

**UNIVERSITAT
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Foreign Trade and the Environment

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ABSTRACT

In modern times, environmental degradation has become one of the main problems our society faces. It has been worsened by the opening of the markets and the liberalization of international trade.

In this sense, international trade has caused a series of mainly-harmful effects on the environment, which is why the International Community has been forced to establish a series of environmental measures to try to reduce the impact it could generate.

For these reasons, the current paper tries to study the impact and the effects these measures applied on international trade for environmental protection really have. The paper also tries to determine how they will evolve in the following years.

Similarly, we focused our study on an econometric analysis based on the effect that actually produces the imposition of a tax on CO₂ emissions in certain countries in Europe, to determine if we have a tax collection effort by the government, or otherwise, it is able to reduce the impact of international trade on the environment.

Finally, we propose a serie of business practices that we understand that it can help to reduce the impact of economic activity.

ABBREVIATIONS

Cit.	Citado
CO2	Carbon Dioxide
Coord.	Coordinator
Ibíd.	In the same place
NOX	Nitrogen oxides
p.	Page
pp.	Pages
RP	Research Project
EU	European Union
UNEP	United Nations Environment Programme

FOREIGN TRADE AND THE ENVIRONMENT

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Chapter I: Introduction

1.1. Introduction

This Final Project (here in after TFG) deals with the environmental study of international trade. As further develop, international trade could have a close relationship with the environment to produce a series of effects that, in practice, have tended to be in a more negative impact than positive (Rauscher, 1997).

In this sense, consciousness of the environmental degradation began in the late twentieth century, due to the high emission of greenhouse gases and the abusive exploitation of natural resources. Thus, because of concern about the continuing deterioration of the environment a series of policies and measures in international trade in order to reduce their harmful impact were initiated

Through this work we aim to analyze the policies and measures that have been applied in international trade in order to lessen the effects and impact that might have on the environment. As can be seen in the present work, these policies and measures are taken on various fields both nationally and internationally, and on various elements, such as regulatory, technological or economic. Similarly, after studying the applied measures, we aim to provide our opinion on possible measures that could be implemented to reduce the impact of the effects of international trade on the environment.

Also, due to the current economic crisis and the implementation of restrictive fiscal policies that have occurred at Community level in recent years, it can be considered of great interest the measure concerning the application of taxation on CO₂ emissions, which perform certain industrialized countries in Europe (as well as others outside our Community framework countries). It is therefore, interesting to realize our analysis of the effects produced by the imposition of this tax rate in CO₂ emissions in countries like Finland, Netherlands, Norway, Sweden, Denmark, United Kingdom, France and Switzerland. All this, in order to determine whether there is a positive relationship between the tax and the protection of the environment, or, conversely, if such tax has no effect on the reduction in CO₂ emissions and are only applied by countries with a purely financial gain purpose.

1.2. Background

As will be discussed below, interest on environmental protection has grown in recent years, observed as an element of positive value, increasing social awareness of conservation and understanding that its deterioration has become a worldwide problem.

In this sense, policies and measures implemented in international trade have been several, its beginning is determined in 1972 by the Stockholm Declaration on the Human Environment. From then until today, international trade has sought to act on them, keeping one of its priorities to reduce as far as possible their impact on the environment.

Also, we can name a lot of measures and policies that have been applied in this sector in order to adapt to the new social reality, which will try to address the most important in the continuation of this work.

In the same vein, note that there are a lot of authors who treat the effects that can generate international trade on the environment, as is the case Christmann, Petra (2000), Steininger, Karl (2001) Tamiotti et al. (2009), among many others. Similarly, respecting the realization of our econometric analysis, we found similar studies already carried out, as in the case of Agnolucci Paolo (2004), where our results become, to some extent, matching, which we subsequently discussed in this work.

1.3. Object of the Research Project

This Research Project (henceforth referred to as “RP”) elaborates on the study of the environment with respect to international trade. In this case, the object of the paper is multiple. On the one side, we set out to analyze the effects that the international trade sector has on the environment and the good practices that this sector follows; on the other side, we want to determine the measures that have been taken to improve commercial practices and the effect that they have had on the environment, with the goal of an econometrical study on the subject.

In the same manner, we set to proposing a series of good practices that firms of the international trade sector can adopt to try and reduce the impact that their economic activity can have on the environment.

Finally, we focus our study on the effects that possibly could have generated the application of a tax on CO2 emissions in those richest countries in Europe.

1.4. Main and secondary objectives

The main objective of this Research Project is to know the consequences that international trade might have had on the environment, and also to observe the evolution it has undergone.

In order to carry out this exploration, two secondary objectives have been proposed, which will help the attainment of the main objective.

Firstly, to determine the practices that are carried out in the aforementioned sector of international trade.

Secondly, to determine the latest measures that have been applied to international trade and the impact it might have generated on the environment.

1.5. Description of the used methodology

Once the general scope of the paper and its objectives have been established, the methodology to be used in order to attain these objectives through the line of investigation is to be established. In this way, the activities and methodological processes to be followed are the following:

- Analysis of the environmental practices carried out in the international trade sector and their effect on the environment.

In order to achieve the aforementioned objectives, it is necessary to realize a study and analysis of the subject, which will be executed following the subsequent phases:

Phase I. Literature Review

In the first place, as in every other research Project, an analysis of the pre-existing literature on the subject must be conducted with the goal of obtaining knowledge in order to research more easily.

Thus, the literature review will be focused on concepts related to “International Trade”, “environment”, “environmental measures”, and “International Trade Sector”.

Phase II. Investigation

Through this phase, we aim to obtain all the data considered necessary for the research. In the first place, and in order to accomplish the first secondary objective, the study and analysis of the international trade sector must be completed, focusing on the measures and environmental practices it follows. In the same manner, this analysis will also be focused on the investigations and reports that elaborate on this subject.

Secondly, in order to fulfill the secondary objective, we will conduct an econometric analysis of the effect that could generate the imposition of a tax on CO2 emissions on the richest countries in Europe, as Finland, Netherlands, Norway, Sweden, Denmark, United Kingdom, France and Switzerland. To do this, we will use the computer system SPSS, through which we will study the relationship between the tax rate applied by such countries on CO2 emissions, with the variation of such emissions during the years of the tribute application and the average of such issue.

As for data collection, we will focus on publications of international organizations and publications, such as "The World Bank" to obtain data on CO2 emissions of the countries studied; and "National Renewable Energy Laboratory" to determine the tax rate on CO2 emissions of each country and know the year in which the application was started.

In the second place, in order to accomplish the second secondary objective, we will realize an investigation on the effects that the application of environmental measures by enterprises of the international trade sector could have had on the environment. In order to do this, we will analyze varied data and statistical reports that can show the evolution of the environmental situation, as well as reports from enterprises and the applicable regulations for this economic sector. All of this will be done with the goal of executing an econometric study that shows the impact it has had.

Phase III. Comparison and analysis

After obtaining all the necessary information on the subject of this research Project, the next step is based on applying this information to really determine the impact that the international trade sector can have on the environment.

1.6. Structure of the paper

Concerning the structure of this paper, it will be developed in the following manner:

Chapter II elaborates on the introductory section of the paper, which serves to study, in general terms, the delicate situation in which the environment is, and the degradation it has suffered in the last years due to the enterprises of international trade.

