used to forecast container volumes described unreal scenarios for the business (De Monie, Rodrigue, & Notteboom, 2011).

Actually, the ECLAC mentioned the ineffective maritime business cycle. Martin Stopford (2009) defined the shipping industry in 3 stages: "a trade boom, a short shipping boom during which there is overbuilding, followed by a "prolonged" slump". Jan Hoffman (2010) also determined the shipping industry as cyclical. Nonetheless, his approach is also related to overcapacity. According to Hoffman, the shipping industry jeopardized their economic system by misinterpreting the market, which brought as a result an overcapacity when demand was contracting (Hoffmann, 2010).

The ECLAC considered as well that overcapacity produced a significant decrease in freight rates that made it even harder for shipping companies to stabilize in the short-term (Sanchez & Perez, 2009). De Monie,

Rodrigue and Nottebom also stated that freight rates tend to decrease international trade (De Monie, Rodrigue, & Notteboom, 2011).

Because the shipping industry is considered a highly volatile market that depends on a significant timing gap between demand and supply, prices are very likely to fluctuate. There is a lot of unpredictability within the industry but financial managers have also used rational expectations models to forecast prices. There is also benchmarking between shipping companies. For these reasons it is believed that the Cobweb theorem can be associated with this type of market.

All authors tried to define through several analyses the impact of the shipping crisis related to overcapacity or credit conditions. Most researches concentrated in global economies or developing countries such as Asia and India, but few have analyzed the Latin American market behavior after the crisis. Latin American economic growth is also based on exports, especially agricultural goods and basic commodities. Nonetheless, it depends a lot on final goods imports.

Since the present investigation studies the financial crisis of 2008, Fed Funds rates were being considered as a crisis indicator. John B. Taylor's important contribution about the 2008 crisis focuses on the analysis of the interest rate as a financial instrument used to avoid the prolongation of the crisis in 2008. For the Federal Reserve the problem was the lack of the liquidity in the market and that was why they lowered interest rates. Nonetheless, Taylor pointed out that the monetary policy implemented by the Fed was mistaken and related the problem to counterparty risk (Taylor, 2009).

The performance of the American dollar during the years of the crisis is also a significant variable regarding the applied monetary policy. Glick and Leduc (2013), were able to find a relationship of the monetary policy applied on the dollar becoming a possible side-effect of the policy as Elwell (2012) mentioned in his paper "*The Depreciating Dollar: Economic Effects and Policy Response*".

Since the economy of Ecuador depends on the American monetary policy, it is important to revise if the approach made by the Fed was an advantage or disadvantage to the country as it is mainly a raw material

exporter. According to economic theory, when a currency devalues towards other it promotes exports rather than imports.

This thesis tries to detect the incidence of the crisis through an analysis of the non-oil imports and exports of Ecuador with the Fed Funds rate and US dollar fluctuations. Both variables are studied and interpreted in order to observe the behavior of the market during the global financial crisis and the Ecuadorian maritime performance. Furthermore, the Cobweb Theorem is exposed as an economic dynamic model that describes the market performance of the shipping industry.

Chapter 3: Methodology

Approach of the Investigation

The present investigation is based on a quantitative approach as its characteristics made it more statistical-numerical oriented.

John W. Creswell (2014), states in his book "*Research design qualitative, quantitative and mixed methods approaches"* that:

> A quantitative approach is one in which the investigator primarily uses post positivist claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data (p. 18).

Research Design

This investigation is based on a non- experimental research design as it does not involve manipulation of the events or people the findings can be applied to a wide audience. Correlational and descriptive studies are examples of non-experimental research design. Longitudinal studies are also non-experimental because they study a situation, people or phenomenon over a period of time in order to observe the change. As in this design the researcher does not manipulate test the variables directly, a causation needs to be established to determine that a certain variable has an impact on another variable (Readingcraze.com, 2015).

Roberto Hernandez Sampieri, on his book "*Metodología de la Investigació*n", emphasizes that: "In non-experimental research, investigators are closer to hypothesized variables as "real" and, consequently, have greater external validity (possibility of generalizing the results to other individuals and common situations)" (2010, p. 162).

Scope of the Investigation

In addition, the research follows an explanatory scope as it is intended to observe and analyze variables to prove their relationship.

Roberto Hernandez Sampieri (2010, pp. 83-84) , on his book *"Metodología de la Investigación"*, clarifies that explanatory scope studies are directed to respond the causes of a phenomenon. It is focused on explaining why the events occur and under what conditions, as well as, the reasons why two or more variables are related.

Moreover, the author mentions specific designs to measure explanatory scopes within a length of time. One of them is the longitudinal design, which collects data over time in exact points or periods in order to make inferences about the change, its determinants and consequences (2010, pp. 158-159). This investigation has features that can be supported through a longitudinal study.

Sample Data

The data obtained in this investigation comes from secondary sources. The non-probability sample scheme follows a convenience sampling in which samples are selected because they are accessible to the researcher. Subjects are chosen simply as they are easy to recruit. This technique is considered as the cheapest, easiest, and least time consuming (Explorable.com, 2017).

In this case, the investigation mainly works with data provided by the Department of Trade and Industry of Ecuador and The Central Bank of Ecuador. Interest rate from 2007 to 2016 was selected for the further analysis is taken from the Federal Fund Reserve official website page. American dollar fluctuations from 2007 to 2016 from the DXY Spot Rate from Yahoo Finance are also taken into consideration. In order to explain the dynamic economic model of the Cobweb Theorem the data used is: (a) the average freight rates in FFE (Forty Foot Equivalent Units), (b) the transported volume in TEUS (Twenty Foot Equivalent Units) from Maersk Line's 2010-2016 financial statements; and; (c) total demand of non-oil Ecuadorian exports from 2007 to 2016.

Statistical tool

A statistical analysis is carried out in order to make inferences from the collected data. The program used is Statgraphics which is an intuitive software program for data analysis, data visualization, statistical modeling, and predictive analytics. It is also offers over 230 procedures covering from summary statistics to advanced statistical models (Statgraphics.com, 2017). Centurion XVI is the 16th version of Statgraphics that studies the information of this investigation. Centurion XVI is divided into several major sections. One of them specifically elaborates relations through regression and classification methods, including simple regression, polynomial regression, nonlinear regression, multiple and stepwise regression, calibration models, comparison of intercepts and slopes, among others (Statgraphics.com, 2017).

A simple regression was used in order to know if there is a significant relationship between the main indicators selected. The procedure is designed to construct a statistical model that can describe the impact of a single quantitative factor X on a dependent variable Y (StatPoint, Inc, 2005).

Chapter 4: Data Analysis

Descriptive Review of Imports and Exports in Ecuador from 2007 to 2016

The following review is a descriptive analysis of the international commerce in Ecuador from 2007 to 2016. It considers imports and exports of private-sector main goods which have an effect in the shipping industry. Imports and exports are very important for the national economy as they have a direct impact and regulate the balance of trade and are supposed to be strategically involved to reach the goals and objectives set by the government.

Imports

Ecuador specializes in primary products within a non-durable goods industry based on the transformation of these products, imports are mainly composed of raw materials, capital goods, and non-durable goods (Acosta, et al., 2008).

In 2006 and 2007, Ecuador's balance of payments strengthened as a result of the existing surplus. It was actually the highest figure in the last 10 years (Vela, 2014). During the year 2007 there was a trade surplus of $1,250.4 million, lower than $1,448.8 million in 2006 because of the increase of the deficit of the non-oil balance of trade by 19.1% (Central Bank of Ecuador, 2008).

Moreover, from January to December 2007, all imported products were higher than ones in 2006. The increase in imports of raw materials (16.2%) and capital goods (11.7%) were the most significant figures reported. Figures of December 2007 indicate that non-durable goods represented 13.6% of total imports ($ 1,755.1 million). In this group, the item with the largest share is pharmaceutical products with 35.3%. On the other hand, imports of durable goods reached $ 1,034.0 million, representing 8.2% of the total imports and a decrease of -5.2% due to the smaller imported quantities (-7.7%) (Central Bank of Ecuador, 2008).

In 2008, the foreign direct investment was very significant, being the highest in the decade. Imports had an annual growth of 36% and oil prices

plummeted when the financial crisis occurred, causing a decrease of approximately $500 million in the commercial surplus and reducing the positive balance of payments. The impacts of the global financial crisis were notable in Ecuador in the last quarter of 2008 as remittances fell by 8,6% in 2008 and by 27% in the first quarter of 2009. Currency of Ecuador's main commercial partners also started to depreciate (Vela, 2014).

The balance of payments in 2009 was negative of $ -3,033.8 million. In this year, the fiscal deficit was $ -2,232 million (-3.6% of GDP). Furthermore, oil exports fell by 40%, as well as imports but in a lower number. The year 2009 began with a group of measurements that were established to boost the economy of the country after the global financial crisis (Vela, 2014).

On January 19th, 2009, the president Rafael Correa decided to apply import restrictions (ad valorem and quotas) to 627 subheadings of products considered as sumptuary and detrimental for national production. The government aimed to reduce imports by $ 1.459 billion compared to the ones in 2008. This reduction in imports was complemented with an increase in tariffs of 30% and 35% in 50 subheadings in order to promote national consumption and exports to guarantee the country's monetary stability. This decision was understandable because the dollarized economy could not resort to any other temporary measure that could contribute to define a new productive policy and encourage national production (Vela, 2014).

On July 13th, 2009, the Ecuadorian government imposed safeguards on 1,346 subheadings of Colombian imports, including automobiles, clothing, toiletries and refrigerators. In that time, the Colombian peso devalued by 40% and there were no full diplomatic relations between the two countries. Nathalie Cely, The Minister of Coordination of Production of Ecuador at the time, mentioned that the safeguard was temporary and intended to correct the distortion in the Balance of Trade caused by the effect of the peso devaluation (Vela, 2014).

The ministry indicated that the imports from Colombia left a deficit of $ -3.033, 8 million in the first half of 2009, which was aggravated by the better commercial position of Colombian products. 1,192 subheadings were under tariffs at rates of 20% to 30%, 96 with tariffs from 32% to 86% and

another 58 with tariffs from 5% to 17%. Cars, clothing, liqueurs, makeup, detergents, tiles, sugar and confectionery, hygiene products, refrigerators and perfumes, among others, were included in the list (Vela, 2014).

