

**SCHOOL OF ECONOMICS AND BUSINESS
UNIVERSITY OF SARAJEVO
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MASTER THESIS

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**SCHOOL OF ECONOMICS AND BUSINESS
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MASTER THESIS

**THE IMPACT OF ENVIRONMENTAL REGULATION ON EXPORT IN
TRANSITION COUNTRIES**

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AUTHORSHIP STATEMENT

The undersigned Irma Bešlić, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), declare that I am the author of the master's thesis entitled The Impact of Environmental Regulation on Export in Transition Countries, written under supervision of Professor Dr. Eldin Mehić.

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INTRODUCTION

For the past five decades special attention has been paid to the interaction between environment and trade. It began as a concern for the problem of industrial pollution during 1960s and continued with the involvement of environmental issues in trade analysis in the late 1970s. Lots of issues have been investigated. For example, the effects of different environmental policies on trade and vice versa, the relationship between environment, trade and economic growth, the role of international organizations in protecting the environment, etc. Today, environmental regulations and their implementation represent one of the key issues in international politics.

According to Mc Laughlin and Coffey (2009) there are two ways of introducing environmental regulations. The first one is the introduction of environmental regulations which appears as the result of changes within country itself (for example, as a result of pressure for cleaner environment from the green parties of that country). The second one is a result of environmental policy which is beyond the control of an individual country (for example, when European Union introduces regulations for all members).

Regardless of whether environmental regulations are introduced by a country itself, or imposed by a group that country belongs to there is always a debate whether such regulations have positive or negative impact on exports. According to Porter and van der Linde (1995) stringent environmental regulations will improve the environment quality and enhance a country's competitiveness because they will encourage it to innovative solutions. On the other side increased stringency of environmental regulations could also have a negative impact on country's export to other countries because it would increase its production costs. Higher productions costs would result in higher prices of domestic products relative to foreign products, which could ultimately lead to the reduction in export. However, empirical studies gave mixed results. Tobey (1990) found out that stringent environmental regulations from the late 1960s and early 1970s had no measurable impact on trade patterns of five most pollution intensive industries. It was the first analysis which included large number of countries in order to investigate the impact of domestic environmental regulations on international trade flows. Also, van Beers and van den Bergh's study (1997), based on bilateral trade flow equation or gravity model, showed significant effect of strict environmental policies in the case of total trade flows, but an insignificant effect in the case of dirty trade flows.

Furthermore, there are some interesting findings with respect to the introduction of unilateral environmental regulations. Charnovitz (1992) emphasized different values and preferences between countries as main argument against harmonization of environmental regulations. He stated that countries are not identical and therefore they shouldn't base their environmental policies on multilateral approval. On the other hand, Steininger (1994) was strongly in favor of

international harmonization of environmental regulations, seeing it as an advantageous way of dealing with competitiveness caused by international environmental problems.

All in all, in OECD (1997) Jan Adams claimed that there is no clear empirical evidence that high or even relatively high, environmental regulations have a systematic negative impact on competitiveness at the macroeconomic or microeconomic level (OECD, 2009). Lots of studies have been written since then. A number of them have uncovered positive, negative, or neutral competitiveness impacts resulting from environmental policy. The overall results still remain indecisive (OECD, 2009, p.29).

The main purpose of this master thesis refers to the effects of environmental regulations on exports in transition countries. Specifically, the empirical analysis is based on a sample of transition countries of Central and Eastern Europe (hereinafter: CEE). When it comes to introducing or an increase in stringency of environmental regulations, there is huge debate whether such regulations have positive or negative impact on exports. This thesis focuses on Porter's hypothesis which speaks in favor of more stringent environmental regulations. Porter (1991) said that stringent environmental regulations have a positive impact on a company because they encourage it to be innovative in order to meet those regulations. The thesis focuses on those scientific studies that have used the gravity model of trade. One part of this thesis is devoted to the explanation of this model and how it has been used in trade analysis.

The objectives of the thesis are:

- to explain some basic international trade theories, emphasizing Porter's diamond theory;
- to understand the relationship between environmental regulation and trade;
- to analyze the impact of environmental regulations on export in transition countries;
- to show that impact of an increase in environmental regulations stringency is more negatively related to exports of non-EU countries relative to exports of EU countries;
- to provide policy recommendations for transition countries in the context of an impact of environmental regulations on export.

The empirical analysis in this thesis is based on an extended gravity model of trade. From its appearance this model has been used in very influential empirical studies related to this topic (Harris, Konya & Matyas 2002; Jug & Mirza, 2005; Mc Laughlin & Coffey, 2009). In their studies they expanded the basic gravity of trade model with different variables to 'capture' the effect of environmental regulations on trade flows between countries.

Unfortunately, most of these empirical studies had problems in finding appropriate variable that could measure the strictness of environmental regulations. These studies mainly used outcome measures as proxies for environmental regulation stringency (energy intensities, recycling rates, abatement costs). However, with these measures it was likely for them to introduce endogeneity in the estimates. To avoid this, the empirical analysis of this thesis uses the gravity model of

trade similar to one used by Mc Laughlin and Coffey (2009). In their work they used survey data rating environmental stringency from World Economic Forum's Travel and Tourism Competitiveness Reports. These reports were based on surveys in which they asked managers from all over the world to evaluate their countries' environmental regulation stringency. The sample in the empirical analysis in this thesis includes countries of CEE and uses an average data on exports, GDP and environmental variables. Using gravity of trade model the thesis analyzes two following hypothesis.

- a) Stricter environmental regulations of the exporting country have positive and significant impact on exports.
- b) An increase in stringency of environmental regulations has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries.

The thesis is structured as follows.

The first chapter deals with international trade theories. It explains some of the most influential conventional and new trade theories. In particular, it emphasizes the Porter's diamond theory and its concept of competitive advantage. It also explains environmental aspect of that theory as well as arguments for and against it. Special attention is paid to this theory because Porter gives a clear framework for this research. He supported the introduction of more stringent environmental regulations and argued that companies need innovative capabilities in order to meet those regulations, and not to base their businesses only on reliable factors without any further improvement, training or development.

The second chapter refers to an overview of different studies relating this topic. It explains many empirical studies with some very different findings relating the effects of more stringent environmental regulations and unilateral environmental regulations.

The third chapter relates to environmental regulations in EU and transition countries. It provides some of the most interesting examples of how these countries imposed more stringent environmental regulations and why those regulations have proven as useful for production and export to other countries.

The fourth chapter concerns the empirical analysis on effects of environmental regulations on trade. This research uses an extended gravity trade model to examine the effects of environmental regulations on exports of these countries. One part of this chapter is devoted to the explanation of the gravity model and its use in trade analysis. This chapter also explains dependent and independent variables included in the model, data sources, model specification and estimation method. The conclusion part obtains all results and findings from the thesis and provides implications for further research.

1. INTERNATIONAL TRADE THEORIES

This chapter gives an overview of the theoretical framework for investigating the connections between environmental regulation and exports. Many theories have attempted to explain this relationship. At first, this chapter explains some of the basic theories of international trade like conventional trade theories and new trade theories. Special attention is paid to Porter's theory because Porter directly relate to the impact of strict environmental regulations of the exporting country on its exports. Porter supports the introduction of more stringent environmental regulations because, according to him, such regulations encourage companies to innovate.

Through history, many economists have attempted to give the right answers to some of the most important issues related to international trade, such as why there is an international trade, what is a pattern of international trade, why countries specialize in the export of certain products, etc. The first generally accepted view of international trade was provided by a group of scholars known as Mercantilists. Mercantilists saw international trade as a way of increasing national wealth, which they measured as the amount of silver and gold, focusing on the development of techniques to encourage exports and limit imports. However, although predominantly during three centuries – 16th, 17th and 18th century, Mercantilism has not evolved into the concept of scientific character so it can't be considered as a complete theory of international trade.

After Mercantilists, international trade theories can be classified into conventional (traditional) and new (modern) international trade theories. There is also a National Competitive Advantage theory by Michael Porter which is usually treated separately. This theory is also well known as New Paradigm. So under this chapter, the thesis explains some of the most influential trade theories, their strengths and weaknesses and their contribution to the interpretation and legality of international trade.

1.1 Conventional International Trade Theories

It might be said that, in essence, international trade theory, considers two key questions. The first question relates to what and how countries could gain from international trade. The second question is about explaining the pattern of international trade and providing the reason why one country specializes in export of certain products and import of others. Classical economists in the late 18th and early 19th century provided the answer to the first question, while theorists from Neo-Classical School in the late 19th and 20th century provided the answer to the second question.

1.1.1 Classical Theories of Trade

Classical trade theories appeared in the second half of 18th and early 19th century. These theories appeared as a need for explanation of radical change of Mercantilist's attitude which became the brake to further economic development.

The most prominent representatives of Classical School were: Adam Smith, David Ricardo and Stewart Mill. With his Theory of Absolute Advantage, Smith laid the foundations of classical views on international trade. In his book 'The Wealth of Nations', from 1776, Smith argued that countries can benefit from trade due to differences in production costs of products. He measured the production cost of one product as a number of working hours spent for the production of that product. His model of international trade is very simple: it implies to two countries exchanging two products, based on labor theory of value – all costs are reduced to the consumption of only one product factor (labor), placed in the world of full employment and perfect competition which includes the same technology, same tastes and constant costs.

Another classical economist David Ricardo in his work 'The Principles of Political Economy and Taxation', written in 1817, claimed that international trade is not conducted on the basis of absolute, but on the basis of comparative advantage. According to Ricardo, as long as country has comparative advantage in production of one product, it should specialize in making that product, to benefit from trade. This Ricardo's model, together with Smith's, was exposed to many criticisms because of its similarity and number of unrealistic assumptions on which it was based. Yet, the Theory of Comparative Advantage, set by Ricardo in 1817, wasn't challenged. Even more it was used as the basis for many neo-classical economists and new trade theorists and it was significantly influential for theory and politics of international trade for almost two centuries.

Unlike Smith and Ricardo, who placed the emphasis solely on the elements of the supply side, John Stewart Mill contributed significantly to the classical theory of international trade, leaving the labor theory of value and introducing the Theory of Reciprocal Demand. Reciprocal demand refers to a country's demand for a product in which another country enjoys a comparative advantage in exchange for a product in which the former country enjoys a comparative advantage (Grimwade & Nigel, 2000, p.36). The value, then, in any country, of foreign commodity depends on the quantity of home produce which must be given to the foreign country in exchange for it (Mill, 1885).

Classical economists developed two theories: the Labor Theory of Value and the Theory of Reciprocal Demand. However, there have been many criticisms related to classical theories which were mostly about an inactivity and abstraction of these theories. Unfortunately, in the world economy since the industrial revolution until today, characterized by great technological changes, increasing number of countries, products and factors involved in international trade,

expressed government intervention and imperfect market structure classical theorists' assumptions do not find their place.

1.1.2 Neo-Classical Theories of Trade

Neo-Classical theories are also based on the presumption of free trade, perfect competition and full employment. However they changed some elements which were constant in classical theory. They left the labor theory of value, replaced the model 'two countries-two products' with the model 'more countries-more products', replaced the physical expression of production costs with cash, introduced product prices expressed in money, transportation costs, exchange rates, etc. Yet the theory of comparative advantage, developed by Ricardo, was firmly in neo-classical theories.

When it comes to neo-classical theorists, there are: G. Haberler, E. Heckscher and B. Ohlin. Gottfried Haberler was one of the first neo-classical economists. He presented The Opportunity Cost Theory. He constructed the model of international trade by introducing the principle of marginal cost. According to him, a country has a comparative advantage in a product if it can make additional unit of that product at lower opportunity cost expressed in other product, than other country. Haberler freed the theory of comparative advantage from Ricardo's labor value formulation, provided it with a modern opportunity-cost formulation, and laid the conceptual foundation of modern trade theory (Bernhofen, 2005, p. 997).

Still, the most important theory developed by neo-classical theorists was Heckschler - Ohlin theory of international trade (hereinafter: H-O). Many economists and policy makers who studied the impact of environmental regulations on international trade used this theory. So, in 1919 Eli Heckscher developed a theory which a decade later was accepted and further developed by his student Berthlin Ohlin. This is the reason why it's called Heckschler-Ohlin theory although it can be found under name Factor Proportions Trade Theory. H-O theory begins from the theory of comparative advantage, but goes one step further, and explains the reasons that lead to differences in the relative costs of countries. In other words, this theory tries to explain the sources of comparative advantages. H-O theory is formulated on the basis of two basic assumptions of country and product. Products differ from each other in the intensity of factor used in production, while differences between countries derive from differential availability of production factors. The main thesis of H-O theory states that a country will have a comparative advantage and will export a product whose production is intensive with a factor which is cheap and plentiful in that country, and it will import a product whose production requires intensive use of factors which is relatively scarce and expensive in that country.

In 30th and 50th of 20th century, H-O theory represented generally accepted explanation of international trade, and it was also quite dominant during next few decades. Several empirical tests have raised doubt about the applicability and validity of the H-O model, but it has never been fully empirically verified nor completely rejected.

1.2 New International Trade Theories

In early 1980s there have been lots of critics of conventional theories for several reasons. Most critics were related to the static assumptions of these theories, the absence of scale economies in production, assumptions of homogenous products, etc. Recognizing the shortcoming of these models, many theorists have tried to modify them. Others completely rejected their assumptions and attempted to develop entirely new explanations of comparative advantage. Both contributed to the further clarification of international trade laws. The result was the appearance of new international trade theories such as: technological theories, Linder's Theory and Theory of Economies of Scale.