Chapter III revolves around the study of the current measures of international trade, as well as an econometric study that shows their evolution.

In Chapter IV, we performed an econometric analysis on the extent of taxation on CO₂ emissions in those richest countries in Europe.

In Chapter V we establish a serie of environmental and practice measures that we consider that their application by the companies in the international trade sector can reduce its harmful impacts on the environment.

Finally, in Chapter VI, we show the conclusions drawn in this TFG.

Chapter II: International Trade and the Environment

2.1. The Environment

In order to comprehend the study object of this paper from the beginning, we must start by explaining the concept of environment, which is defined by the *Real Academia de la Lengua Española* as the “set of circumstances or external conditions to a living being that influence its development and activities”¹. Thus, we must understand the environment in its broadest sense, not only as the space in which the life of living beings is developed, but as one encompassing everything within it. For this reason, and considering the breadth of this concept, we must understand its importance, since all human activity, be it large or small, is related to it, including in the same manner the actions that enterprises in the international trade sector could take.

Nowadays, the situation of sustainability in which the environment is submerged is a very preoccupying problem in our society, where the very International Commission for Climate Change, gathered in the UNESCO headquarters, determined that it will take a thousand years before the Earth absorbs all the damage caused by man, understanding this damage as desertification and floods, the depletion of non-renewable resources and the environment’s inability to absorb the waste. Following this line of thought, we can take into account the estimations produced by the United Nations, who consider that, by the year 2025, developed countries will multiply the levels of waste generation (Guijarro, 2016).

In this aspect, we must consider the great growth of human population, which generates a proportional increase in demand for food and material goods, causing the exhaustion of food and natural resources. Said population growth has caused a strong exploitation of natural resources by companies, who, in order to meet increased demand requirements, increase their exploitation of natural resources in a proportional manner, which can carry dire consequences for the environment (Lang, 1994).

Because of industrialization, there has been an increase in the exploitation of natural resources, which has caused an increase of the general temperature of the planet, because of the exploitation of natural resources like oil, gas and coal. Through this massive exploitation of natural resources, an escalation of the emission of Greenhouse Gases (GHG) has been produced. These gases have developed their presence in the entire world because of the inefficient use of energy and the exploitation of its natural resources (nevertheless, its greatest growth has occurred in

¹ Concept by the *Real Academia de la Lengua Española*. Online version: www.rae.es

developed countries) producing a hike in the temperature of the air and the Earth's surface beyond normal levels (Colque, 2007).

For all these reasons, we cannot forget the role and importance of companies on the situation of the environment, where their business activities have negatively affected the situation in which it is (González Benito, 2005).

2.2. Evolution of the international concern over the environment

The international management system we know today was not created until the year 1972, when the United Nations Conference on the Human Environment was celebrated and produced the Stockholm Declaration on the Human Environment. In this line of thought, the greatest concern was that every country should consider this subject and establish a strong environmental protection, via contamination taxes or the use of a series of standards for the tributaries and the regulation of emissions. In this sense, the starting point of environmental concerns happened due to the contamination that the industrial sector caused (Hirst & Thompson, 1992).

It should be noted that there were several international agreements on the environment, mainly on the topic of sea contamination. However, through this international conference, all of the Member States started to react before the environmental circumstances on all levels and begun developing a great amount of activities in the national and international levels.

In the same manner, this conference allowed for the creation of the United Nations Development Programme (UNEP), which acts as a filter for environment-related initiatives within the proposals of the United Nations. Throughout the years, UNEP has evolved and formalized a great set of agreements that project the conscience of environmental protection in the United Nations system (IIDS & UNEP, 2001).

Notwithstanding the importance of the Stockholm Declaration and the positive effects it has had on environmental protection, the International Community realized it was not enough to promote all the necessary actions for the protection of the environment; this is why, in the year 1985, the United Nations created the World Commission on Environment and Development, which, two years later, produced a report named "Our Common Future", which established the concept of sustainable development that has served as a standard for all international activities in the subject of environment protection.

Finally, it should be noted that, in the year 1992, a second United Nations Conference on the Environment took place in Rio de Janeiro, through which an ambitious sustainable development program was created and the importance of the functions of the Global Environment Fund was reaffirmed (IIDS & UNEP, 2001).

2.3. Effects of International Trade on the Environment

We must start by considering the following excerpt, which explains the strong development international trade has had in the last ages, where the volume of trade is 32 times greater than that of the decade of the fifties, where the world's trade-related GDP went from 5.5% to 21%². This growth can be ascribed to various factors. However, among the main factors are the phenomenon of globalization, as well as the technologic change that has drastically reduced the cost of transport and communications; in the same manner, the growth of information and communication technologies has caused a reduction in the cost of communications.

For this reason, we must insist: the concept of international trade must be paired with the process of globalization that our economy has suffered in the latest times, where a great number of countries have liberalized their commercial regimes through changes in their national policies through international commercial agreements (Schoenbaum, 1992). In this sense, a great part of the authors considers that globalization has had a big number of direct and positive effects on the economy, increasing Gross Domestic Product. However, this globalization has brought an increase in the degradation of the environment alongside it (WTO, 2009).

This growth has come to produce a change in the structure of the barriers between economies; currently, the typical customs offices have been mostly substituted by technical, sanitary, and environmental barriers (May, 2010).

For this reason, and because of the expansion of world trade, the relationship between international trade and the environment has been paid attention to, raising the question if trade is beneficial or harmful to the environment. In this sense, we find an ideological debate about the liberalization of international trade and the protection of the environment, where, on one side, a part of them consider that complete liberalization is beneficial for countries involved in free trade. However, they consider that this liberalization must be reduced in case environmental degradation is elevated;

² Figure relative to the year 2007, obtained from the WTO/UNEP report on Trade and Climate Change

on the other side, we find both ideological extremes, which consider liberalization either completely positive or completely negative for the environment (Gutiérrez, 1995).

In this manner, we understand that it is completely necessary to maintain an equilibrium between the income that can be obtained through globalization and the quality of the environment (Frankel, 2008).

Because of this, and considering this discrepancy in the opinions regarding the subject, we must comment on the effects –both negative and positive- that international trade has had on the environment:

2.3.1. Negative effects

Openness and international trade growth have had a series of negative repercussions on the environment in diverse aspects. Consequently, we can distinguish various sorts of effects (Grossman & Krueger, 1993).

In this line of thought, we must explain, in the first place, the *scale effect*. As we have written before, commercial openness is paired with an increase of economic activity, which generates a growth in contamination. This way, the scale effect entails an increase in the contamination caused by the economic growth produced by a greater Access to the markets. This growth in contamination occurs mainly because, through liberalization, it is permitted to make use of unused resources, which involves a growth in production and energy. In the same manner, it is important to note that a growth in consumption will lead to an increase in the use of transportation, which will in turn cause an increase of these harmful emissions (Copeland & Taylor, 2004).

In the second place, it is worth pointing out that the *composition effect* references the change in composition that an economy undergoes because of trade liberalization, since this economy will specialize in activities characterized by a comparative advantage.