The Andean Community decided that the safeguard could be applied transitorily and within 180 days it was gradually reduced until disappearing. It managed to lower imports from Colombia on a temporary basis, but the trade deficit continued, as fundamental problems were not really solved (Vela, 2014).

In 2010 the Balance of Trade reached another deficit of $ -1.978, 7 million. Non-oil imports between January and July 2010 reached a record in the last ten years. The country bought more from abroad in this period than in similar periods of the last decade. Ecuador imported $8,308.68 million in the first seven months, surpassing 2008 (El Universo, 2010).

Imports in 2011 increased by 20% with a total of $18.958 million. Figures in exports also incremented in comparison to 2010, being the first time since 2007 that exports grew more than imports. Nevertheless, there is a notable difference between imports and exports in August and the deficit in the Balance of Trade was $ -497 million, which was due to the entry of $1,620 million in non-oil imports (El Telégrafo, 2011).

According to the figures of the first trimester of 2012, provided by the Ecuadorian Central Bank, non-oil imports increased by 14.6% (from $ 4,011.73 million to $ 4,575.75 million). Restrictions on cars, tariffs on clothing and shoes, and the taxes to remittances or foreign currency outflow, led imports to a slowdown, but they did not stop. The increase in imports, compared to the minimum growth in exports (3.77%), led the non-oil Balance of Trade to a deficit of 27.07%, reaching $ 2,251.19 million (El Telégrafo, 2012).

However, it is necessary to emphasize that the growth in imports is entirely due to a price effect and not to a larger imported volume. In fact, external purchases grew by 6.8% in value, but presented a reduction of 0.3% in volume. In addition, non-oil foreign purchases were higher and represented $983 million, 6.7% of increase in value, but a reduction of 0.8% in volume. Among the non-oil products that had a significant growth are

capital goods, which grew by $695 million, contributing with more than half of increase in imports (Department of Economic Policy Coordination, 2012).

Between 2011 and 2012 (January - October) consumer goods grew by 4.3% in value but decreased by 5.2% in volume imported ($166 million). Raw materials in the first 10 months of the year was $ 117 million higher than in period of 2011, as they increased by 2% in value but decreased by 0.7% in volume (Department of Economic Policy Coordination, 2012).

In the period of January-December 2013 total imports finished with $ 24,054.03 million, of which 20% were consumer goods; 30% raw materials; 26% capital goods; 23% fuels and lubricants (oil imports) and 0.2% miscellaneous goods. Non-oil imports, corresponding to 77%, were about $ 18,493.52 million. In this year quality certificates were required for 293 tariff headings of non-oil products (different types of meats, cheese, grains, cosmetics, tomato sauces, prepared mayonnaise, some cleaning products and toiletries) to reduce imports by $ 800 million (Vela, 2014).

According to the records of the Central Bank of Ecuador, 31.03% of the imports in 2013 were interregional. United States is the supplier with more participation (29.01%) of the total imported in this year. The participation of Colombia is also very important as it represented the 65% of imports from The Andean Community (CAN) (Department of Trade and Industry of Ecuador, 2014).

In 2014, total imports in FOB were around $26,459.3 million. According to the Economic Classification of Products by Economic Use or Destination (CUODE, in Spanish), when comparing the periods 2013 and 2014, the groups of products whose FOB value grew were: fuels and lubricants (8.3%); raw materials (3.2%); and, consumer goods (0.04%); capital goods (-1.9%), and some other miscellaneous products (-9.8%) (Central Bank of Ecuador, 2015).

From January to October 2014, non-oil imports mainly came from The United States. A total of $ 3.722 billion (CIF) was imported from this country. China was in second place representing $ 2.938 billion (CIF). Ecuador also imported $ 2,437 million (CIF) from the European Union (Department of Trade and Industry of Ecuador, 2015).

During the first four months of 2015, non-oil imports reached $8.035 billion (CIF) ($ 654 million less than in 2014). During these first months, Ecuador imported 7.9% less in quantity than in 2014 (ProEcuador, 2015).

Ecuador's balance of payments was negative due to the drastic drop of oil price and the appreciation of the American dollar, which, by not being Ecuador's own currency, it does not allow the country apply a devaluation system like neighbor countries do in order to stabilize the balance of payments (Department of Trade and Industry of Ecuador, 2015).

In March 2015 the Ecuadorian government decided to apply safeguards to 2,800 products for a period of 15 months to protect the balance of payments (Department of Trade and Industry of Ecuador, 2015). This represents around 32% of the total imports of the country. There are different percentages applied as safeguards: (a) 5% to capital goods and non-essential raw materials, such textile inputs (b) 15% to goods of medium sensitivity, which also have to do with other types of inputs for the industry as they are related to machinery needed to produce goods and services, (c) 25% to tires, clothing and liquors, among others; and (d) 45% for final consumer goods, including tomato sauce, biscuits, milk powder, various types of meat and electronic devices (Ecuavisa.com, 2015).

The product with the largest reduction in terms of variation in dollars between March 11th and November 30th (2014- 2015) were laptops, that had a reduction from March to November of the 2014 to the same period of 2015 of $ 103 million dollars and LED televisions with $ 82 million of dollars for the same period (Department of Trade and Industry of Ecuador, 2015).

As a result, the monthly average in non-oil imports under safeguards from March 11th to November 2015 was around $ 457 million compared to the same period of 2014, which in average was $ 684 million (CIF). This means that there was an approximate reduction in imports of $ 227 million (CIF) per month. Non-oil imports as consumer goods declined by -16.1% and in volume by -21.8%, capital goods, by -16% and in volume by -11.7%. Similarly, imports of raw materials were reduced in amount by -12.1% (CIF) and in volume by -14.1% (Department of Trade and Industry of Ecuador, 2015).

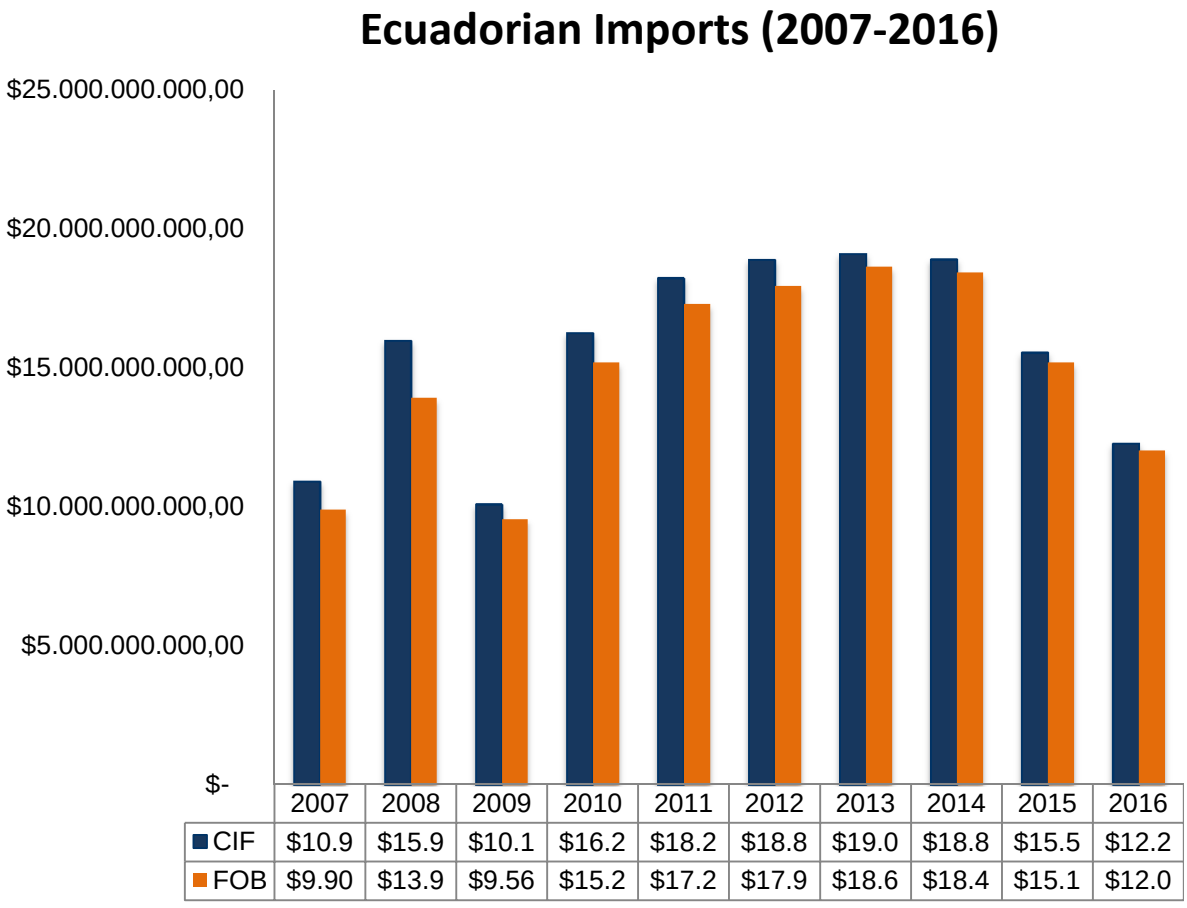
Moreover imports of non-oil products from China led the lists of suppliers as figures increased by $ 3.120 billion (CIF), which means an increase of 6% in comparison to the previous period (January –October) of last year. The United States became the second country from which Ecuador imported non-oil products with an amount of $ 2.538 billion (CIF) dollars, decreasing by -31% compared to the same period of 2014. Meanwhile the amount of non-oil imports that Ecuador from the European Union in the period January-October 2015 was $ 1.865 billion (CIF), a decrease in imports of -23% compared to the same period in 2014. 30% of imports from the European Union were affected by safeguards (Department of Trade and Industry of Ecuador, 2015).

Ecuador's foreign trade contracted during 2016 by double. Imports plummeted by 24% in all its divisions: consumer goods, raw materials, capital goods and fuels. Non-oil imports reached $12,913 million. The greater fall in imports was because of the lower outflow of dollars from the national economy, which explains the surplus in the balance of trade of $ 1,247 million by the end of the year (EL Comercio, 2017).