In Ricardo's model technologies vary across countries. These technologies are static because there is no technological change. H-O model is based on the same technology available to everyone. According to Winters (1991), in more recent theories of international trade, especially technological theories, technology is different from country to country and it's changing constantly due to continuous process of invention and innovation. Michael Posner developed the Technological Gap Model, whereby a significant portion of trade between industrialized countries is based on technological innovation. Unlike H-O theory, Posner assumed that the same technology is not available to everyone at the same time and that there is a sort of delay in the transfer of the technology from one country to another (Appleyard & Field, 1998). This creates technological gap that allows innovative companies and countries temporary monopoly on the world market.

Raymond Vernon gave another approach to the explanation of trade patterns in technological theory. He developed the Product Life Cycle Theory. He said that products for which innovation is very important, usually have limited life span (pharmaceuticals). Their market life time is determined by the time it takes the manufacturer to make new and improved substitute. For that reason Vernon believed that such products have life cycle that pass through three specific phases. Those phases are:

- The New Product Stage. In this phase production is located in innovative country and it's focused mainly on domestic market. Export exists, but producer is trying to be as close to the customer as he can, in order to receive a feedback and make necessary adjustments to the product. There is no competition and product is protected by patent laws. For these

reasons, higher costs related to the location of production itself can be transferred into the price.

- The Maturing Product Stage. At this stage product is mature and it's beginning to deal with increased competition. Now producers from other countries copy the product. In order to meet foreign market and to avoid transportation costs, producer starts to open factories in other countries. As a result, exports from innovating country begin to decline.
- The Standardization Stage. When product reaches the standardization phase, the demand for it is already highly price-elastic. Competition is now much larger. Product is mostly bought on the basis of price difference. Now producer is only interested in minimizing location cost for production so he moves the production to developing countries. Another reason for moving the production is lower wage cost in developing countries. As a result, the export from producer's country declines until the country became the importer of its own product.

So, Vernon's hypothesis states that as product becomes more standardized his production moves to countries with lower income, but also with lower labor cost, which, in this stage of life cycle, becomes more important for comparative advantages than investing in research and development. Moreover, low labor cost could present an initial attraction for drawing investors to less developed countries (Vernon, 1966, p. 203).

Conventional theories represented a view that trade is based upon supply of factor such as labor, capital and human capital. However, Swedish economist, Staffan Linder gave another explanation of trade patterns. It was the Theory of Representative Demand. Linder said that representative demand in trading nations - that is, a range of goods which are typically in demand at a given per capita income level - determines the feasibility of trade flows between them (Sen, 2005, p. 1015). He believed that, while factor endowments play the major role in determining patterns of trade in primary commodities, consumer preferences are the more important for trade in manufacturers (Grimwade & Nigel, 2000, p.56). Regarding to that, H-O theory can be applied on primary goods (agricultural goods and raw materials), but it cannot be applied on manufacturer goods. Trade pattern of manufacturers is more influenced by an average income level that country spent on different products. So according to him, there will be greater volume of trade between countries with similar income levels. They will export in countries with similar preferences, or similar demand which is a function of per capita income level of those countries.

When it comes to the theory of international trade based on economies of scale, Paul Krugman is the person most responsible for the development of this theory. The Economies of Scale Theory suggests more than proportional reduction in average costs with increased production, due to declining trend of unit fixed production costs. According to Krugman (1980) if two countries

have the same composition of demand, the larger country will be the net exporter of the products which production involves economies of scale.

1.3 Porter's Diamond Theory

Dynamic understanding of comparative advantage of new international trade theories inspired the appearance of entirely new paradigm – the Theory of Competitive Advantage. Michael Porter developed this theory. Unlike other theories, Porter's theory tends to be universal, offering a comprehensive interpretation of the development of competitiveness and causes of international trade. The advantage of Porter's theory is that he looked at the competitiveness and international trade from perspective of a company, as well as from a national economy perspective. According to Porter and van der Linde (1995, p. 98), comparative advantage rests, not on static efficiency, nor on optimizing fixed constraints, but on the capacity for innovation and improvement that shifts the constraints.

Noting the shortcomings of previous theories, Porter decided to formulate a new theory, which he called The Theory of Competitive Advantage. He chosen the term 'competitive advantage', because he believed that the term 'competitive advantage' had to explain competitive advantages in all forms, and not just in limited types of advantages based on factors' availability, as it was in the comparative advantage theory set by Ricardo. Porter believed that the primary goal of every country is to create a high standard of living for its citizens, and that this ability depends on the productivity of resources used in that country.

The assumptions of Porter's concept of international comparative advantage are the following:

- First, in his analysis of competitive advantages, he rejected the static view of production factors, emphasizing the dynamic character of competition and its requirements aimed at improving the quality of existing factors, of even the creation of new production factors with competitive preferences which, up to that period, stay unknown.
- Secondly, the study of competitive advantages of individual national economies over the past several decades, has confirmed the view that certain production areas can run the basic mechanism of increasing the competitiveness of individual national economies on a global level. In doing so, as Porter though, it is important to understand why some countries may, or may not, be competitive in international markets, particularly in sectors and areas of complex and high technology products.
- Third, Porter tried to find out why national economies, which conceive the strategy, manufacturing process and technology, educate skilled workforce and form a business and work ethic, in some occasions represented a very supportive factor for the creation of competitive

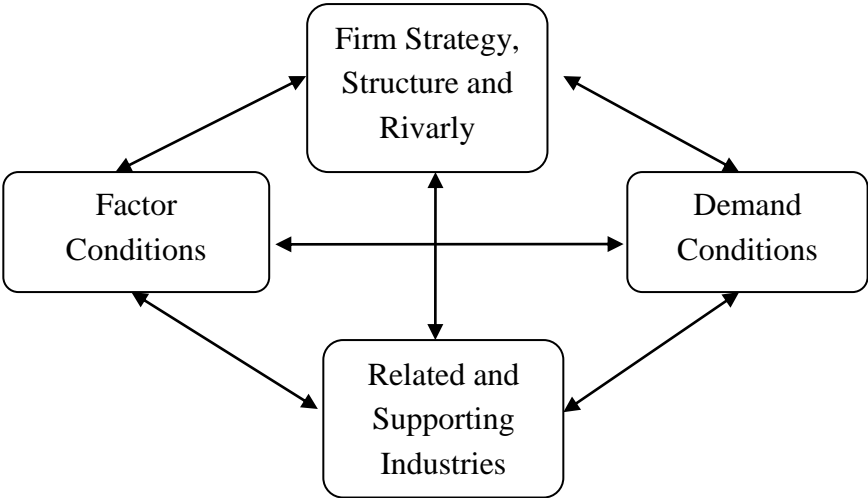
advantages on the international level, while in some other situations it was not the case. Therefore Porter referred to the competitive position of individual companies, since companies can only occur as direct carriers of an international production and trade, and then, based on the conclusions that were valid for the character of the behavior of individual companies, he performed his attitudes regarding the operation of individual economies.

- Fourthly, individual countries, by Porter, achieve notable breakthroughs in the international market, not simple on the basis of actual technological and commercial success in certain fields, but also on the basis of goals and results achieved in the group of mutually related manufacturing sectors.

- Fifth, the concept of competitive advantage has extremely dynamic character. Dynamism is the most important methodological peculiarity of Porter’s approach to global competitive advantages of certain nations.

Porter claimed that, in the past, a country developed itself on the basis of comparative advantages like cheap labor or natural resources. These comparative advantages today reflect in highly developed technologies, infrastructures, expertise and ability to innovate. Porter argued that it's not important which products are produced, but how they are produced. In his Concept of Competitive Advantage, he combined supply elements, such as the availability of factors, with elements on demand side. He explained his concept by creating a system, called the Diamond of National Advantage made of four determinants of competitive advantage. It was a dynamic system in which each determinant affects the other. Porter defined these determinants as: factor conditions, demand conditions, related and supporting industries and firm strategy, structure and rivalry. The following Figure 1 presents Porter’s Diamond of National Advantage.

Figure 1. Porter’s Diamond of National Advantage



Source: M.E. Porter, *The Competitive Advantage of Nations*, 1990, p.78.

As mentioned above, the first component of this system is related to factors of production. It includes all factors that country has, which may engage in the specific industry. They are grouped into several categories: human resources, physical resources, resources of knowledge, capital resources and infrastructure. Porter believed that, for the economic success of one country, it's not enough to have the available structure of these factors. It is also important to have the ability of their continuous creation, training and development.

The second component relates to the demand conditions, which refers to the level of competition on national market. Companies which have the ability to survive and develop on the domestic market are more likely to be competitive on the foreign market.

The third component refers to related and supporting industries, or, in other words, to the competitiveness of related industries. Related industries are those industries that can perform the same activity for more branches or they can transmit the knowledge from one sector to another. A company which operates surrounded by a mass of related industries can acquire and maintain the advantage through close business advantages, proximity of suppliers and continuous flow of products and information.

The fourth component involves firm strategy, structure and rivalry. This component relates to the conditions in the host country which can help or hinder the creation and maintenance of its international competitiveness. Porter emphasized that there is no universal form of management, ownership or operational strategy that can be appropriate for each country, but that it depends from situation to situation.

In Porter's opinion the success is achieved only by those countries which have the most dynamic process of interaction of all determinants of national competitive advantage. This is especially true in the area of new technologies where success can not be achieved if one of the above mentioned determinants doesn't give its full contribution.

However, in Porter's concept the diamond's maximum implies the existence of other two conditions, whose influence is particularly important in the process of shaping international competitive advantages. Those are: the role of the state policy and the importance of random events. Porter said that the role of the state always comes down to a utility function and its tasks are basically orienteering, stimulating, coordinating and supportive nature. State policy will never be successful if it occurs as the sole generator of competitive advantage of certain nations. It will be successful only when there are other assumptions to create competitive advantages of nations and where state policy increases their activity.

Another Porter's objection regarding government limited policy is his position that government policy could be easily found under the influence of some factors that makes the diamond. Therefore one should always have in mind what kind of reaction of other undertakings in a country is caused by certain decisions of the authorities. In the widest sense, it all depends on the

tradition of civil servants, the relations between business and government but also the quality of making decisions especially those of strategic nature.

As for the random events, Porter included: unexpected discoveries, technological breakthroughs, significant fluctuations in prices, large fluctuations in global financial markets, which are reflected in the expressed level of interest rate fluctuations, then unexpected political events, war and natural disasters. It is evident that these events can sway the position of one country, and, in contrary, to create favorable conditions for obtaining certain competitive advantages of other nations.

However, all these ways of achieving success have one big disadvantage. Namely, they don't fully explain why national economies proved capable enough to use their benefits quickly and efficiently, to strengthen its financial position, to increase investments, to realize progressive structural changes in a relative short term, to increase its general level of education and qualifications of employees, all that compared to others which are unable to do so. Does this mean that in their economies, or beyond, in their social environment, general benefits from the diamond determinants, state or random events have not been adequately evaluated and used? For the purpose of gaining an adequate answer to this question it is necessary to have in mind following moments in Porter's approach of setting a national competitive advantage.

First, unlike previous theories which had a starting position that different countries engaging international trade of goods and services, Porter explicitly claimed that companies are the carriers of international trade in a global exchange, particularly the companies with a transnational character. And secondly, the core of every competitive advantage is located in innovation. So, he argued that the key issue is the ability to produce more or less productive, which is directly correlated with the quality and characteristics of a product, on one hand, and the efficiency of technology and management, on another.

After explaining this, it can be concluded that Porter did not question the Theory of Comparative Advantage, set by Ricardo. He only explained why certain industries have or do not have the advantage in global economy. His basic message was that companies achieve competitive advantage through acts of innovation (Porter, 1990, p. 75).

1.3.1 Environmental Aspect of Porter's Theory

Porter and van der Linde (1995, p. 120) declared the following: "Need for regulation to protect the environment gets widespread but grudging acceptance: widespread because everyone wants a livable planet, grudging because of the lingering belief that environmental regulations erode competitiveness.

It might be said that introducing environmental regulations have two sides. One is a social benefit side, which states that preservation of the environment is in the interest of whole society. The other is a higher production cost side. More precisely, from a company perspective, introducing environmental regulations leads to higher costs, which is the reason why companies are forced to increase their prices and therefore to undermine its competitiveness. Porter believed that this static view of environmental regulations is incorrect, because companies exist in a dynamic, not in a static world. Companies are constantly encountered with new technologies and they must be innovative if they want to meet expectations of their customers in a best way.

They claimed that environmental regulations, if designed properly, can trigger innovations which lower the total cost of a product or improve its value (Porter & van der Linde, 1995b, p.120). Environmental regulations force companies to be more productive in a consumption of its resources, which makes them more competitive, not less. In their article 'Green and Competitive', Porter and van der Linde (1995b) explained this situation by the case of Dutch flower industry. According to them the export of cut flowers from Dutch flower industry represents about 65% of world export of cut flowers. Everyone knows that Netherlands faces two inevitable problems. It must reclaim the land from the sea, and it has slightly problematic weather. Despite this, Dutch flower industry succeed in being innovative, and found the way how to meet environmental problems and improve its product at the same time. The problem appeared when this company was faced with new strict environmental regulations on chemicals. Dutch flower industry cultivated its flowers in small areas which contaminated the soil and groundwater with pesticides and other chemicals. When the law was passed, they developed a special system for flowers to grow in water and rock wool, instead of soil. This new system reduced the need for pesticides and fertilizers, reduced variation in growing conditions and improved the quality of flowers. So the idea which was born as a way of meeting new environmental regulations, made this company more productive and, at the same time, more competitive on the world market. Dutch flower industry is a very good example how meeting environmental regulations should not be seen as an expense for that company, but as a great opportunity for it to be innovative and far more competitive in its market.