In the same manner, another of the effects of trade in relation to the environment is *Environmental Dumping*, through which the economies of various countries seek to improve their competitiveness to an international level, which is why they decide not to attend to all of their environmental responsibilities. This can lead them to in compliance with the applicable legislation in environmental matters. In the same way, they could take advantage of a more flexible environmental legislation to try and reduce costs. The goal of this practice is a bigger share of the market at the international level, as well as the economic protection of various sectors that are

considered strategic within an economy, or to avoid the destruction of jobs (Rauscher, 1997).

On the other side, we can comment on the *Displacement effect* or *Relocation of Businesses* because of environmental motives. In this sense, we refer to the effect that the application of heterogeneous environmental measures could have on various economies, since a displacement can be caused by businesses towards those economies where lower (or even non-existent) environmental standards are established. However, the contrary effect can also occur. In other words, that a developing (or under-developed) economy established these less-protecting environmental policies to try and attract business that could generate economic development.

In relation to the aforementioned effect, we must explain the *Overflow Effect*, which means that, through the displacement effect, the environmental policies initially designed in the businesses' original country are less effective than what was estimated (Fernández, 2001).

Nevertheless, although the aforementioned effects are harmful in nature, the main problem we find nowadays and which has not been controlled in the expected measure resides in the growth of Greenhouse Gases. In this sense, the economies that establish softer policies in environmental matters will show a higher rate of GHG, due to the Scale Effect.

In the same manner, it should be highlighted that the international trade sector is closely related to the transport sector, where, in most of its transportation means, the use of oil is required, which could entail a growth in gases emissions by not using more ecologically efficient vehicles.

2.3.2. Positive effects

This is why there is no doubt that international trade can affect the environment, just as a myriad of human activities can. However, trade can also provoke a series of positive effects, because it can make ecologic goods and services be transferred in an ampler way.

In this sense, it is important to note that international trade generates a *Technical Effect*, which is related to the changes in production techniques, which usually go alongside free trade, and can be ascribed to demand, greater environmental

regulation and better access to production technologies which are not harmful to the environment (Grossman & Krueger, 1993).

Thus, this effect references an increase in the protection of the environment thanks to the introduction of production technologies which are not harmful to the environment. In this case, we have arrived to the conclusion that the level of economic and political development can influence the obtention of an economic system that tries to protect the environment. This way, developing countries are less worried by environmental protection than their developed counterparts (Torrás & Coyce, 1998).

In the same manner, globalization and market liberalization can entail an improvement in the *Distribution of Resources*, so that goods are produced in the places with the most efficiency and more ecologically. In this way, a higher level of international trade can entail a stimulus for economic growth, which can conclude in a growing capacity to safeguard the environment (Metzger, 2001).

Concerning economic development, it should be noted that it is not necessarily linked to an increase in contamination, because, in many cases, several developing countries have applied stricter contamination controls than those of OECD countries, basing their actions on the fact that benefits of controlling contamination are much greater than the costs these controls could generate. Likewise, the exported goods reach the production and quality standards of the countries that import said goods.

In the same manner, the openness and free competition promote the *investment in new technologies*, which show more ecological characteristics, as well as a better Access to them. In this way, these new technologies imply production processes which are cleaner and more respectful to the environment, which in turn implies a reduction in contaminating emissions (Christmann, 2000).

2.4. Environmental policies in international trade

The application of environmental protection measures has a series of effects on international trade. As we have mentioned before, the creation and application of these measures and policies are necessary, due to the growing globalization of the world's economy. However, the scarcity of instruments that authorities possess in order to direct environmental policy must be taken into account, because the most applied measures are those related to regulators and environmental taxes.

In this sense, environmental policies can affect the products produced in an economy, because a series of requisites and requirements for environmental protection

will be established based on them. In the same manner, it has a great influence over the production processes, because it requires a series of productive systems characterized by the low emission of residues.

It should be noted, in the first place, that environmental policy can restrict economic freedom in the economy. In this sense, environmental policies can become a sort of trade barrier to imports, because it can determine a series of requisites and requirements to allow commercialization; in the same way, it can also negatively affect exports, because it can generate a loss in international competitiveness (Fernández, 2001).

In this manner, we understand that environmental policies can reduce and restrict commercial freedom. However, the competent authorities should avoid to produce this effect as far as possible, because it should be noted that the negative effects of environment related commercial measures come from countries that cause this environmental problem by not applying, internally, measures that allow for the resolution of these external effects (Fernández, 2001).

Specifying the effects that the application of these instruments of environmental policy on international trade could have, we must start by mentioning that ecologic taxes, which can have an internalizing intention, can cause problems in the competitiveness of the countries in which they are applied. Concerning State grants, they allow to countervail the exporting industries that have been harmed by the external policies in the field of the environment, as well as difficulting the entrance into the country of imports that do not amount to reach the requirements determined as convenient (Fernández, 2001).

Concerning the effect that regulatory measures produce on foreign trade, we must say that they have a very notable effect in those economies that apply them, increasing business costs, which can result in a reduction of their competitiveness, which would in turn result in the creation of difficulties in the sector on which this regulation is produced. At the same time, these measures would entail a favoring of imports from countries in which they had not been applied.

Chapter III: Study of the environmental measures in international trade.

3.1. The World Trade Organization

In order to approach the following excerpt, we must mention the World Trade Organization (hereinafter referred to as WTO), which was born in the year 1994, through the Marrakech Agreement, which is characterized by its great importance and relevance in international trade (IIDS, 2001).

Among the principles upon which this organization acts, we find those related to the protection of the environment, as well as the promotion of sustainable development. In this sense, despite the fact that there is no agreement or treaty on the environment, WTO Member States can adopt all the measures related to trade whose goal is to protect the environment. In this sense, the WTO has recognized the importance of the application of norms of commercial nature in order to achieve the reduction of the impact on the environment (WPO, 2009).

Likewise, we must highlight three main agreements realized by the WTO related to international trade and the environment, which are the following (IIDS, 2001):

1. *General Agreement on Tariffs and Trade of 1994.*

This agreement brought a notable quantity of articles destined to the protection of the environment. It had a great importance because it established principles of great importance for the members of the organization, as is the case with the principle of the most favored nation or the principle of national treatment.

2. *Technical Barriers to Trade Agreement.*

Through this agreement, measures that can create non-tariff barriers to trade were established, as is the case of the application of norms on the efficient use of energy in washing machine appliances. As well as other norms on the products, through which the imperative that these must respect the environment during their life-cycle is established.

3. *Agreement on the Application of Sanitary and Phytosanitary Measures*

This agreement references the basic norms that are necessary in environmental protection with respect to the dangers that could come from plagues, diseases that could enter a country through traded goods, as well as the dangers that can proceed from the commercialization of products from chemical and toxic products.

Thereby, the norms and measures that the WTO applies altogether establish a frame to guarantee predictability, transparency and the proper application of these measures (WPO, 2009).

Following this line, the General Agreement on Tariffs and Trade (hereinafter referred to as GATT), through which the basic norms on tariffs between various States are established, prohibiting States from setting tariffs higher than the level they had set in the WTO.

3.2. Environmental Measures applied in International Trade

Within the scope of international trade, a series of measures and policies have been determined with the goal of ameliorating the effects and impacts on the environment. It should be highlighted that the greatest worry on the environment is focused on the reduction of the emission of Greenhouse Gases, which becomes a negative externality in economic effects. In this sense, part of these measures are applied in a national scope, being applied through the normative system or through economic incentives.