The five main products that were most imported during 2016 were medicines, polyethylene, polymers, polyacetanes and cars. Approximately 47% of total imports came from China (23%), the United States (14%) and Colombia (10%) (Servicio Nacional de Aduana del Ecuador (SENAE), 2016).

All the protectionist measures taken (quotas, safeguards and other restrictions) by the Ecuadorian government worked as expected. Initially, the government's objective was to limit the entry of products that compete with national goods, and then decided to extend the restrictions to other sectors, with emphasis on consumer goods such as televisions, clothing, cell phones, vehicles, among others (EL Comercio, 2017).

By the end of 2016, all restrictions implemented and the economic crisis was reflected in a slump in Ecuadorian imports. Purchases of consumer goods fell by 24%, raw materials by 17%, capital goods by 26% and fuels by 37%. Among all the industries the most affected ones were the automotive and construction. Imports of transportation equipment, for example, fell by 32% last year from 2015, while construction materials purchases dropped by 38% (EL Comercio, 2017).



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CIF	$10.9	$15.9	$10.1	$16.2	$18.2	$18.8	$19.0	$18.8	$15.5	$12.2
FOB	$9.90	$13.9	$9.56	$15.2	$17.2	$17.9	$18.6	$18.4	$15.1	$12.0

Figure 6. Ecuadorian Imports 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador, 2017.

The graphic above describes the behavior of Ecuadorian imports from 2007 to 2016 considering CIF and FOB values as they are the most used Incoterms.

In 2007, there was a more rapid dynamism of non-oil imports because of a deferral of tariffs and restrictions on certain items related to raw materials and capital goods. In 2009 imports slowed down due to the effect of the safeguards on certain goods as well as the impact of the international financial crisis that started in The United States (Vela, 2014).

One of the main reasons why the Ecuadorian government decided to implement protectionist measures was because of the dollarized economy in the country. Since 2000, Ecuador has been under the American-dollarized monetary policy; therefore the real exchange rate cannot be manipulated and

currency cannot be printed either. With a dollarized system the country, having no monetary policy of its own, applied safeguard measures to overcome the trade deficit in the balance of payments (Vela, 2014).

There is very notable drop in imports from 2008 to 2009 as the government imposed ad valorem and quotas to 627 subheadings of products and later tariffs of 30% and 35% in 50 subheadings in order to promote national consumption. By the middle of 2009 safeguards were also applied to 1,346 subheadings of Colombian imports (Vela, 2014).

In the following years, imports started to increase a little bit once again but the balance of payments continued to be negative. In 2010 Ecuador bought more from abroad in this period than in similar periods of the last decade. In 2011 it was the first time since 2007 that exports grew more than imports. In 2012 the growth in imports was entirely due to a price effect and not to a larger imported volume (Department of Economic Policy Coordination, 2012).

During the last months of 2013 the government started to strengthen more local production in order to change the production matrix. In effect, standards and regulations such as quality certifications and labeling were established to limit the access of foreign products (El Telégrafo, 2014). The National Plan for Good Living emphasizes the promotion in the change of the production matrix with the objective of introducing import policies to certain sectors such as the following: metal-mechanical, pharmaceutical, plastic and rubber, automotive, ceramic products, leather, footwear, textiles, processed foods, forestry, pulp paper and cardboard and technological (Department of Trade and Industry of Ecuador, 2014).

In 2013 there was minimum growth as quality certificates were required for 293 tariff headings of non-oil products. This effect was basically reflected in 2014 as the FOB/CIF value decreased (Vela, 2014).

The next years are mainly characterized by a series of protectionist measures in the country. In 2014 quality controls were imposed on certain products that entered the country (Ecuavisa.com, 2014). In effect, norms and regulations of quality, energy efficiency and labeling, also limited the access of foreign products. Among this kind of products are appliances, refrigerators,

televisions, kitchens, toys, cosmetics, and some food (El Telégrafo, 2014). This was one of the main reasons why imports decreased in 2014.

In 2015 safeguards were applied in March with the objective of stabilizing Ecuador's balance of payments, affected by the drop in oil prices caused by an oversupply of crude in the international markets. Ecuador also had to deal with the reduction of remittances to support its dollarized economy (El Universo, 2015).

In addition the appreciation of the dollar makes exports lose competitiveness. The Government seeks to impose tariffs on the imports of products from Colombia and Peru because of the devaluation of their currencies. According to the oil analyst, Luis Calero, the appreciation of the dollar is inversely proportional to oil prices and that this influenced the market. Investors tend to migrate to other types of financial derivatives when the dollar appreciates and abandon commodities, including oil (El Universo, 2015).

In January 2016 safeguards started disappearing on a group of products. However, the Department of Trade and Industry (COMEX, in Spanish) mentioned that due to the persistence of external difficulties that led to the adoption of safeguards, the COMEX decided to defer the safeguard dismantling schedule for the 40%, 25% and 15% rates for one year. It also started eliminating the 5% surcharge on almost 700 of the 2 900 items included in the measure (El Comercio, 2016).

In conclusion after analyzing non-oil imports during the last years, it is easy to infer, as it is shown in the figure below in CIF terms that protectionism caused a drastic change over the amounts imported. It is expected to gradually continue to keep positive figures in balance of payment.

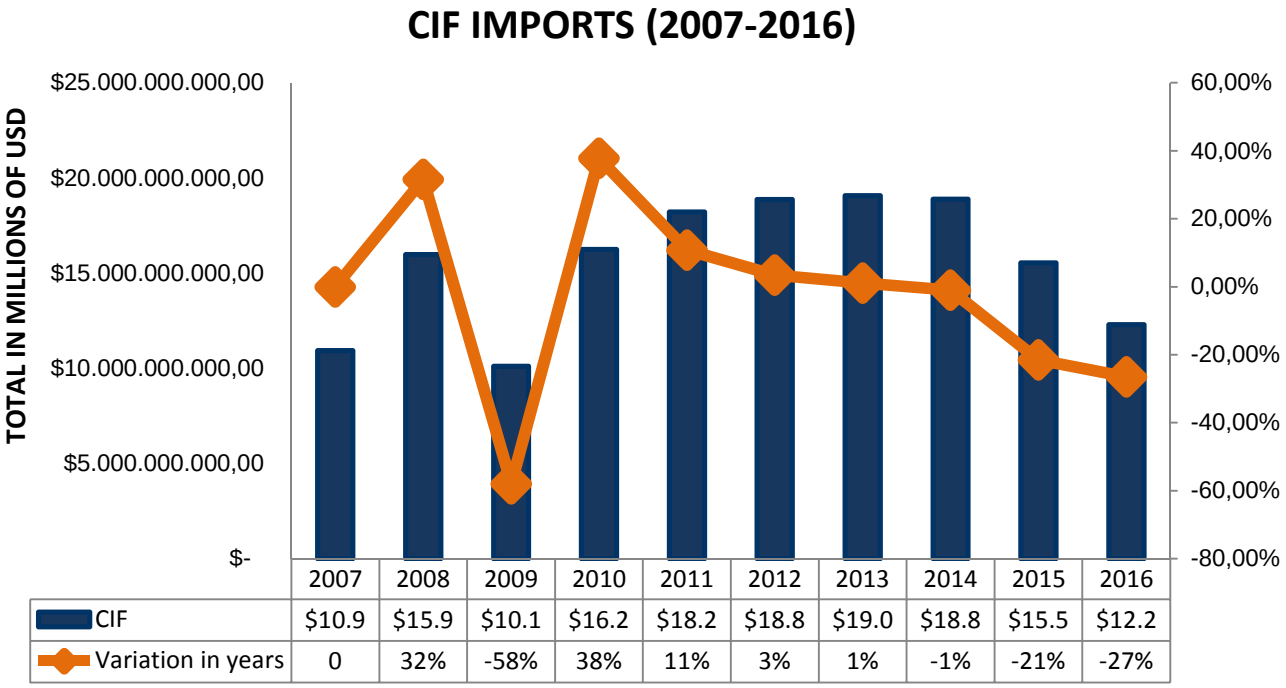


Figure 7. CIF Imports 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador, 2017.

The following figures represent the fluctuations of non-oil imports in FOB terms from 2007 to 2016. The percentages of variation graphically explain the behavior of Ecuadorian imports after all the measures taken. There is a significant drop in 2009 and a constant decrease from 2011.

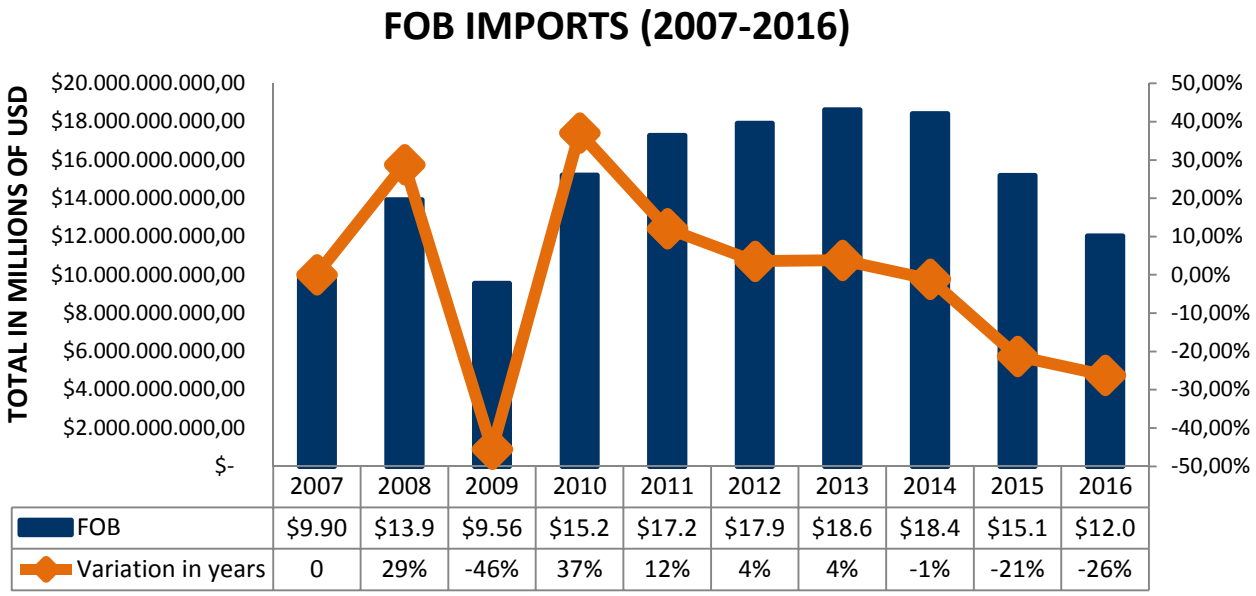


Figure 8. FOB Imports 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador, 2017.