Also, Porter and van der Linde (1995b) argued that external pressure is an additional factor for a company to innovate. This confirms the fact that the world really puts a higher value on resource efficient products (Porter & van der Linde, 1995b, p.127) Many companies charge more for their 'green' products which makes them more opened to new market segments. For example, Germany has this advantage because it introduced recycling standard before others. This country was first in developing less packaging-intensive products and because of that it gained the advantage which reflects in lower costs and sought after products on the market. Czech Republic provides loans for households and companies that installed heat pumps that draw heat from the earth in order to warm up, and thus do not pollute the environment. This method of heating is very expensive but carries the advantage of saving the power up to 50%. It provides special benefits to those companies that have large commercial buildings which operate in areas with not

so favorable climate. Also in many situations, governments support companies which produce, for example, low-emission diesel engines, helping them to place their product on foreign markets. These are all examples which testify that external pressure is an additional factor which forced companies to innovative in order to meet strict environmental regulations.

There is also a static way of thinking that meeting environmental regulations is simply something that is not financially worth for a company. Unfortunately, as Porter and van der Linde (1995b, p. 128) argued: “Businesses spend too much of their environmental dollars on fighting regulation and not enough on finding real solutions”. Some companies still do not realize that respecting environmental regulations can enhance their competitiveness, and that the cost of compliance with new regulations will eventually decline. For example, regarding regulation for sulfur dioxide emissions from 1990, it turned out that, today, the cost of compliance with this regulation is a half of what analysts predicted, and that is still decreasing.

However, not every regulation is the right one. There are bad regulations and right regulations. According to Porter and van der Linde (1995b), bad regulations weaken country’s competitiveness, but the right kind of regulations can improve it. This can be seen on the example of pulp-and-paper sector in the United States and Scandinavian pulp-and-paper sector. In 1970s United States imposed regulations without appropriate phase-in periods. Because of that, companies were forced to adopt best available technologies in short term (Porter & van der Linde, 1995b, p.129). Then, it meant to install proven but expensive technologies. On the other side, Swedish government had more flexible approach which enabled companies to focus on its manufacturing process and to be innovative in order to meet new environmental regulations. Thanks to this approach, Swedish companies invented new pulp-and-paper technologies which met new regulations and, at the same time, lowered their operating costs. United States ignored two principles. The first one is that they do not create maximum opportunity for innovation because they don’t let companies to deal with the problem on their own. Secondly, they don’t have in mind the fact that encouraging companies to innovate cannot be found in static pre-existing technologies. The mistake for United States was that they set strict targets with very short deadlines for compliance with new regulations. Sweden, on the other side, made the right thing and firstly imposed looser standards, clearly indicating that stricter standards will follow. The result was that United States had stopped on their secondary technology, while in the pulp-and-paper sector.

The conclusion of Porter’s environmental policy was that companies must look on environmental improvement as an opportunity to become competitive, innovative and therefore more successful, and not as an unnecessary expense and threat to their businesses.

1.3.2 Criticisms and Arguments in Favor of Porter's Hypothesis

The existing literature provides many arguments and examples which speak in favor of Porter's hypothesis. Some of them were already proved on the case of Dutch flower industry and United States versus Swedish pulp-and-paper sector mentioned above. In addition to that, this section explains some criticisms of this theory and arguments that refute them. These criticisms and arguments were explained by Porter and van der Linde in the article 'Toward a New Conception of Environmental-Competitiveness Relationship' (Porter & van der Linde, 1995a), but there are also some other authors (Leonard, 1984; Sanchez, 1992; Canon de Francia, Garces Ayerbe & Ramirez Aleson, 2007) who argued that greater technological knowledge and innovative solutions prepare companies to comply with new environmental regulations.

According to Porter and van der Linde (1995a), first criticism of Porter's hypothesis related to the very reality of 'innovative offsets'. Critics, whose names are not specified in this article, said that 'innovative offsets' (in other words, innovative ways of how to comply with new strict environmental regulations) are theoretically possible but that they are very rare in the practice. Porter and van der Linde (1995a) thought that this assumption was wrong. They started with the explanation of emissions as a manifestation of economic waste which is often a sign of inefficient and incomplete use of resources. This inefficient use of resources forces companies to do some of the non value activities such as storage and disposal. These non value activities represent a hidden cost for a company, and there are lots of those hidden costs later in the life cycle. Porter and van der Linde (1995a, p. 106) claimed the following: "As the many examples discussed earlier suggest, the opportunity to reduce cost by diminishing pollution should thus be the rule, not the exception". Lots of activities make sense in this case, like replacing hard heavy metals which are often expensive and hard to handle, minimizing some unneeded activities, etc.

Also, as Porter and van der Linde (1995a) argued, earlier environmental improvement efforts were focused on pollution control and after on pollution prevention. But before that, companies and regulators must think about resource productivity when they learn how to frame environmental improvement. They will achieve that if they use their resources in efficient and effective way. So the approach of building the quality into the entire process including, design, components, technologies turned out to be the best solution. Also it showed that total quality management has large potential in reducing pollution and leading to innovative offsets.

A second criticism reflected on a high cost of compliance with new regulations. Again, critics argued that this cost is the evidence that there is a fixed trade-off between regulation and competitiveness. Porter and van der Linde (1995a) considered such opinion wrong because initial estimate of the cost of compliance with new regulations often exceed actual cost. This is because these costs are mostly self reported from industries which are against the rule, which can lead to inflation. Porter and van der Linde here referred to the Clean Air Act debate from 1990

when analysts estimated that burdens on the US economy will reach an amount of over \$100 billion. These predictions turned out to be wrong. Based on the analysis of pulp-and-paper sector actual costs of compliance was \$4.00 to \$5.50 per ton compared to original industry estimates of \$16.40 (Bonsor, McCubbin & Sprague, 1988). Also, these early estimates were wrong because they didn't take into account the possibility of innovation. In many cases net compliance costs were overestimated because they didn't assume innovative benefits.

A third criticism stated that even imposing regulation will encourage innovation it might hurt competitiveness because other productive investments for innovation might be brought out. Porter and van der Linde (1995a) answered that taking into account the incomplete information, limited attention which many companies have devoted to environmental improvements, and poor linkage between pollutions and resource productivity, mentioned above, it's not surprising that marginal benefits from innovations aren't clear enough (dos Santos Vieira, 2001). But, according to Porter and van der Linde (1995a), studies which showed the huge return on this type of innovation supported the view that innovations, as a response to strict environmental regulations, can and will pay off for each company.

In the end, Porter and van der Linde (1995a) point out that they don't think that any strict environmental standard will inevitably lead to innovations and competitiveness. But they believed that with properly crafted regulations and companies which are attuned to the possibilities, innovation to minimize and even offset the cost of compliance is very likely in many circumstances (Porter & van der Linde, 1995a, p. 110).

Besides Porter and van der Linde, there are some other authors (Leonard, 1984; Sanchez, 1992; Canon de Francia, et al., 2007) who also spoke in favor of innovative solutions saying that investing in technological knowledge contribute to the development of innovative solutions which help companies to adopt more easily to the requirements of new environmental regulation.

Leonard (1984) and Sanchez (1992) claimed that more innovative companies which are more intensive in their Research and Development are more likely to answer to a new environmental regulation in an efficient way. Companies which have sufficient technological knowledge will easily adapt to a new strict environmental regulation than companies with less developed technological knowledge. Similarly Canon de Francia, et al. (2007) wanted to prove that greater technological knowledge moderates the vulnerability of companies when faced with new environmental regulation. They investigated how Spanish firms adapt to a new Integrated Pollution Prevention and Control Act from 2002 and they concluded that technological knowledge indeed prepares firms for new environmental regulation. Their main conclusion was: "Managers should take into account the importance of innovation, which enables more efficient adaptation and is less likely to place a firm's competitive position at risk" (Canon de Francia, et al., 2007, p. 308).

1.4 Pollution Haven Hypothesis: Implication for Developing Countries

Besides Porter, there is another, maybe even better known, hypothesis concerning the impact of strict environmental regulations on trade flows called Pollution haven hypothesis. Unlike Porter who argued that stringent environmental regulations could make a positive thing for a company encouraging it to develop an innovative method to meet those regulations, it could be said that Pollution haven hypothesis is a reflection of pessimistic thinking about the impact of environmental regulations on trade. According to Pollution haven hypothesis, an increase in production costs, as a result of the introduction of more strict environmental regulations, will impact negatively on pollution intensive industries because it will increase their costs and, at the same time, lead to increased prices of their products. It also says that this situation will reduce export and harm industrial competitiveness which is the reason why industries, in the case of increased stringency of environmental regulations in a domestic country, will relocate to less regulated developing countries. Eventually, less regulated developing countries will realize a comparative advantage and become so-called 'havens' for world pollution intensive industries. In an environmental sense, this will have a positive impact on the developed countries because, in this way, they will get rid of polluters. But, on the other side, it will have a negative impact on the environment of less regulated developing countries making them more and more polluted each day.

There is no doubt that developing countries see an economic opportunity in pollution intensive industries. They see it for two reasons. First, developing countries can't develop new methods and technologies with which they can introduce or supervise stricter environmental regulations. Second, with low income levels in these countries people are more interested in additional jobs and earnings, and they think less about cleaner environment in which they could live. Also it is quite clear why major developed countries want to displace their pollution intensive industries in developing countries. The main reason is already mentioned. They want to avoid higher production costs which would arise due to strict environmental regulations. Also, taking into account relatively high income levels in developed countries, it is not surprising why they are more interested in cleaner water and fresher air than developing countries. However, the question is whether developed countries will actually succeed to avoid higher production cost in that way. An increase in production costs due to stricter environmental regulations, which is usually cited as the main reason for the relocation of an industry, could also be negligible and thus not so influential. On the other side, even if they succeed in avoiding higher production costs, what will happen with the employees' requirements? There is a possibility that employees in developing countries will ask for compensation for working in environmentally unacceptable conditions. Therefore, additional costs due to these compensations might be higher than production costs which company would have if it remained in its former country. In this case,

relocation of an industry would not have any positive effect for a company. Moreover, it would create a higher cost.

These are all the reasons why Pollution haven hypothesis has been in the centre of interest of so many researchers. However, this work is based on Porter's hypothesis so the empirical analysis in this thesis attempts to refute the assumption that stringent environmental regulations diminish country's export. Stricter environmental regulations, as Porter said, will increase the industrial competitiveness because they will encourage industries to find new appropriate innovative solutions, and not to avoid environmental regulations by relocating to less regulated developing countries.

2. REVIEW OF EMPIRICAL STUDIES

Many studies have been investigating the relationship between the environment and trade. As for the empirical literature, there are plenty of studies that have investigated the influence of trade on the environment. Unfortunately, there weren't so many studies that have dealt with the influence of the stringency of environmental regulations on trade flows. However, all these studies have used different methods, data or indicators of the stringency of environmental regulations. Some of them showed that stringent environmental regulations really affect competitive position of a company and diminish its export. But, on the other side, there have also been many studies which failed to prove that stringent environmental regulations really hurt industrial competitiveness. These are all the reasons why researchers couldn't provide a clear and final position when it comes to the actual impact of strict environmental regulations on trade flows.

An increase in stringency of environmental regulations could have negative impact on country's export to other countries because it could lead to increase in production costs. Higher production costs would result in higher prices of domestic products relative to foreign products, which could ultimately lead to the reduction in export. This was explained by the Pollution haven hypothesis (PHH) which says that an increase in stringency of environmental regulations will diminish export of pollution intensive industries because in the case of more stringent regulations these industries will relocate to less regulated developing country. On the other side, Porter (1991) argued that stringent environmental regulations have a positive impact on a company because they encourage it to be innovative in order to meet those regulations.

Copeland and Taylor (2004) considerably contributed to the theory of environmental regulations and competitiveness. They gave a critical overview of theoretical and empirical literature in order to provide some of the most interesting question such as the relationship between trade, growth and the environment and different policy debates in this field. They came to three important conclusions. The first one is that there is more evidence that higher income levels have positive effect on environmental quality. So, economic growth of one country may not be necessary negatively associated with the environment. Precisely because of the higher income levels people will demand from their authorities to introduce stricter environmental regulations to protect their environment. The second conclusion says that pollution regulations really affect trade and investment. And finally, the third conclusion refers to Pollution haven hypothesis. It says that there is no sufficient evidence which could confirm the Pollution haven hypothesis. Simple, environmental policy does not carry any more costs then other domestic policies. They think that environmental policy should not be overly constrained by trade agreements (Copeland & Taylor, 2004, p.67). However, they argued that question of whether free trade affects positively or negatively the environment demands further empirical research.

As for the empirical part of this issue there have been many influential studies which came to some very interesting results. Some of them were consistent with the positive influence of stricter environmental regulations on exports, while others were against it. Table 1 gives an overview of empirical studies dealing with the impact of environmental regulations on trade flows.