Thus, we can highlight mainly the following:

3.2.1. Setting of market prices to internalize GHG costs

Through this measure, prices are tried to be established in all the economies in which environmental costs are taken into consideration and the real value of environmental resources are reflected. This measure is considered fundamental in order to be able to get to a sustainable development and to correct existing failures in the integration process between economic and environmental policy.

The application of this measure can find a series of setbacks concerning price harmonization, because it is difficult to estimate the prices of goods and services when their prices are not established on the market (Ferrón, et al., 2011).

Therefore, this measure aims to establish a price for these greenhouse gases during the productive process and, thus, through this environmental measure, to be able to alter the prices of goods that are subject to international trade.

Concerning the application of this measure, it can be realized through **national instruments**, as could be the application of taxes on GHG emissions or the establishment of emission allowance trading schemes.

In this sense, the *application of taxes on GHG emissions*, through which CO₂ emissions that can be emitted due to the production of goods and services are taxed. These taxes directly tax the contamination and other activities that are harmful for the environment. This tax is calculated through the measuring the content of carbon in fossil fuels, where its tax base would vary depending on the kind of fossil fuel³. Concerning its passive subject, the question of who has to support it is not specified. However, in practice, it is frequent for this tax to be levied directly from consumers (De Miguel & Manzano, 2011).

On the other hand, we have *emission allowance trading schemes*, through which a maximum limit on total emissions is tried to be established, considering this limit as a right of emission to create a market in which these rights can be traded at a certain price. Thus, a system of negotiable licenses is created. The aim of this system is to combat emissions contamination. In this way, the price paid for these rights is considered the price of carbon emissions. These two systems can have a series of main effects on the environment, where, on the one side, they can generate a direct effect, reducing greenhouse gas emissions by making use of low-carbon production systems; likewise and, on the other side, they can generate an indirect effect through the reinvestment of the generated tax revenue in sectors related to the protection of the environment (WPO, 2009).

In the same manner, the instruments applied in the international scope through the application of **measures in the borders** of countries also have room.

Within this excerpt, we must mention the *border tax adjustments of taxes on carbon and taxes on energy*, which are used to establish, in fiscal policy, the tax criteria of the country of destiny. Through this measure, States seek to accomplish equal conditions between the national businesses that are subject to taxes and foreign competitors (Neuhoff, 2008). On the other side, we must highlight the *border tax adjustments in the frame of an emission allowance trading scheme*, which have not yet been established. However, it has been proposed to create an emission allowance trading scheme through which rules on imports that come from countries who do not impose the same obligation of greenhouse gases reduction can be created (Anibarro, 2012).

In the same manner, the option of applying a tax on some means of international transportation has been proposed, considering the calculation of CO₂

³ For this reason, fuels with a higher carbon content (as is the case of oil and coal) have a higher tax than those with a lower carbon content.

emissions which they emit, in order to measure and internalize the costs on means of transportation.

3.2.2. Use of environmentally harmless technologies

Through these measures, States aim for businesses to try and abandon those productive systems characterized by a big content of carbon and to adopt those who generate a low emission of carbon. For this reason, some States have executed national financing programs in order to promote the acquisition of ecologically efficient technology.

Concerning these financing programs, we can highlight, in the first place, the *incentives for the invention* of new technologies which are respectful to the environment, where States provide grants and donations to encourage inventors to create these machineries (Tamiotti, et al., 2009).

On the other hand, we must highlight the *incentives destined to promote* the use of this kind of technology and the use of renewable energy sources, which are usually destined to the support and financing of the production costs realized through the climate-innocuous technology.

These incentives are usually done through the application of fiscal measures, where a reduction of taxes and fiscal bonifications are produced. They can be directed to consumption through compensation in the acquisition of ecologically efficient technology, or through investment concessions in the production done through this technology. In the same way, helps to investment are also done in order to be able to reduce the capital cost on the installation and use of renewable energies.

3.2.3. Common legal framework to promote the use of environmentally harmless products and technologies

Through this measure, States seek to establish a normative that has as goal to improve the energetic efficiency of the products and the productive processes, as well as the reduction of the energy consumption and the amount of GHG emitted during its production.

Most of these norms are usually applied in the national scope, only having an effect on its sovereign territory. However, we can find a great quantity of norms created at the international level that have as their objective to try and improve the energetic efficiency through the reduction of GHG emissions.

In this sense, the normative usually establishes a series of prescriptions affecting the commercialized product, as well as its production (Tamiotti, et al., 2009). Commonly, these environmental prescriptions are based on processes and methods of production into which an analysis of the vital cycles of the product is included. These prescriptions can influence trade, especially if they are used to protect national products against international competition.

Thus, as economies advance towards more ecological systems, these environmental prescriptions will become a more influencing and determining factor for the access to foreign markets.

Hence, these prescriptions can be applied on the *product design*, through which the main characteristics the product must have, as well as the concrete measures that must be adopted during its production are determined, determining the goods and technologies that must be used.

In the same manner, we can find prescriptions relative to the *properties of use and employment*, through which the norms that establish the environmental results that the products or the production systems must achieved are established. These norms are applied with the objective of withdrawing from the market those products considered ineffective from an energetic viewpoint, as well as promoting the elaboration of products and processes which are more efficient in the environmental scope.

In this way, through their prescriptions, the maximum limitations in diverse elements of great environmental importance, such as CO₂ emissions, the level of energy consumption, the level of energy performance or fuel saving are established.

Chapter IV: Econometric Analysis

5.1. Introduction

As explained above, environmental degradation is an issue of great concern to the international community, therefore, in international trade have implemented a number of measures to try to reduce the harmful effects on the environment.

In this sense, has set out the general measures that have been implemented by States to try to combat environmental degradation (see section 3.2 regarding the "Environmental measures applied in international trade"), however, we have not been able to determine the real effects that reach generate these measures on CO2 emissions, so we consider interesting performing a regression analysis on these measures.

However, due to the large number of existing measures and to the extent that carries with it the concept of international trade, we have been forced to focus our econometric regression analysis of these measures and a number of individual States. Therefore, we believe appropriate to focus the analysis on a topic of great social impact, such as taxation on CO2 emissions in those richest countries in Europe that apply, such as Finland, the Netherlands, Norway, Sweden, Denmark, United Kingdom, France and Switzerland.

Also, through this analysis, we seek to determine whether the application of this tax comes to have a positive effect on the environment or, otherwise, if its environmental impact is minimal and its role versa in a simple collection by the Administration.

Therefore, the hypothesis of our analysis could be determined as follows: **What effect does the tax CO2 emissions on the environment in the richest countries in Europe?**

5.2. Econometric Analysis of linear progression

5.2.1. Data Description

Our sample focuses on the study of 8 European countries with a high level of industrialization applying a tax on the emission per tonne of CO2, namely the study is performed on Finland, Netherlands, Norway, Sweden, Denmark, United Kingdom,

France and Switzerland, each one apply different tax rates per ton of emissions. In this sense, we have had to limit ourselves to these countries because they are the only ones at the Community level to apply this kind of tribute, also, we have not been able to attend to non-EU countries because the measures that apply for determining it are different from European and we could not adapt to this model. In order to meet that rate, we have read the publications of "National Renewable Energy Laboratory" whose information is shown in the Annex to this work.