Exports

The ECLAC report in 2009 predicted a severe decrease in Latin American exports due to the global financial crisis. Countries have eliminated barriers in order to find new markets for goods and services. For Latin American businesses, the globalization of markets is an opportunity to reach foreign countries markets and customers (Rodrik, 2008).

Most Latin American countries have implemented extensive trade liberalization programs, either voluntarily or under the direct or indirect pressure of international institutions such as the World Bank, the International Monetary Fund (IMF) and the World Trade Organization (WTO). Foreign trade has improved macroeconomic performances in Gross Domestic Product (GDP), to achieve a stable balance of payments and low inflation. The mechanism taken is the reduction of tariff barriers to exports and imports (López, 2009).

Ecuador is a predominantly agricultural economy, besides being oil producer. Based on the figure, between years 2008-2009 Ecuadorian total exports presented a severe downfall of 26% in FOB USD. The drastic fall was mainly due to the decline of prices in the petroleum commodity in 2009. After the Lehman Brother bankruptcy, the oil price was $39 per barrel, the lowest price in decades. The possible causes were the credit crisis in terms of short-term loans bank crisis and also the recession of several countries that were economically influential. Thus, in 2010 the scenario was different due to the increase in the oil price with a 26% increase compared to 2009 (Sistema Nacional de Información, 2010) (World Bank, 2010).

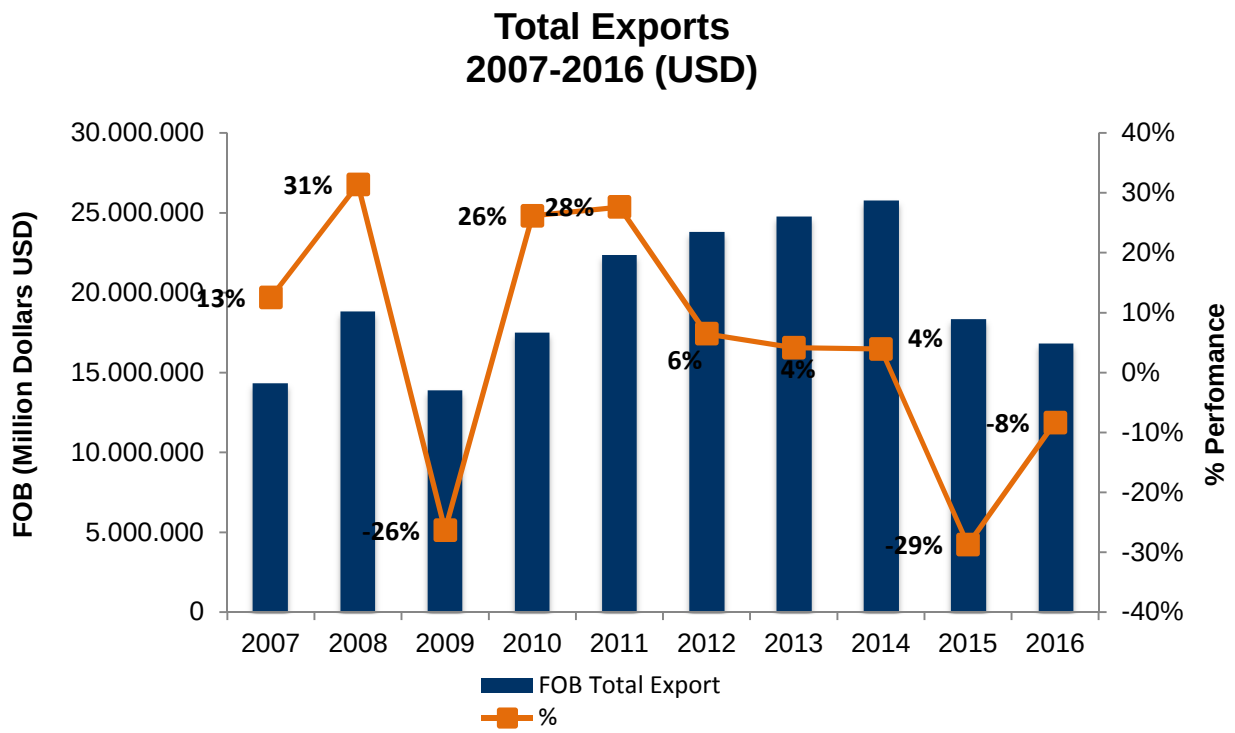


Figure 9. Total Exports FOB 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

The following information in Tons presents an important fall in demand by 3% in 2009. Apparently, 2010 was not also a good year in terms of quantity exported as it also represented 26,628,008 exports, nonetheless, the recovery in oil prices compensated the monetary amount received into the Ecuadorian Economy.

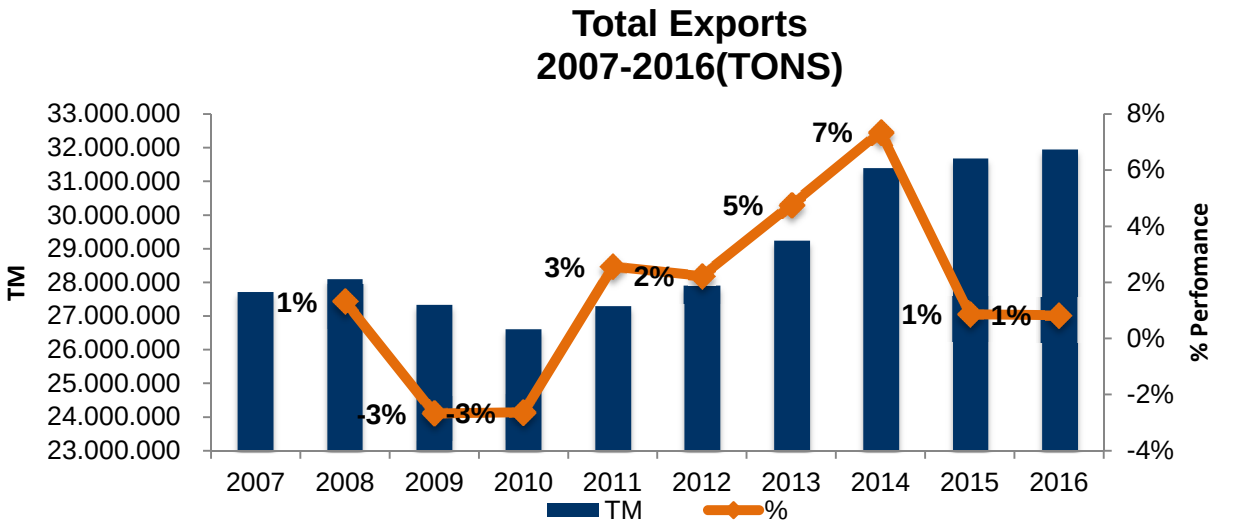


Figure 10. Total Exports TONS 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

Non-oil exports fluctuations between years 2007-2016 have also experienced ups and down as it is shown in the following figure:

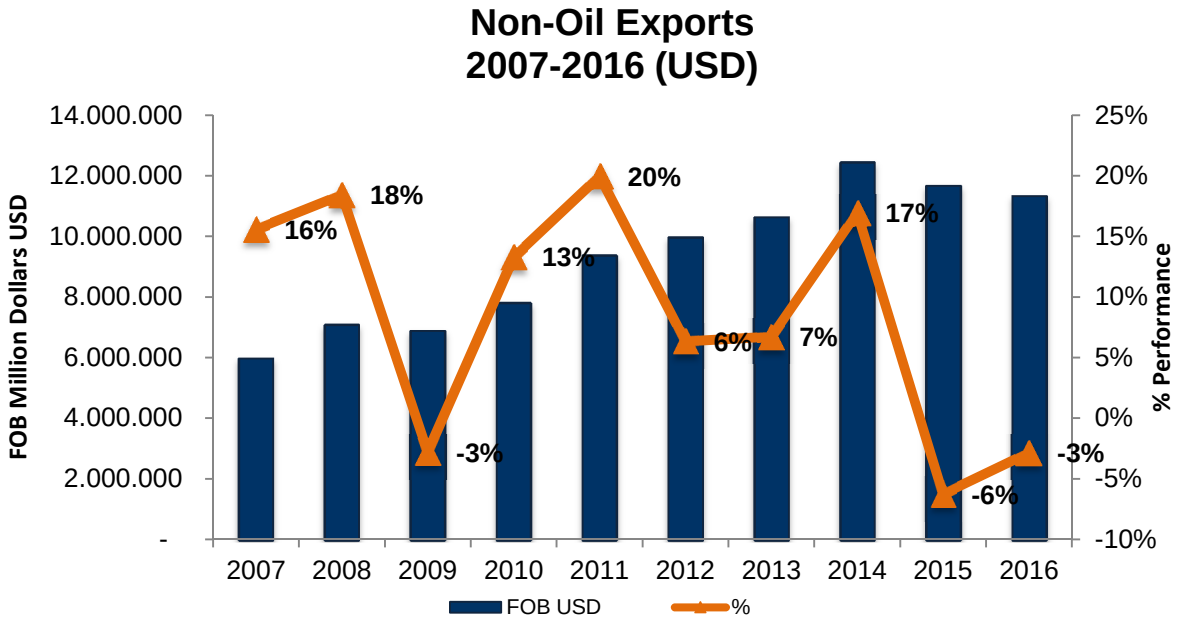


Figure 11. Non-oil Exports FOB 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

Most of the non-oil exports make reference to agricultural products; consequently, they are dependent on commodity index prices and demand. The graphic above shows Ecuador´s non-oil exports throughout 2008-2016.