Table 1. Empirical Studies on the Impact of Environmental Regulations on Trade Flows

Author(s)	Research period	Model	Environmental variable	Result(s)
Tobey (1990)	Late 1960s and early 1970s	Heckscher-Ohlin-Vanek model	Survey data rating environmental stringency	No measurable impact of stringent environmental regulations on trade patterns of five most pollution intensive industries
Van Beers and van der Bergh (1997)	1992	Gravity test	Energy intensities and recycling rates	Significant negative effect of strict environmental policies on total trade flows and insignificant effect on 'dirty' trade flows
Haris et. Al (2002)	1990-1996	Gravity test (included additional importers' and exporters' effects and time effects)	Six indicators based on relative energy consumption and supply	With specific effects taking into consideration: <ul style="list-style-type: none"> - An insignificant effect of stringent environmental regulations Without specific effects: <ul style="list-style-type: none"> - No effect (total trade flows) - Positive effect ('dirty' trade flows)
Jug and Mirza (2005)	1996-1999	Gravity test	Abatement costs	Negative effects of strict environmental regulations on exports
Mc Laughlin and Coffey (2009)	2000-2005	Gravity test	Survey data rating environmental stringency	Effects on an increase in stringency of environmental regulations (in general): <ul style="list-style-type: none"> - Positive on exports of high-income EU members - Negative on exports of low-income EU members
De Santis (2011)	1998-2008	Gravity test (included 'multilateral trade resistance index')	-	Positive impact of MEAs membership on exports of 14 EU countries ranging between 22 and 35%.

As it can be seen from Table 1, Tobey (1990) used a cross-section Heckscher-Ohlin-Vanek model which is a multi-commodity extension of the Heckscher-Ohlin model of international trade. Although, he found out that stringent environmental regulations from the late 1960s and early 1970s had no measurable impact on trade patterns of five most pollution intensive industries. It was the first multi-country analysis which investigated the impact of domestic environmental regulations on international trade (van Beers & van den Bergh, 2000).

However, the most influential study in this field was van Beers and van den Bergh's study (1997). This study used a gravity model to investigate the influence of environmental regulations on bilateral trade flows. The research was conducted on the sample of 21 OECD countries in 1992 which they ranked according to the recycling and energy based strictness measures. This van Beers and van den Bergh's study (1997) showed significant effect of strict environmental policies in the case of total trade flows, but an insignificant effect in the case of 'dirty' trade flows which wasn't consistent with the Pollution haven hypothesis. The explanation for this type of result could be found in the fact that too many 'dirty' industries were included in the sample.

Jug and Mirza (2005) also investigated the impact of environmental regulations on trade flows using an empirical gravity test. Their sample included 12 EU importing countries and 19 EU and CEE exporting countries from 1996 to 1999. They used European abatement costs data as the strictness measure of environmental regulations. Their analysis showed a negative effect of strict environmental regulations on export. This effect was very high for Central and Eastern Europe countries when it comes to their export to 15 EU countries. Also, they proved that abatement costs are about equally influential in the case of dirty and clean industries.

According to Harris et al. (2002, p. 388), most studies on different countries, industries and sample periods concluded that environmental costs relative to total production costs are still marginal and have hardly any effect on comparative advantage patterns and therefore on foreign trade. They also investigated the affect of environmental regulations on bilateral trade flows. They used gravity model which included 24 OECD countries from 1990 to 1996 and six environmental indicators based on relative energy consumption and relative energy supply. In addition to the previous studies, they considered exporting and importing countries' fixed effects and time effects. Their analysis gave different results. In models which did not include previously mentioned specific effects, it showed that relative stringency of environmental regulations of the importing country has strong and significant effect on total trade flows. As for the exporting country, it showed that relative stringency of environmental regulations of the exporting country do not have any effect on total trade flows. On the other side, in the case of 'dirty' flows it showed that stringency of environmental regulations of the importing country has negative effect on 'dirty' trade flows, while stringency of environmental regulations of the exporting country has positive effect on 'dirty' trade. Although, when they included exporters' and importers' fixed effects and time effects, the stringency of environmental regulations has proved to be insignificant. So, their main conclusion was that without exporters' and importers'

fixed effects and time effects taking into consideration, there really is a relationship between strict environmental regulations and trade flows. But, after these effects taking into account it seems that the relationship between strict environmental measures and foreign trade starts to fade.

Among more recent studies relating the impact of environment on trade flows, there is an interesting study done by De Santis (2011). De Santis (2011) investigated the impact of three major Multilateral Environmental Agreements (MEAs) on exports from 14 EU countries to their 23 trading partners (14 EU and 10 OECD countries) from 1998 to 2008. He used a gravity model estimation in which he included 'multilateral trade resistance index' in order to examine the effect of possible participation in one of three MAEs. De Santis (2011) came to the conclusion that the membership of MEAs from 1988 to 2008 had a positive impact on exports of 14 EU countries ranging between 22 and 35%. His results rejected the assumption of negative environmental regulations' influence at least for EU members.

Besides the debate regarding the impact of more stringent environmental regulations on trade flows, there is another inspiring debate regarding this area. It is a way of introducing environmental regulations. A way of introducing environmental regulations might also affect the competitiveness of one company. Regarding to the previous, this work mainly address to McLaughlin and Coffey's study from 2009. According to McLaughlin and Coffey (2009) the impact of environmental regulations significantly differ in the case when those regulations are imposed as the result of changes within country itself, and when they are introduced as a result of environmental policy which is beyond an individual country's control. When environmental regulations are imposed due to changes within one country, it could have positive or negative impact on that country's export. On the other side, there is also a case when these regulations are imposed on a regional level, which is often the case when countries are members of some group or union. According to them, regional environmental regulations might have different effect on countries. They mentioned two reasons. The first one they called the 'uneven competitiveness effect'. They explained it as follows: "A given increase in production costs across all countries is a higher percentage increase in production costs for countries that produce low-cost goods than for those that produce high-cost goods" (McLaughlin & Coffey, 2009, p.1). The second reason they named the 'uneven burden of compliance'. Under this they thought that the cost of compliance with new environmental regulations is not very high in the case of high-income countries because they already have some environmental regulations imposed due to strong impact of green parties in those countries. On the other side, this cost of compliance with new stringent regulations might be higher for low-income countries. To prove their point they have done an empirical research using gravity model of trade. The research included 56 countries from 2000 to 2005. In order to get the desired results they divided these countries into two groups 'High Income' and 'Low Income' countries. For the environmental variable they used survey data from World Economic Forum's annual Travel and Tourism Competitiveness Report in which managers from all over the world assessed the stringency of environmental regulations

in their countries. The first group of results was consistent with the first hypothesis which says that an increase in stringency of environmental regulations affect differently on low-income EU member's competitiveness than for low-income non-EU members' competitiveness. An increase in stringency of environmental regulations causes exports from low-income EU members to decrease and from low-income non-EU members to increase. Export from high-income EU and non-EU member countries increases. Also competitiveness of high-income EU countries generally increases more the competitiveness of low-income EU countries. As for the joint effect, in general, exports from all EU countries were highly influenced by an increase in stringency of environmental regulations. When it comes to high-income EU countries their export increases, while the export of low-income EU member countries decreases as a result of increased stringency. According to McLaughlin and Coffey (2009) the results of this analysis suggest possible political interest of high-income EU member countries to impose more stringent regional environmental regulations, but they leave it for some other researchers.

Besides McLaughlin and Coffey (2009), other authors have also studied the effect of unilateral environmental regulations. Charnovitz (1992) emphasized different values and preferences between countries as main argument against harmonization of environmental regulations. He stated that countries are not identical and therefore they shouldn't base their environmental policies on multilateral approval. Unlike them, Steininger (1994) was strongly in favor of international harmonization of environmental regulations seeing it as a way of dealing with competitiveness caused by international environmental problems.

In the end of this chapter it can be concluded that, as Jan Adams said in OECD (1997), there is no clear empirical evidence that high or even relatively high, environmental standards have a systematic negative impact on competitiveness at the macroeconomic or microeconomic level (OECD, 2009, p.31). Lots of studies have been written since then. A number of individual studies have uncovered positive, negative, or neutral impacts resulting from environmental policy. The overall results still remain indecisive (OECD, 2009, p. 29).

3. ENVIRONMENTAL REGULATIONS AND TRADE

3.1 Environmental Taxes

The endangerment of the environment has always led to the need that state should be involved in a program of protection. In the thirteenth century, during the reign of Edward I of England, the state prohibited the use of one type of coal that would protect air from pollution. Later, in the eighteenth century in the United States, the establishments of national parks have been ordered for achieving an ecological balance. The forms of environment disruptions, of that time, were much smaller compared to the pollution in the modern industrial age. The industrial development has resulted that the developed countries of the world were increasingly aware of growing environmental problems. In the last two decades many countries made significant progress in achieving control of industrial raw materials and substances that are actual or potential environmental pollutants. On the other side, there have been some problems of global character such as: the increase of carbon dioxide, sulphur oxides and other harmful substances that destroy the ozone layer and cause climate of growing problems. The state, therefore, has a significant function in protecting the environment.

In recent years, the idea of the use of environmental taxes has become a subject of growing interest in broad social public. According to Markandya and Lehoczki (1994), environmental taxes increase revenue in a way which does not create inefficiencies in the economy. The environmental tax (hereinafter: eco-tax) should be viewed as a regulation method of human behaviour. Eco-taxes are market form of regulation and they are not imposed for the purpose of collection of state revenues. Eco-taxes are very important part of the signaling mechanism for business organizations and other spheres of social life that their environmental actions and attitudes have to change. However, the success of these signals largely depends on the reaction of the receiver signals. It is very important that every package of measures connected to eco-taxes is accompanied by an active program with the primary goal of improving human reaction on the same taxes as well as educating, advocating an alternative finding, investing in infrastructure and etc.

Most packages of measures regarding eco-taxes are focused mainly on conservation of energy and minerals, and reducing pollution. For this purpose, states introduce taxes for penalizing the negative environmental changes, as well as taxes that punish partially or integral alienation, i.e. the isolation of soil and water from nature. Tax on non-renewable energy sources is designed to cross with the use of non-renewable energy sources on renewable. The purpose of such taxes is to discourage the use of fossil fuels. Another role of eco-taxes is to disable a recovery of waste in

the environment and to force the recycling and utilization of waste in a closed production cycle. Taxes related to the disposal of waste material in this and similar cases are divided into two parts. The first part is paid by one who is responsible for the disposal of waste which is created by using a particular product, while the other part is paid by a manufacturer or importer of a product. The amount of such tax is based on the assessment of a product and its potential waste. Sending waste in other countries for the purpose of disposal should be discouraged, while exports of waste for recycling purposes should be carefully and systematically carried out, because this process often leads to collapse of the system of collecting waste in the receiving country. Since the prohibitions of waste export are not in accordance with the rules of the World Trade Organization and here, eco-taxes have main role in the form of export taxes and duties.

The basic forms of eco-taxes were systematized by Opschoor and Voss in OECD (1989) and they are:

- Effluent charges - were founded on the impact of waste discharge into the environment;
- Product charges - where the products that are inputs or outputs of certain manufacturing processes payments are charged on the basis of their impact on the environment;
- User charges - charges for the collective recovery of the costs of environmental impacts;
- Tax differentiation - an application of different tax rates to respond to the activities of greater pollution.

The advantage of effluent charges is that it is closely linked to environmental damage as a result. The collection of these funds is usually organized at the regional level. These costs are not optimal because the relationship between the imposed cost and emissions into the environment is not that strong.

Product charge is somewhat more common form of eco-taxes and applies when the emission cannot be directly monitored. It is based on charging a certain amount by the government for each product. It has the disadvantage that it does not include any relationship between manufacturing processes and pollution. A typical example of this is that two companies, one of which has very high, and the other very low level of pollution in the production process, are paying an equal amount per unit produced. However, this can be avoided in two ways, to be given a discount depending on the technology used or to be offered the subsidies to the companies for installation equipment to reduce emissions into the environment. The product charges are related to fuels, plastic bags, plastic packaging, and fertilizers and pesticides.

User charges are imposed for the collective treatment of pollution. They are applied to problems of water pollution.

Tax differentiation involves tax cuts imposed to friendly activities oriented around the cost of those activities that are cruel towards environment. For example, differentiation of tax used to

promote the transition to the use of unleaded gasoline, as well as to promote the increase of efficiency of energy use in vehicles.

In order to cope with environmental problems, EU member states have adopted more than 200 directives designed for the effective elimination of waste, industrial pollution control, environmental protection and improvement of water and air quality. The pollution does not respect borders, as transmitted through the air and waterways, and so arrives to other territories which have not their sources of pollution. One of the most obvious examples of this is global warming and greenhouse effect. Today's EU policies want not only to improve the quality of water and air that included the protection of land, residence of flora and fauna and conservation of wild birds. A particular problem is a conflict of economic development with environmental protection. Most people have a view that it is a good thing in an environmental and economic sense. However, the second part is opposed to eco-taxes, arguing that they hinder the national economy and decreases the competitiveness of domestic industry in relation to foreign industries.

It is significant to know that even before institutional arranging of environmental taxes, in market economies of the EU and the OECD countries, an economic benefit existed in the system of indirect and direct taxation as a function of environmental protection and pollution control. The eco-tax incentives have been particularly useful in calculating so-called accelerated depreciation of the equipment that protects the environment from pollution. They were complemented by system of special tax duties that had troubled motor fuels, engines and certain specific forms of energy. These duties have been introduced from non-ecological reasons, but during the 1980s (when they were conducted relatively radical tax reform) have acquired an environmental dimension. These are, for example, taxes on motor vehicles, taxes on energy, taxes on plastic bags, taxes on fertilizers and so on.

Today, in almost all European countries, different types of motor fuels are taxed by different tax rates. The lower rate applies to diesel fuel for motor vehicles used for business purposes. Higher tax rates applicable to petrol, unleaded petrol and diesel fuel that is not used for business purposes. The taxation of other energy resources is a different per countries, especially when it comes to environmental tax on energy sources and so-called carbon taxes. The carbon tax on fossil fuels (depending on the carbon content in them) was first introduced by Finland. The release of sulphur during combustion of oil, coal and peat is also a subject to tax depending on the amount of sulphur. In contrast to Finland, Sweden introduced more taxes on carbon. Energy sector introduced ecological tax on oil, coal, and natural gas and liquefied petroleum gas, while the transport sector introduced ecological tax on gasoline and diesel fuel.