On the other hand, we consider CO₂ emissions of these countries from a period of time between 1990 (which has begun to be applied this tax in certain countries), until 2011 (which is the last year in which there are published official data). In this case, therefore, it has taken into account the evolution of CO₂ emissions from these countries for a period of 22 years with the purpose to obtain their variation from the time of application of the tax. Similarly, we have studied the average CO₂ emissions of these countries, from the time of application of the tax, in order to be able to determine if a high tax rate on CO₂ emissions could lead to a more reduced emission. To understand the evolution of these emissions, we have used the publications of "The World Bank" (which are shown in the Annex to this work), in order to be able to calculate the variation of CO₂ emissions of each country in our sample and its average emission.

5.2.2. Explanation of the model

Our analysis focuses on the performance of two models of simple linear regression, which we will develop in the following sections along with the resulting functions in each one, however, first off all, we must understand that theoretically is referenced by the following function:

$$Y = \beta_1 + \beta_2x + \mu$$

Our first model (called **Model 1**) focuses on determining whether the application of a tax on CO₂ emissions in the countries of our sample, lead to a reduction in the emission of these in recent years. At first, logic suggests that, with the application of that tax, will be a reduction of CO₂ emissions, as companies try to reduce their consumption not to increase their production costs. Thus, our first hypothesis is as follows:

H1: The application of a tax on CO2 does reduce its emission from the years of issue.

Our second model (called **Model 2**), focuses on studying whether the application of the tax on CO2 emissions, lead to a reduction of average emission. In this sense, we can understand a priori that the application of a higher tax rate will make average CO2 emission decrease compared to those countries that set a reduced or nonexistent tax rate. Thus, our second hypothesis is as follows:

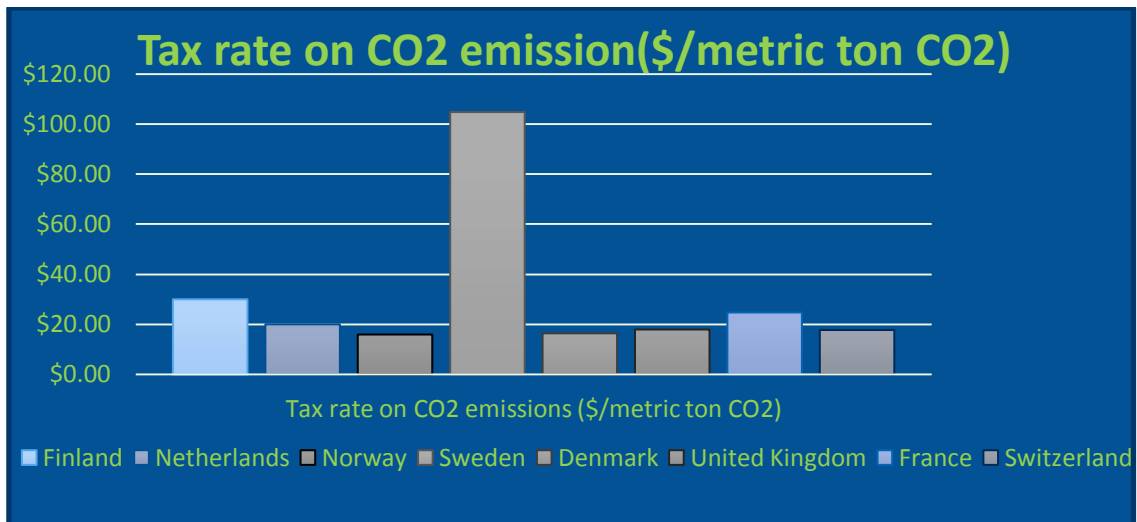
H2: The application of a tax on CO2 emissions in one country does reduce the average emissions in the same relation to other countries that do not apply it.

5.2.3 Explanation of the variables

For the realization of this econometric analysis, we have made use of the computer program called "Statistical Package for the Social Sciences", better known by its acronym "SPSS".

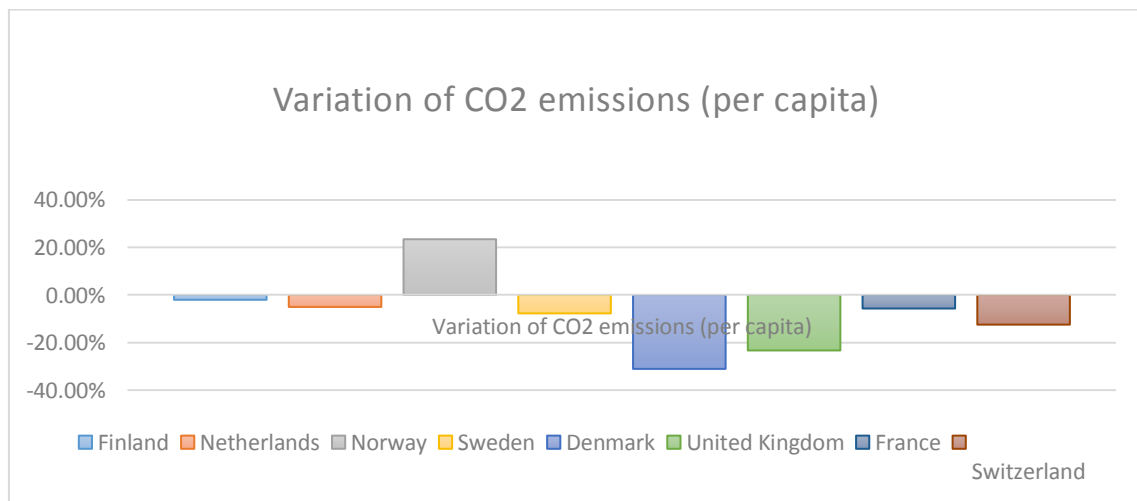
Note that the data that we use refer to the period of time from 1990, in which this kind of tax has begun to be applied, and the year 2011, which is the last year for which official data are available and published. Similarly, all data used are in the Annex to this work.

In this regard, we have taken care to an independent variable, which focuses on the tax rate of CO2 emissions in the richest European countries that have implemented such a tax. In this case, countries covered are Finland, Netherlands, Norway, Sweden, Denmark, UK, France and Switzerland, which show the following tax rates in relation to the emission of tons of CO2:



Graph 1: Tax rate on CO2 emission.