2009 was the year with the lowest perfomance in Ecuadorian exports.It shows a decrease of 3.8% in comparison to the same period of the previous year. The decline was representative in non-traditional exports (Coporación de Promoción de Exportaciones e Inversiones (CORPEI), 2009).

In contrast, non-oil exports in 2010 generated $ 7´816,699.88 with a 13% more in compaison to 2009 exports that ended with a total of $ 6´898,419.37. In average between 2008-2013, non-oil exports grew by 10%.

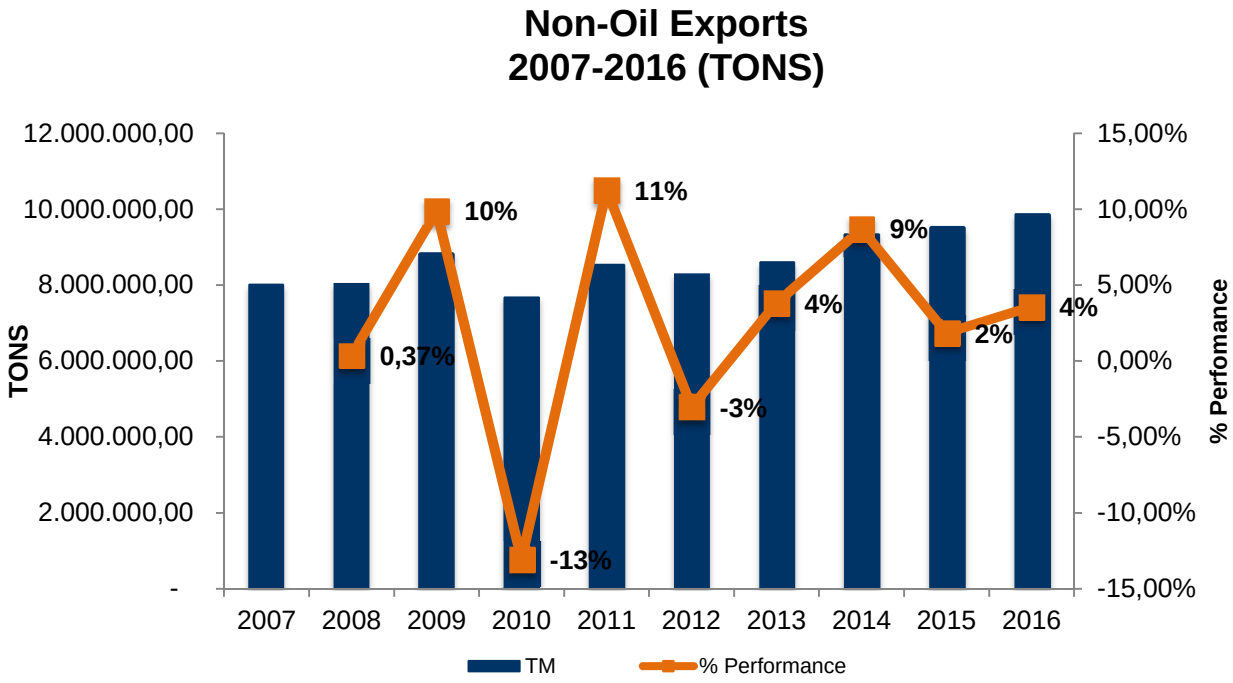


Figure 12. Non-oil Exports TONS 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

As it is shown in the figure above, product demand reached a 10% in 2009 in comparison to 2008. The reason why there is a small peak in 2009 in export demand is due to an important increase in traditional exports during that year. Ecuador's main buyers ;United States, European Union and Asia were facing an economic recession and as consequence they reduced the demand in foreign products.

Ecuador's exportable offer is divided into two sectors: Public and Private. The Public sector is based in exports of Crude Oil and Petroleum Products. Nevertheless, Ecuador has always been characterized for its broad exportable offer in both traditional and non-traditional products. According to data provided by the Department of Trade and Industry and The Central Bank of Ecuador, Ecuador's most exported products are: bananas, shrimps, cocoa, processed coffee, natural and washed coffee, fish, tuna and plantains.

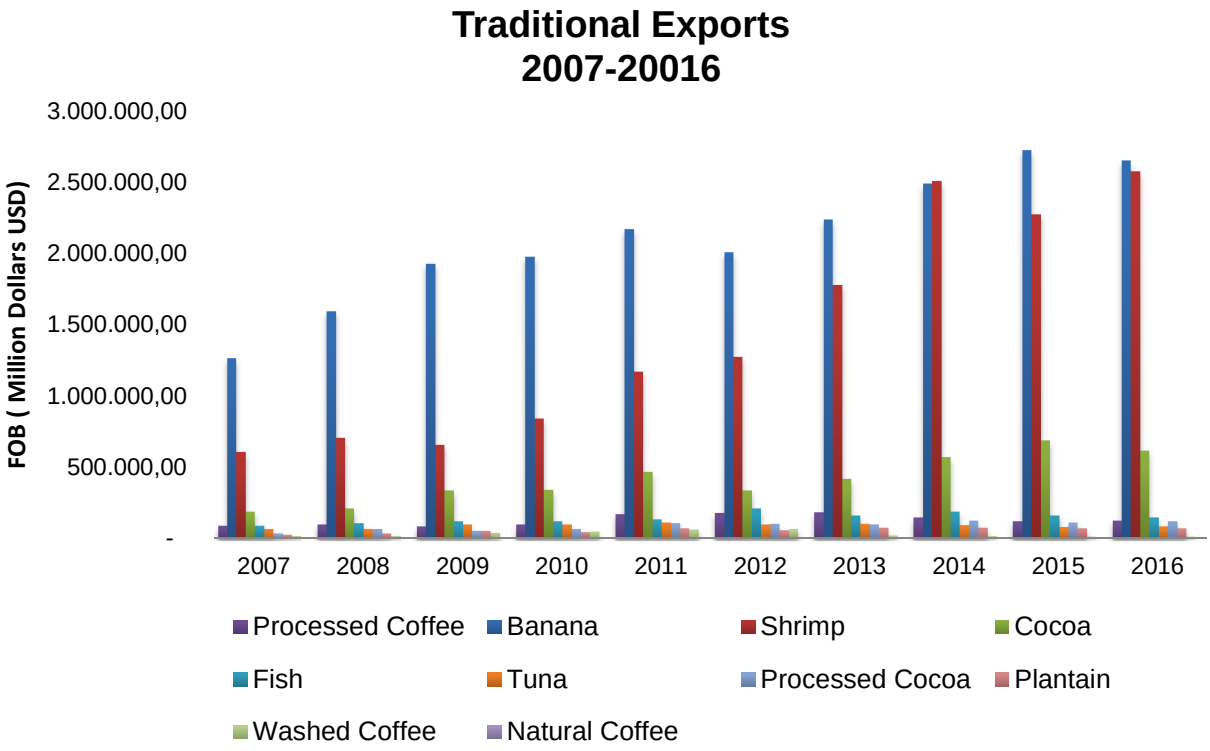


Figure 13. Traditional Exports 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

Since 2008, Ecuadorian traditional export products have been increasing by 10%. Main exports continue to be bananas, shrimps and cocoa. Bananas reached 10%, shrimps 19% and cocoa a 16% more in comparison to the previous year.

As it is presented in the next figure, in 2009 traditional products increased in both, FOB and exported demand due to the high commodity price in food products that favored Ecuadorian Traditional Products. However, in a bulletin of the Ecuadorian Central Bank it was informed that prices were more representative than the demand of products in the year of the crisis (Central Bank of Ecuador, 2009).

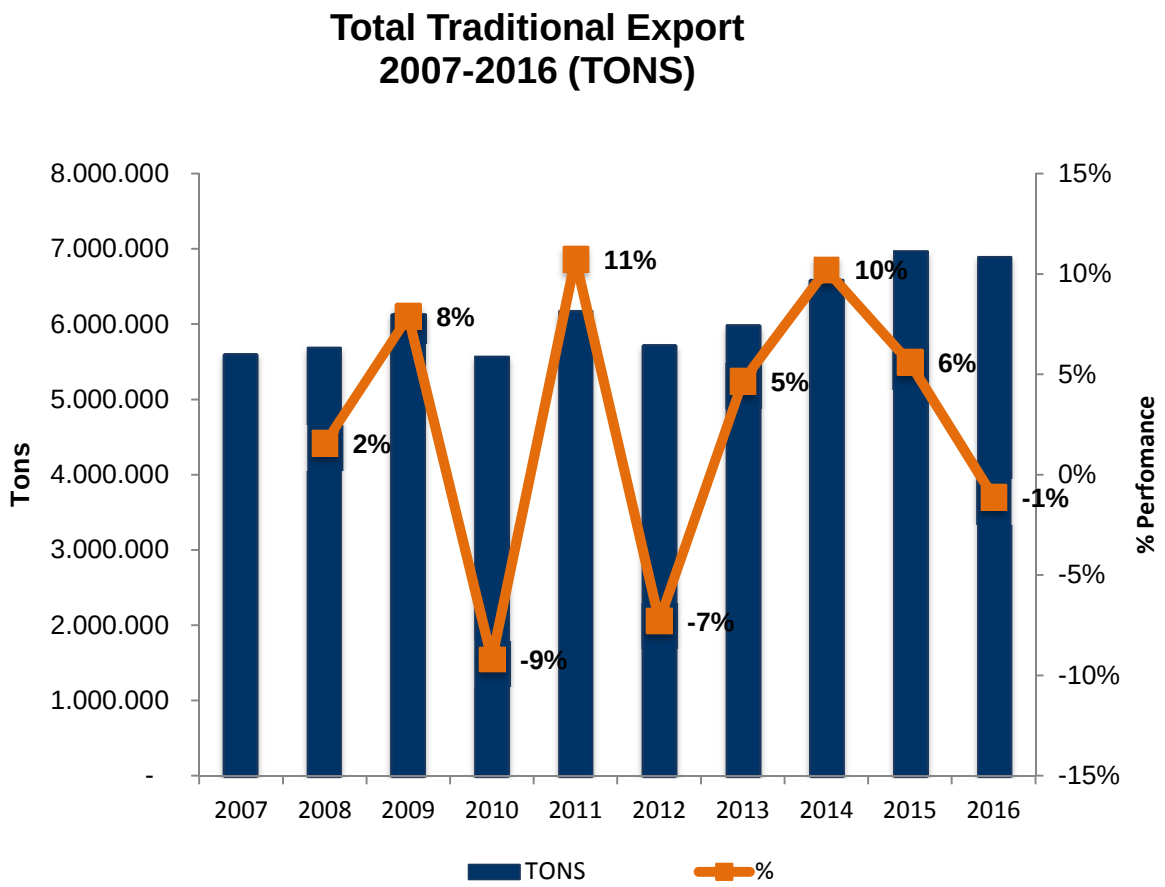


Figure 14 . Total Traditional Exports TONS 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

Carlos Parodi in the ¨*Economy and Business Journal of Peru*¨ determined that the possible increase in 2009 of traditional products exports was because main investors concentrated their investments in food products. However, this might have produced an increase in the amount exported but fewer revenues as the market was too unstable (Parodi, 2012).