Regarding the taxation of motor vehicles, it is timed with the environmental objectives but not in the form of new taxes, but as an additional, already existing sales tax or consumption. As a rule,

the tax on motor traffic is higher than the sales tax of any other product (except of course those who are among the luxury goods). Netherlands as a member of the EU introduced a different system of taxation of motor vehicles. Tax rate depends on the ecological characteristics of the vehicle. The sales tax on vehicles in the UK is taxed on the value added tax and special tax on motor vehicles. Norway is practiced a different system of sales tax on vehicles. Tax incentives are built into the system of taxation of motor vehicles with catalytic converter, but for vehicles that use unleaded gasoline for vehicles that use gas as a driving force. In Finland the system of sales tax varies. It depends on whether the vehicle is supplied with catalytic converters. Otherwise, the motor fuel tax rates have increased since 1990 from the environmental reasons.

Special taxation of certain products is existed in OECD countries for environmental reasons:

- Sweden, Denmark, Finland and Norway introduced tax on beverages in containers and boxes (especially if the boxes are thrown in the garbage);
- Sweden and Norway introduced tax on car accumulators and batteries (especially environmentally damaging batteries that draw higher tax rates);
- Italy introduced tax on plastic bags (especially bags that do not decompose through bacteriological);
- In Denmark, certain products, depending on the environmental characteristics, include VAT tax with differentiated tax rates of 6 to 20%.

In OECD countries, there are taxes of agricultural tax inputs:

- Finland introduced the taxation of phosphate fertilizers on the horizon and taxation of components of nitrogen;
- Sweden introduced 5% relief ecological taxation of fertilizer whose price structure composed the phosphate and nitrogen;
- Austria has tax affected quantities of used fertilizer;
- Norway introduced 7% relief ecological tax wholesale price of fertilizer;
- Sweden introduced the cancellation of the tax burden imposed on each ecological innovation in products.

Finally in almost all OECD countries and EU, eco-tax component is the same as the direct taxes, particularly the taxation of corporations. Investments in clean technology and environmental equipment 'pull' a relatively significant tax privileges in the form of special incentives. Accelerated amortization and tax credits, tax incentives as an additional replacement policies followed older, more polluting, capital equipment, but also new domestic and foreign investment in the ecological sphere of reproduction.

According to Markandya and Lehoczki (1994), in the public finance literature one can find a position that taxes from various activities should be collected into a single fund which can be

used to finance government spending. This means it should be no separation or reservation of funds collected from environmental taxes from other state revenues. The fact which goes in favour of this statement is that if the funds collected from eco-taxes were separated and reserved for environmental investments, there might appear a difficulty because these investments directly depend on revenues from environmental taxes, or tax rates would change depending on the environmental investments, and not on the assessment of environmental damage. In connection of this, it can be said that EU countries have large space for maneuvering of fiscal policy. General tax revenues and payments can be used in other purposes which can lead to distortion of a national economy.

The following Table 2 gives an overview of the proportion of environmental tax revenues in total revenues from taxes and social contributions in EU member countries.

Table 2. The Percentage Rate of Environmental Tax Revenue in Total Revenues from Taxes and Social Contributions

Country	2005	2006	2007	2008	2009
Belgium	5.21	4.84	4.75	4.43	4.66
Bulgaria	9.56	9.43	10.08	10.66	10.48
Czech Republic	7.26	7.04	6.72	6.91	7.23
Denmark	11.76	12.44	11.97	11.88	9.97
Germany	6.35	6.12	5.67	5.57	5.69
Estonia	7.43	7.14	6.99	7.33	8.31
Ireland	8.20	7.75	7.86	8.43	8.39
Greece	6.56	6.35	6.39	6.10	6.52
Spain	5.45	5.13	4.89	4.94	5.35
France	5.12	5.00	4.87	4.79	5.04
Italy	6.74	6.42	6.01	5.67	6.08
Cyprus	9.92	9.04	8.21	8.02	8.23
Latvia	9.13	7.85	6.80	6.74	8.69
Lithuania	8.10	6.15	5.98	5.48	6.98
Luxembourg	7.85	7.33	7.13	7.04	6.61
Hungary	7.28	7.57	6.96	6.70	6.64
Malta	9.75	10.00	10.86	10.19	9.77
Netherlands	10.5	10.34	9.82	9.93	10.42
Austria	6.25	5.96	5.79	5.63	5.69
Poland	8.09	8.15	7.72	7.62	8.05
Portugal	9.41	8.90	8.62	7.81	8.07
Romania	7.24	6.81	7.09	6.35	6.99
Slovenia	8.28	7.85	7.96	8.06	9.47
Slovakia	7.63	7.79	7.23	6.98	6.76
Finland	7.03	6.88	6.39	6.27	6.17
Sweden	5.79	5.62	5.54	5.77	6.02
United Kingdom	6.97	6.54	6.80	6.44	7.44

Note.* Data were used from Eurostat Statistics Database

It can be seen that Bulgaria, Netherlands and Denmark have the largest share of environmental tax revenues in total revenues from taxes and social contributions. Also, Malta and Slovenia are not far away, while France and Belgium are among those EU countries that have the lowest share of environmental tax revenues.

3.2 European Union Environmental Regulations

Serious necessity for protecting the environment has appeared in Europe in middle 50s of the last century. Currently in EU two kinds of sources regarding the environment protection and man's right to healthy environment exist. Those are primary sources and secondary sources. The first group includes Treaties of European Union, among others, The Treaty of Paris from 1951, Treaties of Rome from 1957, the Single European Act from 1986 and the Treaty of Maastricht from 1992. As the data on the state of the environment became alarming in the late 60s, it's completely understandable why Treaties of the fifties do not contain precise provisions in the area of man's right to a healthy environment. Authors of Treaty of Rome from 1951 didn't perceive any common threat so they haven't seen a need for providing a common policy environment protection. It should be noted that this does not applied to the European Atomic Energy Community (or EUROATOM), which reflects to the use and protection from nuclear radiation. However, at the Conference of United States in Stockholm in 1972, it has been realized that a common policy on the environment is really needed. They brought the decision on the implementation of 'Action Programs' in the area of protecting the environment, which should make the protection, preservation and promotion of healthy environment. So far, it has been conducting five action programs in a period from 1973 to 1992.

Single European Act from 1986 which came into force in 1987 contains the confirmation of provision from Treaties of Rome. This Act includes the Chapter VII, which discusses the protection of the environment and introduces lots of novelties in this area. Priority tasks include: protection, promotion and prevention of man's environment, protection of human health and rational use of human resources. The Maastricht Treaty from 1992 devotes Chapter XVII to this issue, which provides high authority for European Union: protection of the environment, rational use and protection of natural resources, protection of human health, need for associating members and making European organizations in order to solve local, regional and planetary problems which have an adversely affect on the environment. The Amsterdam Treaty from 1997 confirms the terms of the Maastricht Treaty in clauses from 174th to 176, but states that it is the imperative that policy of protection man's environment be integrated in communal policy and activities of the Union.

It is currently in force the Sixth Environment Action Programme of the European Community which started in 2002, and will last until 2012. It contains a series of goals and principles, as well as measures and instruments which should be applied in order to realize those goals. Priority areas are:

1. Climate change, reducing emissions, reducing greenhouse effect and reducing pollution levels below the standards recorded in the Kyoto agreement.

2. Protecting biodiversity in order to recover plant and animal species and enable their functioning.
3. Environment and health, or increase the quality of environment to the levels which do not endanger human health.
4. Sustainable management of resources and waste through the rational exploitation of renewable and non-renewable resources, which do not reduce the capacity of the environment, through the waste recycling and increase resources productivity.

Secondary sources include: regulations, decisions and instructions (which constitute the first group of secondary sources), and resolutions, recommendations and opinions (which constitute the second group of secondary sources). At this point it will be mentioned only a few of secondary sources in a protection of: air, water, wild flora and fauna, and noise.

1. In the field of air, one of the most important documents is the Directive 96/62/EC on ambient air quality assessment and management from 1996.
2. In a water protection area, one of the most important documents is certainly Directive 2000/60/EC which established a framework for the Community action in a field of water policy.
3. In a field of endangered plant and animal species, one of the most important documents of EU legislation is the Regulation 338/97/EC on the protection of species and wild fauna and flora through regulation of their trade.
4. In a field of noise protection, the most important document is a Directive 2002/49/EC, relating the assessment and management of environmental noise.

Also, there is a document of the Council of Europe in this field. The Council of Europe is one of the first regional organizations in Europe established after World War II, by the Treaty of London from 1945. The fundamental objectives of the Council of Europe are: alleviating world habits, protection of human rights, introduction of democracy and the rule of law and protection of man's environment. The Council of Europe has brought a number of resolutions, conventions and recommendations relating this area: Convention on the Conservation of European Wildlife and Natural Habitats, Convention on Civil Legal Liability for Damage Resulting from Activities Dangerous to the Environment and etc.

In addition to the previous task, this thesis point out a couple characteristics of EU laws:

- they should be implemented in each country by the date specified in the Regulation;
- they have precedent over state legislation relating the same questions;
- they can't be replaced unilaterally by any EU Member State;

- there may be exceptions for some Member States specified in Regulation.

From an industrial growth perspective, measures oriented towards environmental protection could be seen as obstacles to economic development. Environmentalists believe that industrial growth creates negative effects on the environment, which, today, increases even more with the expansion of industrial activity. There is no doubt that, in the long run, economic potential of production factors will depend, above all, on the environmental conditions (Giannias & Liargovas, 1998). This can be clearly seen from the current situation regarding the effects of accumulated pollution on man's health and land productivity. After this, it can be concluded that economic development and environment should unite in a common framework, from which one can derive mutual benefit. Today, this common concept of economic development and environment is called sustainable development. In this regard, sustainable development is explained by the continuity of economic and social development together with preservation of the environment and rational exploitation of natural resources. Many Commission policy documents explore different issues regarding sustainable development. Also, according to Giannias and Liargovas (1998, p. 88), an integrated environmental policy into regional policy is essential if sustainable development is to succeed. In accordance with this, Article 139 of the Maastricht Treaty claims that it is necessary for all EU policies to make the goals of environmental protection an integrated part of any future strategy.

In the last two decades, the leading position on the international environmental political scene was taken over by the European Union (EU). EU took a major role in promoting Multilateral Environmental Agreements (MEAs) regarding different environmental areas, from climate change, biodiversity to a trade of toxic substances. Today, there are over 250 multilateral environmental agreements dealing with the various environmental issues which are currently in force (De Santis, 2011, p.1). Twenty of them contain provisions which concern trade. Also, EU presents a guide in creating 'green' institutions like World Trade Organization (WTO). However, EU has not always had a leading position in international environmental politics. In the early 1970s United States (hereinafter: US) played this role, and they have been credited for organizing 1972 United Nations Conference on the Human Environment and 1973 Convention on International Trade in Endangered Species (CITES). US were also behind the 1987 Montreal Protocol on Ozone Depleting Substances. The Europe Community (EEC), which was the precursor to the EU, in that time, didn't play a significant role on international environmental scene.

During 1970s and 1980s the influence of green parties was much more significant in Europe than in the US. However, in the 1990s, that influence became weaker in the US and stronger in EU. It could be argued that EU became a leader in international environmental scene thanks to the combination of domestic politics and international regulatory competition (Kelemen, 2010, p.2). Kelemen and Vogel (2007) gave an explanation of this phenomenon. According to them, as the political influence of green pressures is stronger, more stringent are domestic regulations and

more it becomes in the interest of business to support internationalizing those standards. Kelemen (2010, p. 21) claimed the following: “In the 1990s the dramatic increase in power of environmental interests across Europe, and the dynamics of EU policy-making which encouraged harmonization at high levels of environmental protection led the EU to adopt the strongest, most ambitious environmental legislation in the world”. Today, EU is very successful in multilateral environmental governance. It is formed of 27 countries interconnected with common agreements and common objectives. Yet, each member has the final say when it comes to the enforcement of regulations and directives at a national level.

3.3 Environmental Regulations in Transition Countries

Given the fact that a period of transition from central-based to market oriented economies represent a significant part of economic growth strategy of each transition country, there is a common concern that costs of introduction of stricter environmental regulations will indeed reduce a country’s export and so affects its competitiveness. In his review of over 100 articles, Jaffe et al. (1995, p. 157) concluded that there is relatively little evidence that environmental regulations have had a large adverse effect on competitiveness. Despite him, there are still many studies which have come to the same or similar conclusion. Although empirical studies, provide a very good starting point for understanding the aggregate relationship between environmental regulations and export, environmental policy makers in developing and transition countries are often asked more detailed and forward-looking questions about the impacts of their existing and proposed environmental regulations on export (Larson, 2000, p. 535).

Taking into account so many problems facing governments in transition countries, like unemployment, uncertain economic growth and serious social problems, no wonder why problems related to the protection of the environment are not on the top of their priorities. Having in mind that environmental policy takes an important place in EU strategies, it is clear why transition countries, which have ambitions to be part of the EU, are increasingly deciding in incorporation environmental issues in their decision making processes.

Thus, certain problems characterize transition countries and many of them are still undergoing economic crises. These problems are precisely the reason why environmental managers in transition countries access management tools in a different way than managers from developed countries. They are also a reason why instruments from developed countries cannot be used in the same or similar way in developing countries.