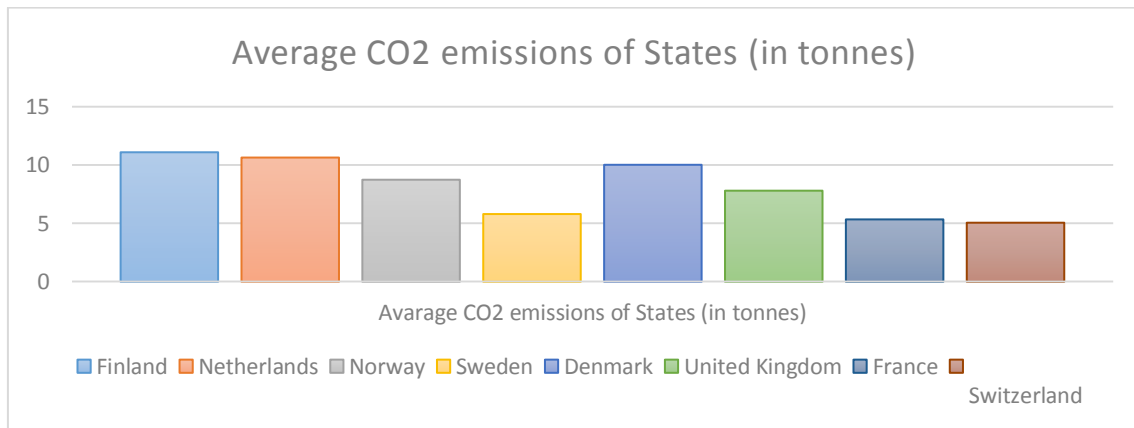
Thus, we aim to analyze the effect of this tax on our first dependent variable, which is the variation of CO2 emissions per capita of these countries since the application of that tax. In this case we have studied the relationship between the amount of tons emitted in 2011 and the amount of tons emitted in the year that began to be applied in each state these taxes on CO2 emissions. With this variable, we aim to analyze if such an environmental tax has come to affect the evolution of CO2 emissions in states that have applied it. Thus, this variation can be represented by the following chart:



Graph1:Variation of CO2 emissions (per capita)

Similarly, we then applied a second dependent variable, that is the average CO2 emissions per capita of each of the countries analyzed from the time of application of the environmental tax until 2011. With This variable we aim to determine if those countries where a higher tax rate is applied show a more reduced emission

average. In this sense, we can represent the average emission of each State by the following chart:



Graph 2: Average CO2 emission of States (in tonnes).

5.2.4. Analysis Result

After integrating the data into the system SPSS for the realization of our linear econometric analysis, we have obtained the following results:

Model Summary				
Model	R	Square Adjusted	R Square Adjusted	Squared standard error of estimate
1)Independent Variable: CO2 emission tax Dependent Variable: Change in CO2 emission	0,088	0,008	-0,158	0,17344
2)Independent Variable: CO2 emission tax Dependent Variable: Average CO2 emission	0,390	0,152	0,11	2,42589

Table 1: Model Summary.

In this section we must make special attention to R-Squared indicator, as this shows the proportion of variance that the dependent variable is explained by its independent variable. So, as you can see, both models have a very closed correlation, where its R^2 represents a percentage of 0.8% compared to the reference model between the tax rate on CO2 and the variation of CO2 emission; and 15.2% compared to the relative model between the tax and its average CO2 emission. Similarly, the corrected R^2 of both models does not become substantially relevant regarding its R^2 .

Therefore, we can deduce first off all that both variables do not become relevant, so , initially, we can deduce that the effect of applying a tax rate in the amount of CO2 emissions on environmental protection is remarkably low.

Correlations			
Model 1 :			
Independent Variable: CO2 emission tax		Variation emssion	
Dependent Variable: Variation of CO2 emission		CO2	Tax rate
Pearson correlation	Variation Emission CO2	1,000	0,088
	Tax rate	0,088	1,000
Tax rate Sig . (unilateral)	Variation emission CO2	.	0,418
	Tax rate	0,418	.
N	Variation emission CO2	8	8
	Tax rate	8	8
Model 2:			
Independant variable:: Tax emission CO2		Average emission	
Dependant Variable: Average of CO2 emission		per capita	Tax Rate
Pearson Correlation	Average emission per capita	1,000	0,390
	Tax rate	0,390	1,000
Sig. (unilateral)	Average emission per capita	.	0,170
	Tax rate	0,170	.
N	Average emission per capita	8	8
	Tax rate	8	8

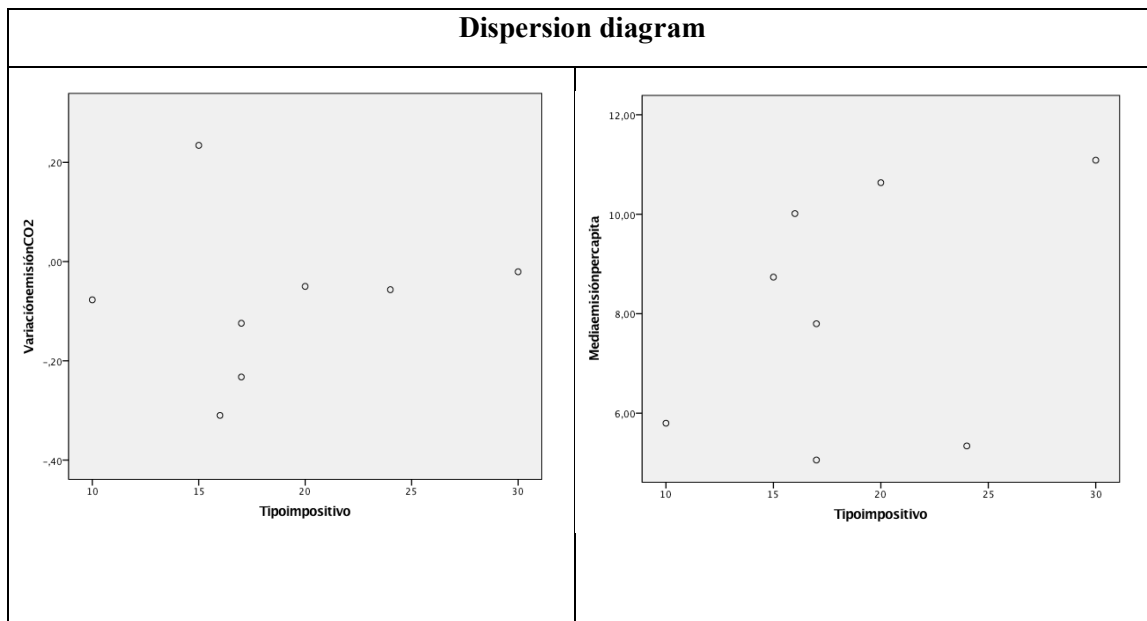
Table 2: Correlations of the model.

In this analysis we must take into consideration mainly the Pearson correlation coefficient, which indicates the degree of relationship of the variables in each model that we are studying.

In our model, we can see how these correlation values show 0.088 results in the first model; and 0,390 in the second model, in this sense, we can say that to be at a

level between 0 and 1, we can deduce that there is a positive correlation between the two variables of each model, however, being in a very close values of 0, we must understand that, to some extent, both variables have a minimal correlation

This situation does not seem very reasonable in both models, as they indicate that with an increase in the tax rate on CO2 emissions there is an increase in the variation of emissions and emission average. However, these results can redisplay us that the imposition of carbon taxes do not become useful for environmental protection, so, we must insist that their protection must be done by other way.



Graph 4. Dispersion diagram of the models

Through scatter diagram we can see the whole behavior of the variables of each model we have done. As we can see in both diagrams, a minimum correlation is represented, where variables can even be considered that are uncorrelated, as mentioned above. Similarly, due to the distance at which units are in each diagram, we can say that it shows a weak correlation.