Thus, the opposite scenario occurred to non-traditional exports that suffered a drastic decline during the crisis. According to the Central Bank of Ecuador, non-traditional products are composed of: flowers, abaca, wood, mining products, other fruits, fish flour, juices and canned fruit among others.

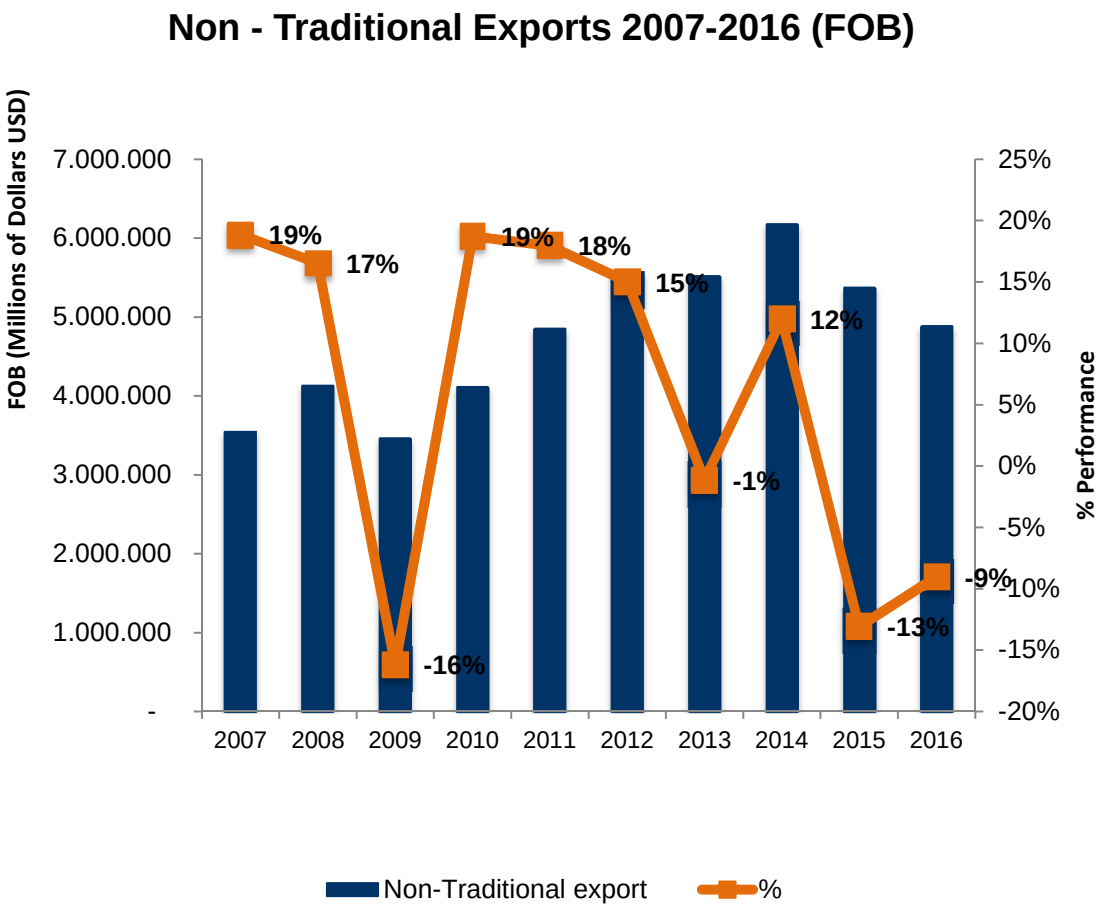


Figure 15. Non-Traditional Exports FOB 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

According to the analysis made by the Central Bank of Ecuador after the dollarization, the exchange rate brought good results to Ecuador exports through the years. Nevertheless, the financial crisis caused a major step back in the demand of non-traditional products. Due to the lack of liquidity in the market and recession in several global economies, this type of commodities was affected by the crisis even more than the traditional products. In fact, they were affected by lowest prices and fewer demand producing a decrease of 16% in FOB value. The low performance in non-traditional exports was partially compensated by traditional exports, mainly bananas, fish and tuna (Central Bank of Ecuador, 2009).

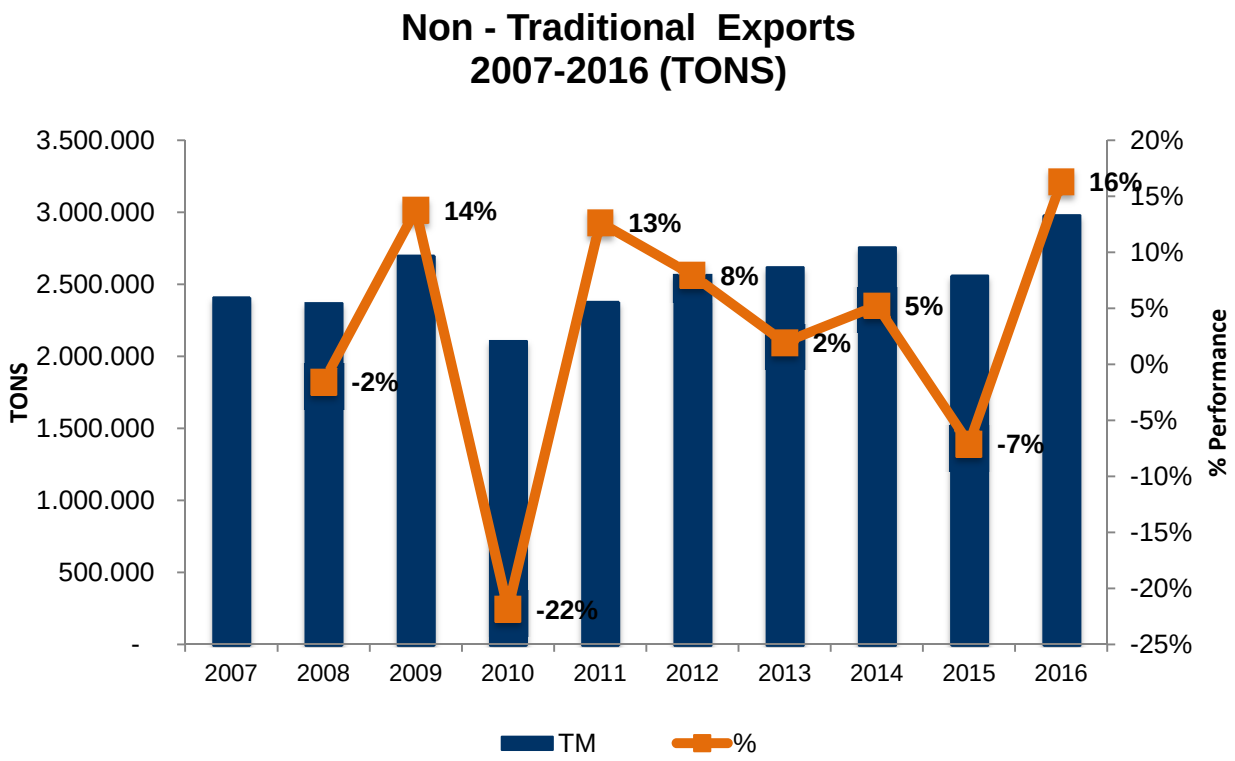


Figure 16. Non-Traditional Exports TONS 2007-2016. Data retrieved from the Department of Trade and Industry of Ecuador and Central Bank of Ecuador, 2017.

Despite observing an important decline in value FOB of non-traditional products, the figure above represents the amount demanded that increased by 14%. As the market was unstable, these products prices might have been low; as a result, the demand exported may have increased due to its accessible price.

Apparently, the crisis did not cause an important effect, but rather a slowdown in the Ecuadorian economic growth, mainly caused by the oil price decline. As it concerns the non-oil exports, the decline was not as severe as it was expected to be due to the unstable market in those years and the economic crisis in most developed countries where Ecuadorian products are dependable.

Descriptive Analysis of the Federal Funds Rate During 2007-2016

The Federal Funds rate is regulated by The Federal Open Market Committee (FOMC). Therefore it must follow the current state of the economy in order to use a proper monetary policy to maximize economic growth. The FOMC considers several trends such as trends in prices and wages, employment, consumer spending, business investment and foreign exchange markets. Thus, the stock market is highly linked to the Fed Funds, also known as the central interest rate in the United States. (Federal Reserve Bank of Saint Louis, 2017).

The reduction of interest rates was a way to boost the American economy after the burst of the dotcom era in early 2000's. By November 2000, the Fed lowered its federal rate considerably from 6.5% to 2.10% until November 2001. Because of the slow economic recovery, the low-rates provoked a housing and construction boom. When the Fed lowers its rates, people are more willing to apply for loans and access to credits (Palley, Thomas I, 2009).

John B. Taylor expressed that excess is one cause of financial crisis. He explained the importance of the reduction of the Federal funds rate that produces the housing boom. The graphic below shows the interest behavior while the housing and construction boom was occurring. As the Fed wanted to improve the economy, they allowed a flow of excessive amounts of money in the market that at the end it was not enough to cover all debt from loans. The monetary policy influenced the burst of the housing boom in 2006-2007 and financial crisis in 2008. Nevertheless, the excess of global savings might also explain the financial crisis in 2008 (Taylor, 2009).