Primary problem of transition countries are old technologies developed for previous centrally oriented structures. What these countries need to do is to develop more environmentally friendly structures. Also, some transition countries are characterized by higher rates of inflation and

inflationary expectations. Although, the situation had improved, inflation rates in some transition countries are still higher than in most developed countries. There is no doubt that such high rates of inflation have an adverse affect on country's investment attractiveness and reduce incentives for technological innovation. Also, environmental benefits are rarely a subject of consideration and governments often are unwilling to pay for environmental services. In many cases markets in transition countries are not developed enough. Because of such poor management systems environmental degradation, unfortunately, becomes an inevitable factor.

Simply put, problems related to environmentally protection do not represent a priority for transition economies in recent years. Power of those involved in protection of the environment gets weaker. Environmentally regulatory systems have either disappeared or became victims of industrial lobbies. This case occurred with the State Environmental Committee in Russia. After it was found it was taken by the Ministry of Natural Resources, whose main objective was to use natural resources in a profitable way. Therefore, its priority was not to protect the environment. This Ministry was so uninterested in environmental management, that industrial lobby succeeded in convincing lawmakers to set aside pollution fees. In addition to that, environmental protection curses were expelled from school programs, which decreased already low public interest for environmental protection. There is no doubt that, in the case of such lack of care, an impact on the environment in Russia and other transition countries which applied similar polices, will be even bigger and stronger.

Unfortunately, what many transition countries cannot see is the fact that, despite operating under-capacity and facing difficulties in allocation of scarce resources, transition countries can enhance the quality of their environment by improving their operational efficiency. The problem is that environmental managers, in many cases, do not take into account the advantages of cost-benefit analysis, so they cannot see real benefits from an efficient use of resources and rational decision making regarding environment. Also, what is even more important and urgent, is a necessity for simultaneous construction of market and environmental institutions. Transition countries must improve their institutional capacities at firm level and at the level of government. New entrepreneurs must understand the importance of environmental responsibility. The ideal moment for building a strong sense of responsibility for environmental protection is precisely during the transition from state to private ownership (Golub, Dudek & Strukova, 2003, p. 1).

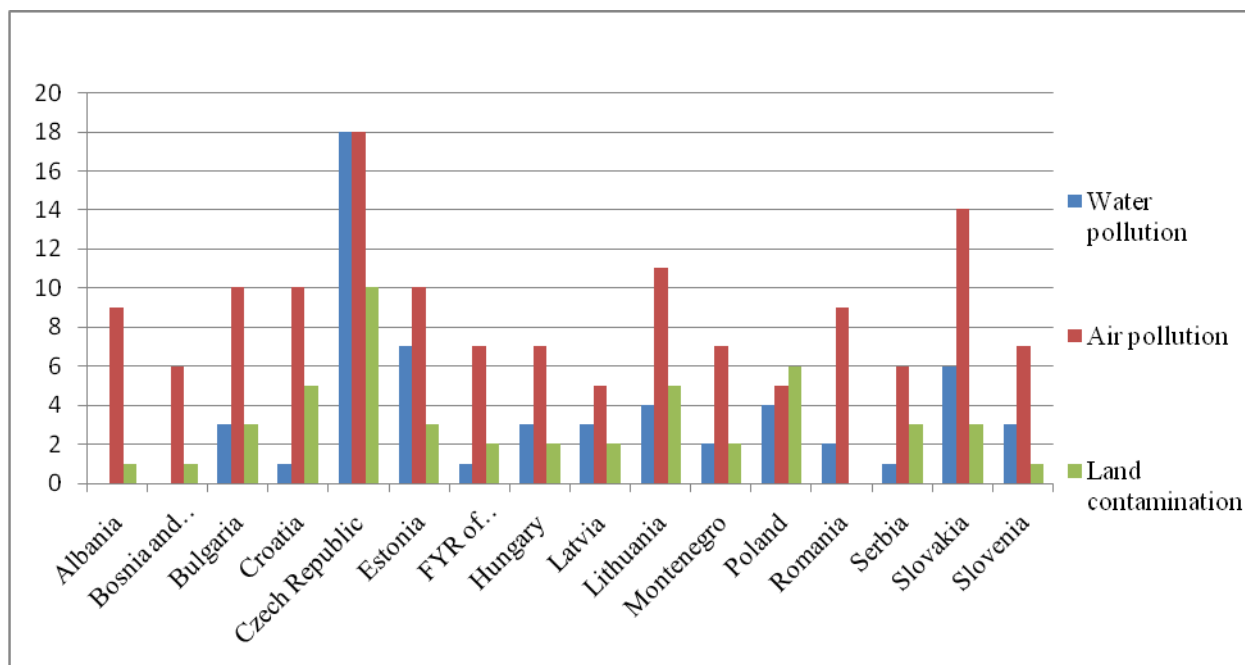
When it comes to environmental tools, it is very important for transition countries to choose the right and appropriate environmental tool and to do it very carefully. In doing so, environmental managers should not be convinced that some environmental tools will necessary be too 'expensive' for them. The evidence is the US SO₂ trading program. US SO₂ trading program could serve for transition governments as a successful case in which a very ambitious goal was met using least-costly approach. Also, China was very careful in introducing their environmental regulations. It used so-called 'crossing the river by touching the stone method'. At first, China applied its environmental regulations to certain cities and regions, and when its government

became more convinced in the value of these regulations, it expanded the circle. Economists and policy makers from Western Europe considered that transition countries, in general, should use pollution charges for controlling pollution (Sand, 1987). They believed that pollution charges will represent a significant advantage for transition countries, because of their previous experience with those instruments. However, according to Soderholm (1999, p. 4) pollution charges will produce few to no incentive effects in CEE countries as long as they do not make fundamental changes in economic and legal institutions. Institutions are based on informal constraints on human behavior, such as conventions and norms, and not only on formal rules such as laws, regulations (North, 1990). In his paper Soderholm (1999, p. 13) used the example of Russia to show that without viable economic and social institutions, neither economic incentives, nor any other type of control strategy, will have much effect on the environmental degradation in Russia. He states that if there is a necessity for introducing environmental regulations, it is smarter for transition economy to introduce lax environmental regulations in the beginning. Later, with developed environmental agencies in terms of higher budgets and greater power of compliance with new regulations, and developed market institutions as well, it could be possible to introduce stricter environmental regulations such as pollution charges and tradable permit schemes. This was also the case with many developed countries. At first, they imposed environmental taxation, and only after a while, input taxes and quantitative regulations. Also, there is no need to stress how it is important to think in the long term when it comes to these regulations. Imposing regulations in a short term will yield only limited results.

Figure 2 gives an overview of all environmentally related taxes, fees/charges and other economic instruments and voluntary approaches used to address water pollution, air pollution and land contamination in transition economies¹.

¹ These transition economies relate to sixteenth countries from Central and Eastern Europe which will be incorporated in the empirical analysis later in this work.

Figure 2. Environmentally Related Taxes, Fees/Charges and Other Economic Instruments and Voluntary Approaches in Central and Eastern Europe Transition Countries



Note. * Data for these countries were taken from OECD database. This database was updated in different years depending on a country. Last update was made in February 2011 for Czech Republic.

Of course, there are so many others domains which environmental policy regulate. For the purpose of this work, Figure 2 separate three domains in order to compare the representation of environmental regulations in different countries.

As it can be seen in the Figure 2, Czech Republic has the largest number of different environmental instruments related to all three areas. As for the water pollution regulations, Czech Republic is followed by Estonia, Slovakia, Poland and Lithuania. The highest number of environmentally related instruments in domain of air pollution has Slovakia and Lithuania. And as for land contamination regulations there are Poland, Croatia and Lithuania.

4. EMPIRICAL ANALYSIS: EXPORTS IN CENTRAL AND EASTERN EUROPE COUNTRIES

4.1 Methodology

The empirical analysis in this thesis uses the gravity model of trade. Recently, this model has been used for lots of very influential empirical studies related to this topic (van Beers & van den Bergh, 1992; Harris et al. 2002; Jug & Mirza, 2005; Mc Laughlin & Coffey, 2009). In their studies they expanded the basic gravity of trade model with different variables to ‘capture’ the effect of environmental regulations on trade between different states.

The main problem of most empirical studies that have investigated the impact of environmental regulations on trade was to look for an adequate variable that could measure the strictness of environmental regulations. According to Jug and Mirza (2005), with previously used proxies for environmental regulation stringency there was a greater chance for the introduction of endogeneity to the estimates. The reason is that most studies mainly used outcome measures as proxies for environmental regulation stringency. For example, van Beers and van den Bergh (1997) used data on energy intensities and recycling rates for the indicator of environmental stringency of OECD countries. Also, Jug and Mirza (2005) used pollution abatement cost measures. So, in order to avoid this, Mc Laughlin and Coffey (2009) used survey data rating environmental stringency from World Economic Forum’s Travel and Tourism Competitiveness Reports. These reports were based on surveys in which they asked thousands of executives from all over the world to rate their countries’ environmental regulation stringency. McLaughlin and Coffey (2009) used these survey data especially because they wanted to avoid possible endogeneity. However, using these data as proxies for environmental regulation stringency had another advantage for their empirical analysis. These reports enabled them to include more non-EU members and less developed countries into their analysis, which they wouldn’t include if they had used some other environmental indicators.

This empirical analysis uses a gravity model similar to one used by Mc Laughlin and Coffey (2009). In addition, the empirical analysis attempts to use data published by Eurostat, which refers to information about the state of the environment in the observed countries in the sample (environmental tax revenue and environmental protection expenditure). The sample includes the CEE countries, depending on the availability of data for variables that will be included in the econometric model. Also, the research uses an average data in order to avoid fluctuations due to changes in export for different years. Using this gravity model of trade this thesis tries to prove that stricter environmental regulations have positive and significant impact on exports as well as that an increase in stringency of environmental regulations has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries.

Because of the better understanding, the next section of this thesis provides an overall explanation of the importance and use of gravity model for the purpose of different analysis. The thesis pays special attention to the analysis of trade flows of transition countries as well as the analysis of the effect of strict environmental regulations on trade.

4.2 Gravity Model

In its simplest form, gravity model states that bilateral flow between two countries is proportional to those countries' economic size (often used population size or GDP), while, on the other side, it is inversely proportional to the distance between them. Thus, as two countries have larger population or higher GDP, and as they are closer to each other, it may be expected that those countries have higher volume of mutual trade.

Previously mentioned Newton's 'Law of Universal Gravitation' states that the force of gravity between two objects can be represented as in the equation (1):

$$F_{ij} = G \times \frac{M_i M_j}{D_{ij}^2} \quad (1)$$

Where:

F_{ij} = the force of gravity

G = gravitational constant

M_i = mass of object i

M_j = mass of object j and

D_{ij} = distance between objects.

In 1962 Dutch economist Jan Tinbergen was first to use the gravity model, similar to this Newton's model. He suggested that similar form should be used in the analysis of international trade flows. Since Tinbergen, different analysis regarding tourism, migrations, foreign direct investments and, of course, the influence of environmental regulations on international trade have been used gravity model. Equation (2) shows the expression of gravity model of trade:

$$F_{ij} = G \times \frac{M_i M_j}{D_{ij}^2} \quad (2)$$

But, where:

F_{ij} = the flow between destination i to destination j (it also can represent all flows between these two destination, in both directions)

M_i and M_j = relative economic sizes of observed locations (in export analysis, M_i and M_j mainly represent the size of GDP of each country)

D_{ij} = the distance between two countries, often measured as the distance between capital cities.

Now it can be seen why gravity model is so similar to the Newton's 'Law of Universal Gravitation'. After Tinbergen, Linnemann (1966) added more variables to the gravity model expanded its theoretical aspect. According to him, gravity model should include three more factors:

- ✓ total export from a country to the world market
- ✓ total imports from a country to the word market
- ✓ factors which represent some kind of obstacle to trade and thus affect the intensity of trade flows (Paas, 2000)

He examined trade flows among 80 countries in 1959. There were about 6000 trade flows with imports and exports treated separately. This Linnemann's analysis showed clear results regarding trade between countries inside and outside blocs. It showed how many times trade flows between countries within a bloc are greater than between countries outside the bloc which are approximately the same size. This hypothesis supports the second hypothesis of this thesis which states that there are significant differences in the effects of increased stringency of environmental regulations on export in the case of EU member countries and non-EU member countries.

However, after introduced by Tinbergen, gravity model was empirically tested and then connected with analysis of international trade flows. The assumption of Heckscher-Ohlin theory turned out to be wrong because of so-called 'border effect'. This 'border effect' assumes that prices of products across borders won't be the same. And it is true. They won't. Anderson (1979) was first to use the assumption of product differentiation between countries. He helped to clarify the presence of income variable in gravity equation and its log linear form. His gravity equation can be represented as in equation (3):

$$M_{ijk} = \alpha_k Y_i^{\beta k} Y_j^{\gamma k} N_i^{\xi k} N_j^{\varepsilon k} d_{ij}^{\mu k} U_{ijk} \quad (3)$$

Where:

M_{ijk} = the flow of products or factor k from country/region i to country/region j

Y_i, Y_j = incomes in i and j

N_i, N_j = populations in i and j

d_{ij} = the distance between i and j

U_{ijk} = lognormal distributive error term with $E(\ln U_{ijk}) = 0$.

This Anderson's model was adapted by Bergstrand (1985) who came to the conclusion that price could be a significant variable that should be included in gravity equation.

In his later study Bergstrand (1989), together with Helpman (1987), used monopolistic competition model of new trade theory to provide additional theoretical explanations of gravity model. They believed that there is a product differentiation among companies rather than among countries. Helpman (1987) stated that specific resources and knowledge of companies such as marketing and R&D can be used for the production in other countries, and not just in origin country in which these inputs are already using. In this case differentiation between countries is replaced with product differentiations between companies.