The scatterplot on the left is striking point on the reference (0.23, 15), which represents the situation in Norway, this case is unique in relation to other states in the sample, because it is the only showing a positive variation on CO2 emission.

Non standardized coefficients

Model		B	Standard error
1) Independent Variable: CO2 emission tax Dependent Variable: Variation in CO2 emission	(Constant)	-0,123	0,210
	Tax Rate	0,002	0,011
2) Independent Variable: CO2 emission tax Dependent Variable: Variation on CO2 emission	Constant	5,150	2,931
	Tax Rate	0,156	0,150

Table 3: Coefficients of Non standardized model

Through these non-standardized coefficients we can create a regression equation, which allows us to observe the mean change that may correspond to the dependent variable for each unit that varies its independent variable. Thus, the equation of both models would be as follows:

Model 1 → Variation in CO2 emissions = $-0.123 + 0.002 \text{ tax rate}$

Model 2 → Average CO2 emissions = $5.150 + 0.156 \text{ tax rate}$

Thus, in Model 1, for each percentage unit that increases the tax rate will be reached to generate growth in the variation of CO2 valued at 0,121 metric tons per capita emission. Similarly, considering the Model 2, an increase of one percentage point increase on the tax rate can generate an increase in the average emission value of 5,306.

5.2.5. Conclusión

As we can meet our models have not complied with the hypothesis that we had established at the beginning, as they reflect us that the CO2 tax on the richest European countries have a minimal effect on environmental protection. In this regard, we believe that there are a lot of elements and most influential to be considered for protection. As can be seen in the treaties countries, CO2 emissions per capita of each has maintained a constant line from the beginning of the nineties, to date, without allowing it to be seen any substantial change from the application of that tax. Thus, we can represent by the following chart:

However, although our analysis does not show a direct relationship and does not express a reduction in CO2 emissions, we can assume that the application of this tax come to serve as a limiter in business conduct that may become harmful to the environment. So, we understand that, through these taxes, businesses can have greater awareness and try to reduce the emission of such greenhouse gases, since the issuance of these disproportionately could have high costs for the company.

For this reason, we can not assume that the application of these taxes is based on a lucrative effort by the administration since come to play an important role as limiting emissions. However, we believe that its effect does not reach directly on the protection of the environment, or comes to have such an important effect as desired.

In conclusion, we must say that, as shown by other studies (see Paolo Agnolucci, June 2004), it is very difficult to get to measure the effect that can generate the application of these taxes on environmental protection, as it can not be observed a direct relationship. Therefore, we consider it appropriate to try to reduce CO2 emissions through other ways or policies that are not linked to the tax system.

Chapter V: Proposals to improve upon environmental commercial practices

As we have been able to observe, international trade can have an important impact on the environment. For this reason, it is necessary to apply a series of measures or policies that try to lessen its harmful effects.

In this line, despite the already-existing measures that are established on trade at both national and international levels, we want to propose a series of measures or practices that can give place to benefits for environmental protection, which we highlight in the upcoming paragraphs.

Promotion of the application of Corporate Social Responsibility

Due to the degradation of the environment that has been promoted through the phenomenon of globalization and the opening of new markets, businesses and industries have needed to establish new instruments in environmental protection for the sake of new business ethics. In this sense, businesses must change their focus and avoid considering the environment as a mere expense in their production process, with the goal of integrating into the environment in which they are, assuming responsibilities of social nature, mainly in the environmental subject and in quality service for the customer.

In this manner, the concept of Corporate Social Responsibility (hereinafter referred to as CSR) emerges. This concept can be understood as *the voluntary integration, by businesses, of social and environmental concerns in their commercial operations and in their relations with their peers*⁴. Thus, CSR entails a model of entrepreneurial action that possesses a reach and a compromise much ampler than established by regulatory obligations and international agreements, compromising itself with a series of actions of social interest that go beyond the interests of the very enterprise⁴ (McWilliams et al., 2006).

⁴ In this sense, according to McWilliams and other authors (2006), they determine a series of additional benefits that the application of CSR can entail, such as: Access to foreign markets, which are more demanding and restricted due to environmental reasons; Improvement in the image of the business and its credibility; Helps in the compliance with environmental legislation and reduces the possibility of incurring in the imposition of sanctions due to their non-compliance; Introduction of better techniques and functioning.

As can be observed, the application of CSR in businesses related to the international trade sector can be very beneficial, which is why we consider that its application must be promoted in businesses, trying to make the benefits these enterprise models can offer known, and raise awareness on its benefits. Thus, this is about raising awareness among businesses for them to observe the protection of the environment, not as a simple expense within its productive process, but as a way to obtain ecologic positioning that could bring about a competitive advantage over its competitors.

Likewise, we consider that authorities of the public administration possess an important role in order to realize this promotion of CSR. In this manner, we consider as very interesting the option of having the very public administration establish a series of clauses of imperative nature to contracting which provide that all acquired products, as well as contracted services, be they local or foreign, come from businesses that applied a CSR and tried to reduce the impact of their economic activity on the environment.

At the same time, a system of fiscal bonifications which benefits all of those who exhibit a responsible business model centered on sustainable development, and, at the same time, harm all the businesses which do not comply with these environmental requirements could be applied. This system could incentive the very investors that act in these socially responsible entities through determined compensatory measures.

In the same manner, we understand that it is of great importance to spread, through information campaigns, as well as any other social media, the importance and the benefits that businesses can obtain in exchange for the adoption of these socially responsible compromises.

Greater weight and importance of the World Trade Organization

As we have mentioned. The WTO has a great importance in the protection of the environment through international trade, where, through the application of basic principles of the organization, such as transparency, predictability and “non-discrimination”, allow to set the pillars that allow Member States to apply measures to improve the protection of the environment (Tamiotti, et al., 2009).

Nevertheless, it is required that these Member States apply measures and normatives so that environmental protection can be done in a more real and efficient way. In this sense, the WTO could have a new role, creating a control organ that holds

among its functions that of ensuring that Member States correctly apply these measures and normatives.

In this line of thought, and in relation to compliance, we thought it would be an interest option to set standards in order to take into account the degree of compliance with these normatives.

Creation of an international organ specialized in matters of environmental protection at the community level

We understand that the creation of a specialized community organ responsible for environmental protection in the international trade sector would be beneficial. Thus, through this organ, more committees can be created to try and analyze the situation of these matters, as well as the creation of new proposals for normatives on the subject.

This community organ, through its normative initiative, could create projects that would be later be subject to approval by the European Parliament. Hence, in case it was approved this normative would have a direct application in national legislations through regulations and directives. In this manner, a common normative among all Member States concerning trade and environmental protection could be created, at least in the community scope, which would generate greater awareness and contribute to generating a more efficient and equilibrated European trade.

Promotion of the use of natural productive resources and renewable energies

Another option could be focused on promoting the use of natural productive resources and renewable energies by businesses in the trade sector. For this purpose, fiscal authorities could reduce taxes concerning those businesses that made use of them, as is the case with solid biofuels and biomass boilers, which are characterized for being respectful to the environment and emitting a low level of contaminating emissions to the atmosphere.

Promoting intermodal transport

One of the main sectors related to international trade is the merchandise transport sector, because the very definition of trade includes the physical movement of goods from their place of manufacture to the places where the product will be consumed (Steininger, 2001).