Taylor's empirical research found that through a statistical regression, there was a relationship with other central bank recessions in the same period of time. Eventually, the Federal Funds rates decisions were influencing other central bank performances. In that case the Fed Funds rate could be considered crucial during the global economic crisis (Taylor, 2009).

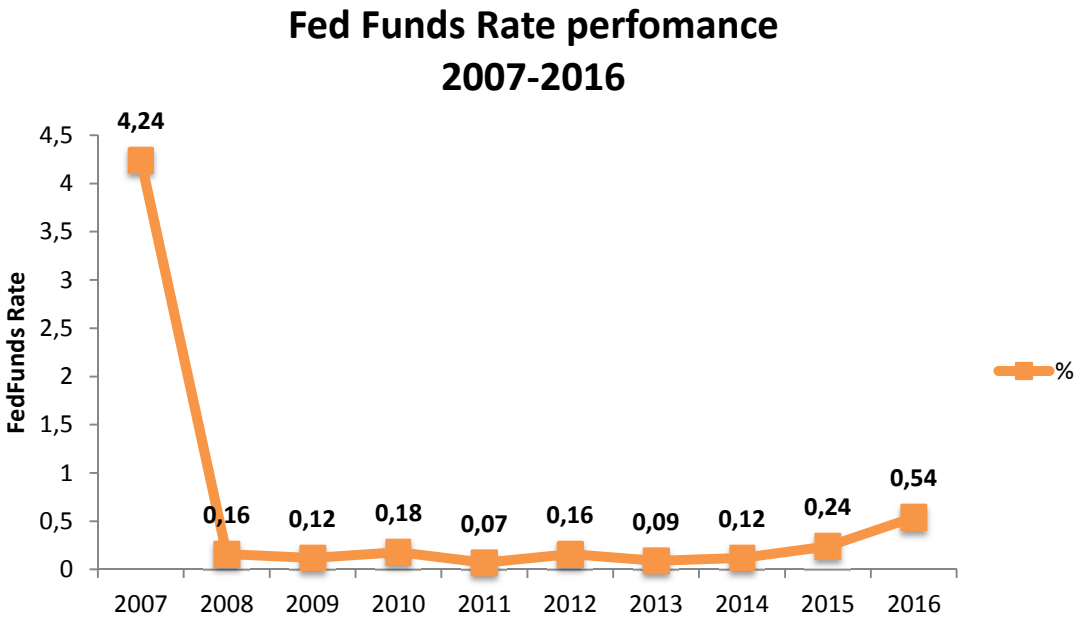


Figure 17. Fed Funds Rate Performance 2000-2007. Data retrieved from Federal Reserve Bank of Saint Louis, 2017.

This research mainly focuses in the behavior of the Federal Funds rate during years of the crisis. Nevertheless it is interesting to review its behavior before the crisis as it shown in the previous figure.

However, in the following figure represents the performance of the Fed Funds rate through the years 2007-2016.

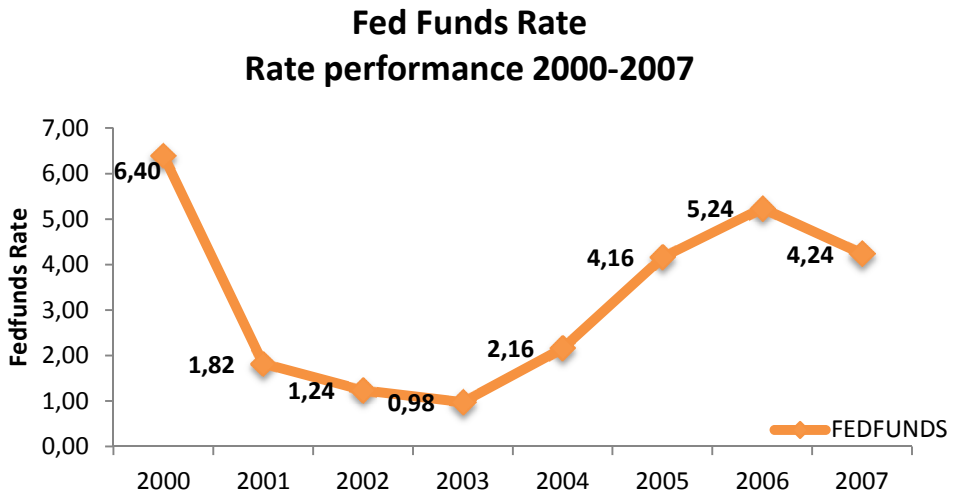


Figure 18. Fed Funds Rate Performance 2007-2016. Data retrieved from Federal Reserve Bank of Saint Louis, 2017.

Apparently, the crisis was due to liquidity. As a result, by 2008 the Fed Reserve decided to reduce their interest rate almost to zero for a few years. By reducing the monetary base, the Federal Reserve provided funds to commercial an investment banks in order to deal with their short-term operations. They also supported short-term loans to corporations known as commercial papers, as well as short-term investments such as treasury bills (The Economy: Crisis and Response, 2009)

John B. Taylor proposed an interesting interpretation of a possible consequence of the sharp reduction of the Federal Funds rate. Based on statistical information, he observed a close correlation between the Federal Funds rate and oil prices in a monthly average data from 2007-2008. When the Federal Funds rate was cut, oil prices increased rapidly throughout the first year of the crisis, producing a major problem to the global economy. It is said that this major cut in rates might have also influenced the raise of several commodity prices, not just oil (2009).

Another significant event was the dollar depreciation from 2008-2009 and its slow recovery in 2016. To stimulate the American economy, the government sent over $100 billion to families and individuals, that pretended to increase consumption and revitalize the economy (Taylor, 2009).

According to Taylor's research, it was important for the Fed in that time to find the source of the crisis. If liquidity was the problem, because there was not enough money in the market to ask for loans; the idea of reducing interest rates was logical. Therefore, what the problem was not liquidity but risk, directly focused on the quality and transparency of banks.

Statistical Analysis of the Data

The statistical analysis of the data obtained was carried out by Statgraphics Centurion XVI. The results of the simple regression between Fed Funds rates and non-oil exports and imports of Ecuador brought as a result the following figures:

Table 2

FOB USD of Non-oil Exports vs. Fed Funds Rates

Variables	P-Value	Correlation

		Coefficient
Dependent Variable: FOB USD of Non-oil Exports	0.1507	-0.489782
Independent Variable: Fed Funds Rates		

Data retrieved from Statgraphics Centurion XVI, 2017

Table 3

TONS of Non-oil Exports vs. Fed Funds Rates

Variables	P-Value	Correlation Coefficient
Dependent Variable: TONS of Non-oil Exports	0.4544	-0.267823
Independent Variable: Fed Funds Rates		

Data retrieved from Statgraphics Centurion XVI, 2017

Table 4

CIF USD of Non-oil Imports vs. Fed Funds Rates

Variables	P-Value	Correlation Coefficient
Dependent Variable: CIF USD of Non-oil Imports	0.1178	-0.52662
Independent Variable: Fed Funds Rates		

Data retrieved from Statgraphics Centurion XVI, 2017

Table 5

FOB USD of Non-oil Imports vs. Fed Funds Rates

Variables	P-Value	Correlation Coefficient
Dependent Variable: FOB USD of Non-oil Imports	0.1039	-0.544192
Independent Variable: Fed Funds Rates		

Data retrieved from Statgraphics Centurion XVI, 2017

As it is shown in the charts above, since the P-values of 0.1507, 0.4544, 0.1178 and 0.1039 in the tables exposed by Statgraphics Centurion

XVI are greater than or equal to 0.05, there is no statistically significant relationship between Fed Funds rate and non-oil exports and imports of Ecuador that were measured throughout CIF, FOB values and TONS; with a confidence level of 95.0% or more. The correlation coefficients indicate a weak relationship between the variables.

The results seem to match the criteria of John B. Taylor. By the beginning of the financial crisis the priority of the Federal Reserve was to implement a monetary policy that lowers interest rates in order to control the situation in the interbank market and boost liquidity in the economy. According to Taylor's results, the problem was not liquidity but an inherent issue of counterparty risk, which linked back to the underlying cause of the financial crisis (Taylor, 2009).

The outcomes of the present thesis support Taylor's beliefs. Even though Fed Funds rate played an important role in the American monetary policy during the 2008 financial crisis, it was not a major indicator of Ecuador's imports and exports performances. This rejects the suggested hypothesis.

Because the previous analysis with the suggested indicators was not significant, U.S Dollar Index (DXY) is also taken into consideration due to the fact that U.S dollar fluctuation overtime might have influenced non-oil imports and exports in terms of CIF, FOB and TONS in Ecuador.

The statistical charts below created after the statistical simple regression point out the following:

Table 6

FOB USD of Non-oil Exports vs. DXY

Variables	**P-Value**	**Correlation Coefficient**
Dependent Variable: FOB USD of Non-oil Exports	0.0187	0.720676
Independent Variable: DXY		

Data retrieved from Statgraphics Centurion XVI, 2017

Table 7

TONS of Non-oil Exports vs. DXY

Variables	P-Value	Correlation Coefficient
Dependent Variable: TONS of Non-oil Exports	0.0013	0.864316
Independent Variable: DXY		

Data retrieved from Statgraphics Centurion XVI, 2017

Non-oil exports in FOB and TONS terms determine that since the P-values of 0.0187 and 0.0013 in the tables exposed by Statgraphics Centurion XVI are lower than 0.05, there is a statistically significant relationship with DXY considering a confidence level of 95.0%. The correlation coefficients indicate a moderately strong relationship between the variables.