According to the previous, it can be concluded that gravity model is compatible with some settings of Heckscher-Ohlin model and its theoretical context which include differentiation of origin countries and product differentiation of companies. Also, there are other gravity models which do not depend on the specialization, like in Haveman and Hummels's study (2004). In their study they looked on trade limits through the distance based on transportation costs and trade barriers related to the choice of economic policies. However it can be concluded that gravity model together with all his foundations gave an enormous contribution to the econometric analysis in the area of international trade, but also in many other areas.

Given the fact that the focus of this master thesis are transitional CEE countries, it should be point out what are the advantages of using this model in analyzing trade flows of transition countries.

The advantage of using the gravity of trade model for placing transition processes in foreign trade is the ability of this model to explain international trade patterns under the conditions of comparatively little data and for validity of theoretical background of the model to the economies in transition (Paas, 2000, p. 634). The research section of this thesis provides confirmation to this statement. All data used for the gravity model which analyzes the impact of environmental regulations on export of transition countries, were available and easily accessible. Therefore, one of the greatest advantages of gravity model, related to trade theory, is the ability to explain increased trade flows in the context of international trade flows. Namely, trade theory provides an explanation of why countries trade different products, but do not give the explanation why trade links between certain countries are stronger, and why the intensity of these trade flows increases overtime (Rahman, 2003). The gravity model of trade provides this

explanation because it allows researchers to include more factors in order to explain the size of trade flows and their growth on international level.

Those are the reasons why researchers who analyzed trade flows of transition countries have widely used this model during their processes of transition in the early 1990s. Countries members of European Free Trade Association and countries from Central and Eastern Europe (CEE) were in the centre of this analysis. In this context, it is significant to mention Wang and Winters (1991). In their book 'Foreign trade relations between the EFTA and CEE countries' from 1991, Wang and Winters used gravity model which included 76 non CEE countries and analyzed the period from 1884 to 1986. Results showed that potential trade turnover between CEE and EFTA countries were much greater than actual turnover (Paas, 2000). For Bulgaria, for example, this gap was 30% and for Hungary 650%. After, Baldwin (1993,1994) upgrade their model saying that trade flows between two countries also depend on GDP of those countries, their populations, the distance between them, and a variety of dummies. He said that gravity model used to have poor reputation among reputable economists (Paas, 2000).

In the mid 1990s, more attention was paid to the development of trade relations between developed and transition countries, as well as to the integration of CEE and Baltic countries in EU (Cornett & Iversen, 1988). Empirical and similar analysis showed that gravity model, despite its simplicity, has proven to be a very useful tool for exploring transition and integration processes in international trade. Taking this into the fact, together with previously mentioned advantage that gravity model needs little comparatively little data and that these data are usually available, no wonder why so many economists have used gravity model for predicting and testing changes of trade flow patterns of transition countries.

When it comes to the use of gravity model in studies which explore the impact of environmental regulations on trade flows, it could be said that these studies didn't succeed in finding support for the common belief which states that countries, despite becoming more polluted, will introduce less stringent environmental regulations in order to reduce their production costs and increase their export.

Van Beers and van den Bergh (1997) used gravity model to test the effect of stringency of environmental regulations on bilateral trade flows. They created their own indicator of stringency of environmental regulations and ranked OECD countries according to strictness of their environmental policies. Their analysis showed significant effect of strict environmental regulations in the case of total trade flows, but an insignificant effect in the case of dirty trade flows.

Harris et al. (2002, p.404) claimed the following: "The impact of environmental policies on foreign trade cannot be assessed properly without importing and exporting country effects and time effects". They argued that it seems that there may be a connection between more stringent

regulations and foreign trade, but that without effects mentioned above, this relationship slightly disappear.

Also, Jug and Mirza (2005) modified gravity estimation and introduced European abatement costs data as a measure of environmental stringency. Their gravity model showed that environmental stringency is relevant for the export of Eastern Europe countries, because EU member countries are more sensitive on imports from developing countries. Also, in their analysis they showed that abatement costs are not less harmful for cleaner than for dirty industries (Jug & Mirza, 2005).

As it can be seen above, none of this analysis showed that relationship between environmental regulations and trade is so robust. As Jug and Mirza (2005, p. 1612) said: “There might exist many other positive effect on trade that are produced by more stringent environmental regulations, such as increases in perceived quality by the consumer, or investment in new pollution-free technologies by producers, two factor that could end up by favorable to trade and welfare”.

It remains to be seen what kind of results will give the gravity model in this work. Is it really true that stricter environmental regulations of the exporting country have positive and significant impact on exports? Is it true that the impact of an increase in environmental regulation stringency is more negatively related to exports of non-EU countries relative to exports of EU countries? The next section of this master thesis provides an overall explanation of these two questions.

4.3 Data Sources

As mentioned above, the empirical part of this thesis investigates the influence of environmental regulations on export of CEE transition countries. It includes a sample of 16 countries from 2007 to 2009, listed in Table 3. It should be mentioned that, although 8 of these 16 countries have completed the transition process², the empirical analysis considers them because of the second hypothesis, which refers to the export of EU member and non-EU member countries. All data regarding export of these countries were available and easy to reach for. But, when it comes to environmental variables, there have been some difficulties. In the case of survey data rating environmental stringency from World Economic Forum's Travel and Tourism Competitiveness Reports, these reports provide all data. However, in the case of environmental protection expenditure, data exists only for 10 EU countries and Croatia and, there are no data for each year of the observation time period. Also, in the case of environmental tax revenue data exist only for 10 EU countries but, again, there are no data for all years of the observation period. Simply, Eurostat did not realize required data for those countries. Therefore, the selected period of observation, depends on the availability of data on export and variables that ranked countries according to their environmental policies.

² According to the European Bank for Reconstruction and Development

Table 3. Central and Eastern Europe Countries from the Sample

Country	Country's position in relation to the EU
Albania	Potential candidate
Bosnia & Herzegovina	Potential candidate
Bulgaria	Member
Croatia	Candidate
Czech Republic	Member
Estonia	Member
Hungary	Member
Latvia	Member
Lithuania	Member
Former Republic of Macedonia	Candidate
Montenegro	Candidate
Poland	Member
Romania	Member
Serbia	Candidate
Slovenia	Member
Slovakia	Member

Note. * European Union' website provides data from the second column, which concerns EU membership.

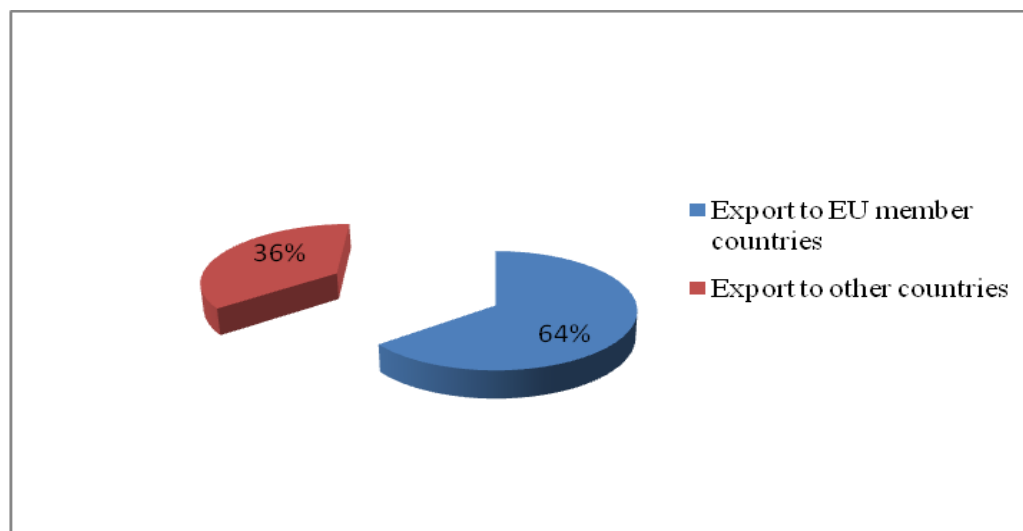
Dependent Variable

Dependent variable in this empirical analysis is an annual value of exports from country i to country j . As for the exporting countries, the analysis considers a sample of 16 CEE countries, of which 10 countries are in the EU, 4 of them are candidate countries and 2 of them are potential candidate countries.³ This analysis constructs each observation as an average of bilateral trade relations between these 16 CEE countries and their 10 largest export partners from all over the world in a period from 2007 to 2009. The analysis uses an average data in order to avoid fluctuations due to changes in export for different years. Regarding export partners for countries from the sample, it ranks them according to data from 2009, after which data for 2007 and 2008

³ According to the European Union website

were simply picked up from different sources which are specified later. It turned out that export partners of observed countries were mainly EU member countries. Certainly it is not surprising for countries which are members of EU, but it represents an interesting finding regarding Balkan countries⁴. Figure 3 presents the proportion of export from Balkan countries to EU member countries and other countries according to data from World Trade Organization portal.

Figure 3. Graphic Representation of the 2009 Total Export of Six Balkan Transition Countries



Note.* Percentages relate to merchandise export of observed countries.

The empirical analysis uses the Eurostat statistic database as main source of data for the dependent variable. It seems obvious to use this database because it provides the most comprehensive and detailed overview of data for most European countries. There were also alternative sources like IMF online Data and Statistics and different statistic agencies from given countries. The research uses data from these statistic agencies in the case of Balkan countries (Albania, Bosnia and Herzegovina, Croatia, Former Republic of Macedonia, Montenegro and Serbia), given that Eurostat does not provide such detailed data regarding export partners of these countries. However, it can be concluded that all data relating export of countries in the sample were easily and fully available so there were no problems regarding this variable.

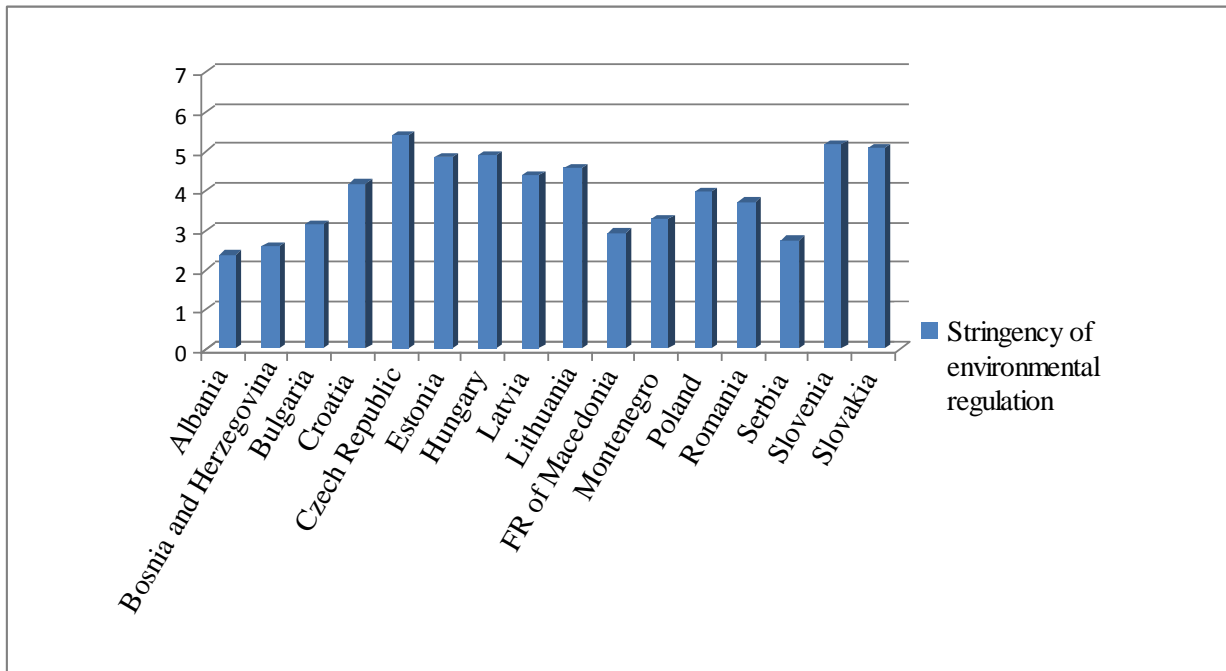
⁴ These Balkan countries include: Albania, Bosnia & Herzegovina, Croatia, FR of Macedonia, Montenegro and Serbia.

Independent Variables

Environmental Regulation Stringency Variable

Environmental regulation stringency variable was one of three variables used in this work for 'capturing' the environmental effect on export of 16 CEE countries from the sample. This variable came from World Economic Forum's Travel and Tourism Competitiveness Reports which ranks countries all over the world according to the level of stringency of their environmental regulations. These reports were based on surveys in which they asked thousands of executives from all over the world to rate their countries' environmental regulation stringency, compared to all other countries. Each of them had to rank their country's environmental regulation stringency according to the scale 1-7 where 1 relates for 'very lax' and 7 for 'very stringent' environmental regulations. This variable has proven to be the most appropriate variable for this type of analysis because of two reasons. The first one is that it was the only variable available for all countries from a sample for a given period of time. The second reason is that it reflects the perception of those countries' managers themselves. So it might be the most reliable indicator of real stringency of environmental regulations. It's expected that coefficient on this variable has a positive sign, which would mean that with increased stringency of environmental regulations a country increased its export as well. Figure 4 shows CEE countries according to the stringency of each country's environmental regulations.

Figure 4. Central and Eastern Europe Countries According to the Stringency of Each Country's Environmental Regulations



Note. * Data in Figure 4 represent an average values of environmental regulation stringency scores from World Economic Forum's Travel and Tourism Competitiveness Reports 2007, 2008 and 2009.