In this manner, we understand that intermodal transport can prove to be very beneficial in order to reduce the impact that international trade could generate on the environment. In this sense, we must understand intermodal transport as a transport of goods done in one same unit or vehicle using, successively, two or more without manipulating the goods in the modal exchanges. Hence, we do not pretend to develop a mode of transport per se, but we seek to integrate and complement all kinds of transport in order to make a more effective use of the transport system (Bauer et al., 2010).

For this reason, this mode of transport allows us to reduce the use of road transport, which requires the most energy and emits the highest levels of CO₂. And to allow to make more use of other means of transportation, like transport by water (Marketa, 2015).

Promotion of the openness of international markets and the establishment of stable conditions

As we have mentioned before, international trade, alongside globalization, can generate a series of benefits on the environment. This is why we understand that a liberalization of the international markets and the application of stable conditions between the economies of various countries could help protect the environment.

Thus, we consider that a liberalization of trade at the world level would lead to the creation of conditions that would conclude in innovation, the efficient use of resources and, at the same time, economic development. In the same way, this growth entails an improvement in the quality of life and the economy of the citizens, as well as an improvement in the distribution of resources (Metzger, 2001), which can generate a higher probability of capacity for environmental protection.

Conclusions

The Environmental degradation has been increased in recent years because of the effects such as globalization and the opening of international trade, which has generated a series of positive and negative effects on the environment, but negative effects have been more.

The world trade organization has some important functions in the development of international trade, through which should try that such development.

is done in a sustainable way to the environment. In these sense, The world trade organization has created three major agreements linking the international trade with the Environment, among we find: general agreement on tariffs and trade of 1994; Agreement on technical barriers to trade; and the agreement on the application of sanitary and phytosanitary measures.

International trade has sought to reduce its impact on the environment through various media and policies, from which the following stand out: Market pricing for internalizing the costs of GEI; Use of harmless environmental technologies; Creation of common framework to promote the use of harmless products and technologies to the environment. Despite the implementation of these measure and policies, today has grown exponentially emission of greenhouse gases worldwide.

Through our Econometric regression analysis, we conclude that the implementation of a tax on CO₂ emissions in the richest countries of Europe shows a minimal effect on the Protection of the Environment. The main function of this tribute can be determined as a limiter in business behavior, as companies try to internalize that tax in its production costs and try to issue the minimum possible quantity of CO₂. Thus, there is another large number of measures that has a mayor effect on the Protection of the Environment that these CO₂ taxes.

There are a number of measures that can be applied to try to reduce the impact of international trade on the environment. We consider two main:

- It is necessary the creation of an international body that is specialized in the field of environmental protection at the community level, with the aim of constantly assess the situation in which we find ourselves and make legislative proposals to the European Parliament when they are required.
- Intermodal transport can be a good option to try to reduce the impact of the transport sector (which is closely linked to international trade) in the environment and especially in reducing CO2 emissions. Therefore, Community policies must be aimed at promoting this type of transport and make greater use of other modes, such as marine transport.

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ANEX

Evolution of CO2 emission

Country Name	Indicator Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Finlandia	CO2 emissions (kt)	10,38	10,71	9,42	9,95	11,25	10,32	11,96	11,66	11,06	10,73	10,13
Netherlands	CO2 emissions (kt)	10,59	10,96	10,68	10,78	10,75	10,89	11,28	10,75	10,75	10,37	10,38
Norway	CO2 emissions (kt)	7,40	7,45	6,92	7,41	7,05	7,14	7,15	7,82	8,26	9,18	8,62
Sweden	CO2 emissions (kt)	6,07	5,98	5,89	5,94	6,25	6,25	6,32	5,90	5,99	5,77	5,56
Denmark	CO2 emissions (kt)	9,77	11,69	10,50	11,00	11,72	10,92	13,71	11,65	11,23	10,36	9,61
United Kingdom	CO2 emissions (kt)	9,71	9,87	9,66	9,45	9,45	9,27	9,47	9,04	9,09	9,05	9,20
France	CO2 emissions (kt)	6,42	6,67	6,22	6,09	5,70	5,86	6,28	5,86	6,34	6,17	5,98
Switzerland	CO2 emissions (kt)	6,35	6,28	6,22	5,87	5,91	5,57	5,64	5,85	5,87	5,70	5,44

Country Name	Indicator Name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Finlandia	CO2 emissions (kt)	11,00	11,86	13,26	12,83	10,42	12,57	12,10	10,65	9,96	11,53	10,16
Netherlands	CO2 emissions (kt)	10,47	10,65	10,77	10,85	10,54	10,22	10,47	10,53	10,25	10,95	10,06
Norway	CO2 emissions (kt)	9,11	8,26	9,34	9,29	9,18	9,50	9,57	10,55	10,82	11,62	9,19
Sweden	CO2 emissions (kt)	5,75	6,43	6,12	6,06	5,71	5,46	5,25	5,33	4,70	5,61	5,52
Denmark	CO2 emissions (kt)	9,88	9,68	10,39	9,36	8,69	10,11	9,20	8,55	8,06	8,39	7,25
United Kingdom	CO2 emissions (kt)	9,23	8,88	9,03	8,99	8,98	8,90	8,62	8,44	7,60	7,84	7,09
France	CO2 emissions (kt)	6,21	6,13	6,21	6,19	6,18	6,00	5,86	5,77	5,51	5,50	5,19
Switzerland	CO2 emissions (kt)	5,94	5,59	5,48	5,47	5,56	5,60	5,03	5,28	5,37	4,95	4,63

Done by myself: data obtained from the The World Bank. Available in:
[\[http://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=chart\]](http://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=chart)

Variation and average of CO2 emission

Country Name	Country Code	Indicator Name	Variation	Media
Finlandia	FIN	CO2 emissions (kt)	-0,020537669	11,08614174
Netherlands	NLD	CO2 emissions (kt)	-0,050024684	10,63411535
Norway	NOR	CO2 emissions (kt)	0,234268157	8,735867958
Sweden	SWE	CO2 emissions (kt)	-0,077063724	5,798837733
Denmark	DNK	CO2 emissions (kt)	-0,309982283	10,01363451
United Kingdom	GBR	CO2 emissions (kt)	-0,232584187	7,798780947
France	FRA	CO2 emissions (kt)	-0,056699993	5,34087504
Switzerland	CHE	CO2 emissions (kt)	-0,124275825	5,057906552

Done by myself. Data obtained from The World Bank. Available in:
[\[http://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=chart\]](http://data.worldbank.org/indicator/EN.ATM.CO2E.KT?view=chart)

Tax rate on CO2 emission

Country	Tax Rate	Start Rate
Finlandia	\$30/metric ton CO2	1990
Netherlands	\$20/metric ton CO2	1990
Norway	\$15.93/metric ton CO2	1991
Sweden	\$104.83/metric ton CO2	1991
Denmark	\$16.41/metric ton CO2	1992
United Kingdom	\$17,94 per metric ton of CO2	2001
France	\$24.74 per metric ton of CO2	2010
Switzerland	\$17,73 per metric ton of CO2	2008

Done by myself. Data obtained from the National Renewable Energy Laboratory.
Carbon Taxes: A review of experience and policy design considerations