Table 8

CIF USD of Non-oil Imports vs. DXY

Variables	P-Value	Correlation Coefficient
Dependent Variable: CIF USD of Non-oil Imports	0.8853	-0.0525995
Independent Variable: DXY		

Data retrieved from Statgraphics Centurion XVI, 2017

Table 9

FOB USD of Non-oil Imports vs. DXY

Variables	P-Value	Correlation Coefficient
Dependent Variable: FOB USD of Non-oil Imports	0.9410	0.0269726
Independent Variable: DXY		

Data retrieved from Statgraphics Centurion XVI, 2017

Non-oil imports in CIF and FOB terms determine that since the P-values of 0.8853 and 0.9410 in the tables exposed by Statgraphics Centurion XVI are greater than 0.05, there is no statistically significant relationship with

DXY considering a confidence level of 95.0%. The correlation coefficients indicate a relatively weak relationship between the variables.

Since 2000, Ecuador has adopted the American dollar as currency; therefore, the country depends on the American monetary policy. In comparison to the rest of neighbor countries in the region, Ecuador is in disadvantage as it cannot control its currency on its own.

Ecuador might have benefited from the low Fed Funds rates that provoked a depreciation of the American dollar. As it is shown in the descriptive analysis, there is an opposite effect between imports and exports overtime. The relationship of non-oil exports and the fluctuations in U.S dollars is positive as it is possible to infer that exports became more attractive to foreign investors when the currency dropped.

On the other hand, in the case of imports, there is no significant relationship as foreign products became less accessible, due to protectionist measures imposed by the government, such as safeguards. The year 2009 began with a group of measurements that were established to boost the economy of the country after the global financial crisis.

It is assumed there is no strong relationship, and even though the fluctuations in U.S dollar had an impact in the Ecuadorian economy, imports were mostly affected by protectionism.

According to Elwell (2012), specialist in macroeconomics monetary policies, U.S dollar behavior during the crisis can be considered a side-effect of policies achieved controlling inflation or stimulating the economy recovery. This is why the present thesis relates the fluctuations of the U.S dollar with commerce in Ecuador.

However, shipping companies might have increased their demand in exports but reduced their imports in terms of volume not in price. The fluctuation of the U.S dollar and its devaluation during the financial crisis might have caused deficits in their balance sheets.

As the shipping industry acts as an indispensable intermediary party in international trade and commerce, it facilitates approximately 90% of the global trade volume (Heaver, 2015); it is assumed that somehow it was affected by the financial crisis of 2008.

The Cobweb Theorem Applied to the Shipping Industry Behavior

Because the shipping industry is considered a highly volatile market that depends on a significant timing gap between demand and supply, prices are very likely to fluctuate. There is a lot of unpredictability within the industry but financial managers have also used rational expectations models to forecast prices. There is also benchmarking among shipping companies. For these reasons it is believed that the Cobweb theorem can be associated with this type of market. Meifeng Luo, Lixian Fan and Liming Liu (2009) studied the Cobweb Theorem related to fluctuations in freight rates and predicted, based on speculations, that the shipping industry would continue facing a reduction in freight rates as demand increased.

The following figure analyzes the average freight rates in FFE (Forty Foot Equivalent Units), the transported volume in TEUS (Twenty Foot Equivalent Units) from Maersk Line's 2010-2016 financial statements, and the total demand of non-oil Ecuadorian exports. This supports the authors' predictions of a constant decrease in freight rates from 2010 to 2016 as demand and capacity increased in the same periods.

The theory implemented describes how the Cobweb Theory can be considered the ideal describer of the shipping industry financial system.

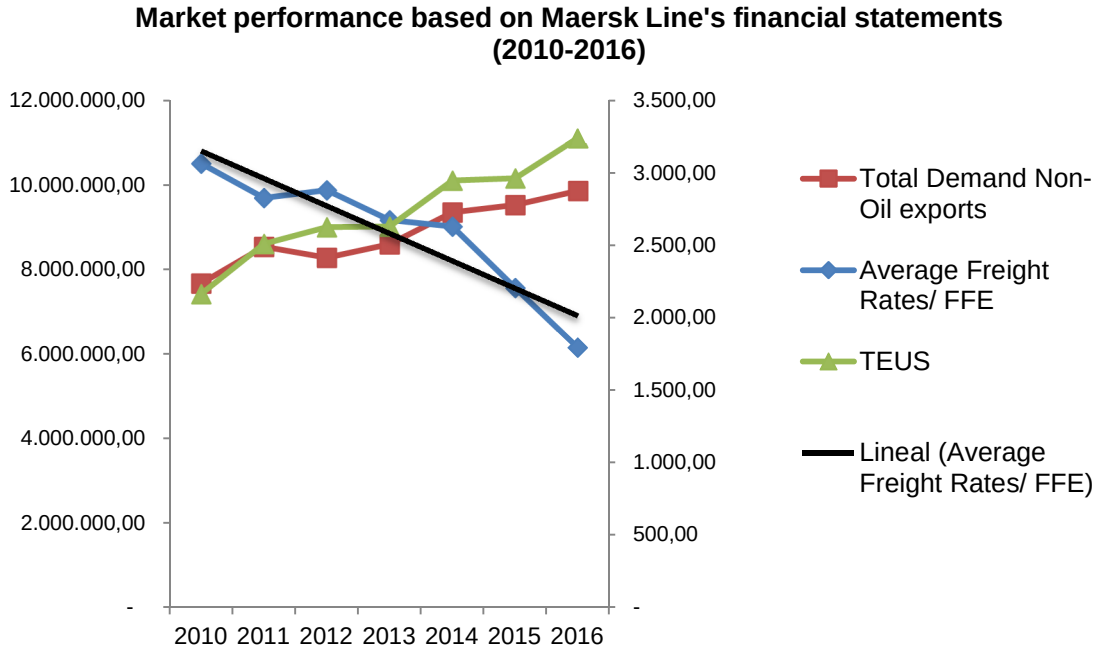


Figure 19. Market performance based on Maersk Line's financial statements. Data retrieved from Maersk Line's 2010-2016 financial statements.

Conclusions

After all the analysis of the collected data and based on investigations of specialists the present thesis concludes with the following statements: (a) there is no relationship between the Fed Funds rates and non-oil exports and imports of Ecuador. The results seem to match with the research of John B. Taylor, as the real problem during the financial crisis was not liquidity but issues of counterparty risk. Therefore the Fed Funds rate is not considered a symbolic variable that can evaluate and adequately measure the crisis. Even though Fed Funds interest rate played an important role in the American monetary policy during the 2008 financial crisis, it did not have major effect over Ecuador's imports and an export. This rejects the suggested hypothesis of the thesis; (b) there is a relationship between non-oil exports and the fluctuations in U.S dollars, as exports became more attractive to foreign investors when the currency dropped. In the case of imports, there is no significant relationship because imports were mostly affected by protectionism. The year 2009 began with a group of measurements that were established to boost the economy of the country after the global financial crisis. The U.S dollar behavior during the crisis can be considered a side-effect of policies. This is why this thesis relates the fluctuations of the U.S dollar with commerce in Ecuador due to the dollarized economy of the country;(c) the shipping industry acts as an indispensable intermediary party in international trade, facilitating approximately 90% of the global trade volume (Heaver, 2015). However, a small group of dollarized economies, including Ecuador, managed the crisis relatively well and did not have to seek IMF support (United Nations Conferece on Trade and Development, 2010). This is the reason why the shipping industry in Ecuador was not significantly affected by the financial crisis of 2008 as it was demonstrated throughout the statistical analysis of the chosen indicators for each variable; and (d) The Cobweb Theorem, when used as a rational benchmarking model, can describe the shipping financial system based on speculations of prices fluctuation, demand and capacity. The theorem is exposed as an economic dynamic model that explains the market performance of the industry.

Recommendations

Based on conclusions the present investigation recommends the following: (a) to measure the financial crisis of 2008 with other indicators such as risk, in order to determine the effects on specific companies in the industry, (b) to study the shipping industry in terms of overcapacity and credit as it jeopardized its economic system by misinterpreting the market, which brought as a result an overcapacity when demand was contracting during the financial crisis (Hoffmann, 2010). For future investigations, it is highly recommended to consider financial statements of shipping companies to better observe the impact on this industry over time. This is because the analysis of a single case does not report enough data to extrapolate the results to the whole industry; and (c) to scrutinize the behavior of Ecuadorian imports after the implementation of protectionist measures in order to analyze how the shipping industry was affected.

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Nosotras, **Burgos Ubilla, Daniela Verónica y Vélez Vera Ingrid Magaly**, con C.C: # 0923991277 y #1310023898 autoras del trabajo de titulación: **Impact on the Shipping Industry in Ecuador as a Result of the Financial Crisis in 2008** previo a la obtención del título de **Ingeniera en Gestión Empresarial Internacional** en la Universidad Católica de Santiago de Guayaquil.

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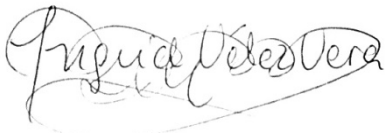

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RESUMEN/ABSTRACT

La presente tesis analiza el efecto de la crisis financiera mundial del 2008 sobre la industria naviera en Ecuador. Para su propósito, el impacto de la crisis financiera ha sido representado por la fluctuación de las tasas de la Reserva Federal de Estados Unidos y fluctuaciones del dólar estadounidense. De la misma forma, se tomaron en cuenta como indicadores FOB, CIF y toneladas de exportaciones e importaciones no petroleras del Ecuador. Se realizó un diseño longitudinal y un análisis de regresión simple para la prueba de hipótesis. Los resultados del análisis no encontraron relación entre las tasas de la Reserva Federal y las exportaciones e importaciones no petroleras del Ecuador, pero se detectó una relación significativa entre las fluctuaciones del dólar y las exportaciones no petroleras. Sin embargo, la relación no fue estadísticamente significativa con las importaciones no petroleras, aparentemente debido al efecto de las salvaguardias en Ecuador durante ese período. Los resultados parecen coincidir con la investigación de John B. Taylor, quien afirmó que el verdadero problema de la crisis financiera no era la liquidez sino el riesgo de contraparte. La industria naviera es interpretada como intermediario en el comercio internacional. Es por esto que se asume que de alguna manera la industria en Ecuador fue afectada por la crisis financiera del 2008. Además, el Teorema de la Telaraña puede describir el sistema financiero de la industria naviera basándose en especulaciones de fluctuación de precios, demanda y capacidad; este también se utiliza racionalmente como un modelo de *benchmarking*.

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