As we can see from Figure 4, managers in Czech Republic, Slovakia and Slovenia assessed the stringency of their environmental regulations with the highest scores. As for the Balkan transition countries, Albania, Bosnia & Herzegovina, FR of Macedonia and Serbia turned out to have the lowest scores, below 3. Montenegro's score, on the other side, is above 3, and Croatia's score is even higher, above 4.

Environmental Tax Revenue

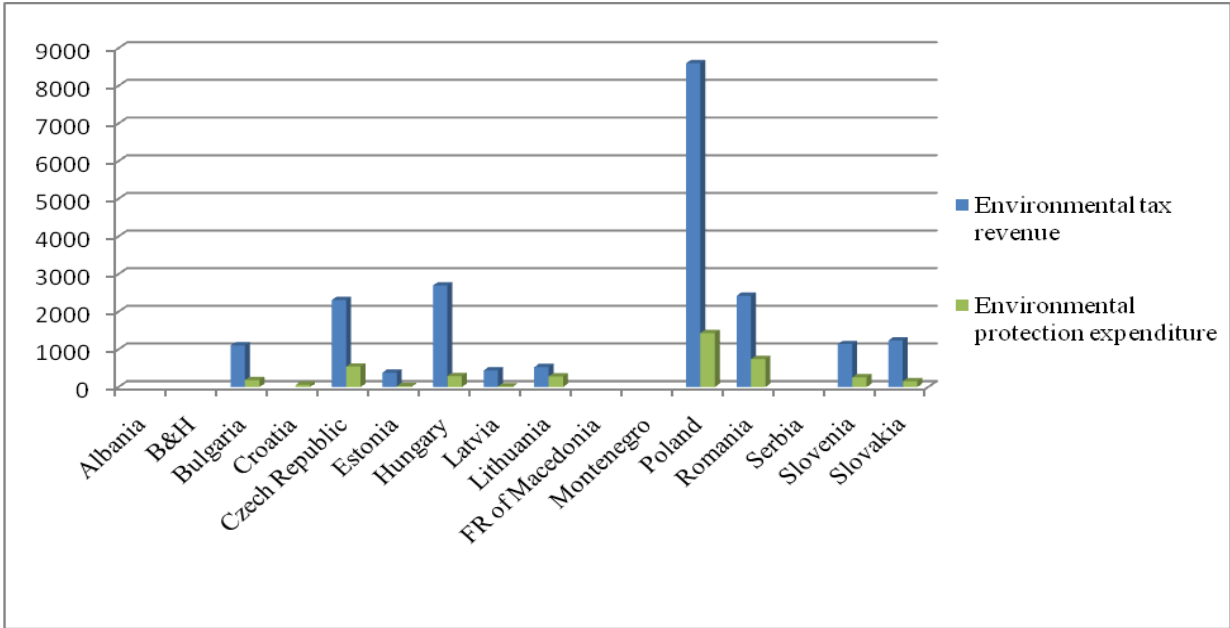
The second environmental variable is environmental tax revenue. Eurostat online database provides data for this variable. Unfortunately, Eurostat provides incomplete data regarding this variable. In a period from 2007 to 2009 only data for 10 EU countries are available. However, as it can be seen in Table 5, there is a high level of correlation of environmental tax revenue variable and GDP variable, so this variable is not included in the model.

Environmental Protection Expenditure

Environmental protection expenditure is a third environmental variable. It represents total investments and total environmental expenditure for a country. Eurostat provides environmental protection expenditure data only for 10 EU countries and Croatia for a given period of time. Eurostat does not provide data for Serbia, Albania, FR of Macedonia, Montenegro, Bosnia and Herzegovina. However, there is one more important reason why this variable is not included into the model. As it was the case with the previously mentioned environmental tax revenue, also provided by Eurostat, there is, again, a high level of correlation of the environmental protection expenditure variable and GDP variable. This can be seen in Table 5. So, the initial plan to use these two variables for comparison purposes was abandoned, because of the high level of correlation between these variables and GDP variable.

Figure 5 shows CEE countries ranked according to data on Environmental tax revenue and Environmental protection expenditure published by Eurostat. It should be mentioned once again that Eurostat does not provide data for some countries, so columns for those data do not exist in the Figure 5.

Figure 5. Central and Eastern Europe Countries According to Data on Environmental Tax Revenue and Environmental Protection Expenditure Published by Eurostat



Note. *Data in Figure 5 represent average values of observed data for a period from 2007 to 2009.

Figure 5 points a large gap between environmental tax revenue and environmental protection expenditure, which leads us to think that, although, for some of these countries, the awareness of environmental protection is at a very high level, they still don't spend all of their environmental revenues on the protection of their own environment. This gap is particularly visible in the case of Poland.

Gross Domestic Product (GDP)

Gravity model of this analysis also use GDP data. It is expected that coefficient on this variable has positive sign because it seems obvious that trade flow between two countries increases with the increase in GDP of these countries. Data on GDP were taken exclusively from Eurostat online database.

Geographical Distance

As previously explained by the gravity of trade model, bilateral trade flows are proportional to the size of both countries, but inversely proportional to geographical distance between them. For this reason, it is expected that coefficient on this variable has negative sign. This would mean that export decreases with greater geographical distance between trading partners. Krugman (1980) explained why distance has negative effect on trade flows in general, but didn't say anything about particular role of geographical distance. The analysis in this work will include this variable because geographical distance may indeed affect trade flows between countries in terms of transportation and other transaction costs. Distance variable may be particularly important for transition countries because transportation and other transaction costs might put more stress on their budgets then it would be the case with developed EU countries. Geographical distance between trading partners was calculated by the Distance calculator from www.timeanddata.com. It is an air distance between capital cities of two countries.

Table 4 provides the results of measurement for all variable used in the gravity model in this analysis.

Table 4. Results of Measurement

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
Export_av	160	1834.15100	3639.2020000	3.35600	28081.73
GDPi_av	160	62410.15000	80013.5400000	2915.70000	328191.20
GDPj_av	160	943200.30000	1501911.0000000	2883.05000	9983187.00
Distance	160	978.27500	1315.4420000	56.00000	9344.00
Environmental regulation stringency_av	160	3.94375	.9771476	2.36667	5.40
Environmental tax revenue_av	160	2085.39600	2325.8320000	381.78670	8596.92
Environmental protection expenditure_av	160	362.31940	400.1644000	17.62350	1433.77

*Note.** Av stands for average value.

Unfortunately, two environmental variables (environmental protection expenditure and environmental tax revenue) cannot be used because there is a high level of correlation of these variables and GDP. This can be seen in Table 5 Correlation Matrix.

Table 5. Correlation Matrix

	GDPiavln	GDPjavln	DISln	STRAVln	INTER- TERM	ENTAXav	ENVPRav
GDPiavln	1.0000						
GDPjavln	0.2883	1.0000					
DISln	0.1364	0.6374	1.0000				
STRAVln	0.5267	0.2307	-0.0264	1.0000			
INTERT~M	-0.5788	-0.2577	-0.0931	-0.6324	1.0000		
ENTAXav	0.8458	0.1177	0.1168	-0.2052	-	1.0000	
ENVPRav	0.8621	0.1074	0.1353	-0.2179	-0.2411	0.9391	1.0000

4.4 Model Specification

The main goal of this analysis is to determine whether stricter environmental regulations of the exporting country have positive and significant impact on exports and whether an increase in stringency of environmental regulations has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries.

As already said, it will be determined by applying the gravity model of trade. That gravity model can be presented with the following equation (4):

$$\ln EXP_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 STRAV_i + \beta_4 STRAV_i * nonEU_i + \beta_5 DIS_{ij} + \varepsilon_i \quad (4)$$

Where

EXP_{ij} = value of exports from country i to country j

GDP_i = GDP in country i

GDP_j = GDP in country j

$STRAV_i$ = stringency of environmental regulation in country i in a given time period

$STRAV_i * nonEU_i$ = interaction term (INTERTERM)

DIS_{ij} = distance between country i and country j

ε_i = error term

It should be noted that variables related to exports, GDP and stringency of environmental regulations are the average values of variables in given period of time.

The first hypothesis says that stricter environmental regulations of the exporting country have positive and significant impact on exports. This hypothesis would be confirmed if it turned out that the coefficient β_3 on $STRAV_i$ is significant and positive. In accordance with this, it is expected that coefficient β_3 has positive sign, which would indicate that stricter environmental regulations of the exporting country result in an increase in exports of that country to their

trading partners, other factors remain the same. This situation could be explained by a fact that countries will undoubtedly prefer to import from countries with higher environmental regulations. On the other side, a negative value of this coefficient would indicate that environmental regulations of a country i affect negatively on that country's export. This would mean that higher production costs, which emerged due to environmental regulations, will make that country less competitive on the international market.

The second hypothesis which states that an increase in stringency of environmental regulations has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries will be tested thanks to the coefficient β_4 on $STRAV_i * nonEU_i$. Coefficient β_4 on the interaction term $STRAV_i * nonEU_i$ added to the coefficient on $STRAV_i$, β_3 estimates the effect of increased stringency of environmental regulations of country i on its export, taking into account that country i is a member of European Union. This analysis chooses an Ordinary Least Squares (OLS) method of estimation as an appropriate technique because of the use of cross sectional data.

4.5 Results

This section explains estimated coefficients for the export determinants for all Central and Eastern Europe transition countries from the sample. Because of the cross-sectional data this analysis uses the Ordinary Least Squares Regression (hereinafter: OLS). The following Table 6 presents estimated results of the gravity model without interaction term $STRAV * nonEU_i$.

Table 6. Results of Gravity Model

Coefficients (standard errors)	
GDPIAVLN	1.060**
	(0.064)
GDPJAVLN	0.217***
	(0.067)
DISLN	- 0.619***
	(0.148)
STRAVLN	1.305***
	(0.309)
Constant	- 5.115***
	(0.773)
R-squared	0.80
Adjusted R-squared	0.80
Probability > F	105.32***

Note. * 1) Standard errors are in parentheses.

2) ***, **, and * represent significance at 1, 5, and 10 percent, respectively.

3) Ordinary Least Squares Estimation with robust standard errors for heteroskedasticity – HC3).

4) All variables in logs.

In accordance with the assumption of the regression model the diagnostic tests suggest the assumptions of heteroscedasticity at 5 or 10% level of significance cannot be rejected so it reports coefficients for heteroscedasticity-corrected OLS.⁵

⁵ An evaluation by Long and Ervin (2000) suggests that HC3 is the best, especially in small samples. The thesis used Stata 11 and Microfit for all analyses.

Table 6 shows positive values for the coefficients on GDP and environmental regulation stringency. It also shows a negative value for the coefficient on geographical distance. Results of the t-test show that all three variables are significant for the model, which indicates that they very much contribute to changes in exports as the dependent variable. However, results for GDP and geographical distance were expected. Normally, with greater geographical distance between country i and country j , the export from country i decreases. After all, this fact is provided by the definition of gravity model itself.

However, considering that one of the main goals of this thesis is to prove the hypothesis that the stricter environmental regulations of the exporting country have positive and significant impact on exports, the coefficient on environmental regulation stringency is the most important coefficient in this analysis. Table 6 presents positive value of this coefficient which certainly speaks in favor of this hypothesis. The results show that if the stringency of environmental regulations in the exporting country increases by 1%, exports will increase by 1.31%. So, it can be concluded that the first hypothesis in this thesis is confirmed. Stricter environmental regulations of the exporting country have positive and significant impact on export.

After the empirical analysis of this thesis tested a model, which emphasized the effects of stricter environmental regulations on export of transition countries in general, it inserted the interaction term $STRAV * nonEU_i$ to separate the effect of these regulations on the export of EU and non-EU transition countries. This particular model was constructed in order to test the second hypothesis which says that an increase in stringency of environmental regulations has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries.

The results of the extended gravity model with the interaction term $STRAV * nonEU_i$ are given in Table 7.

Table 7. Results of Gravity Model (Including Interaction Term)

Coefficients (standard errors)	
GDPIAVLN	0.999*** (0.065)
GDPJAVLN	0.213*** (0.066)
DISLN	- 0.630*** (0.142)
STRAVLN	0.909*** (0.360)
STRAV*nonEU	- 0.152*** (0.053)
Constant	-3.660*** (0.898)
R-squared	0.81
Adjusted R-squared	0.79
Probability > F	86.20***

Note. * 1) Standard errors are in parentheses.

2) ***, **, and * represent significance at 1, 5, and 10 percent, respectively

3) Ordinary Least Squares Estimation with robust standard errors for heteroskedasticity – HC3).

4) All variables in logs.

Table 7 shows similar results when it comes to GDP and geographical distance. Values of β coefficients show that export from country i to country j increases with greater GDP of these countries, while it decreases with greater geographical distance between them. Because of the negative sign the results indicate that an increase in stringency of environmental regulations results in higher increase in export of EU member countries and lower increase in export of non-EU member countries. The results for stringency of environmental regulation variable in the case of EU member countries is 0,909 while for the non EU member countries is 0,757 statistically significant at the 1 percent level.⁶ So, it can be concluded that the second hypothesis is also confirmed. An increase in stringency of environmental regulation has greater marginal effect on

⁶ The coefficient estimates for the interaction term should be added to the estimates on coefficient for STRAVLN in Table 7 for estimates of the effect on exports of an increase in environmental regulation stringency for non-EU members.

exports in the case of EU member countries than in the case of non-EU member countries, because the export from non-EU countries increases less than export from EU countries.

CONCLUSIONS AND POLICY IMPLICATIONS

Taking into account that world today is characterized by high levels of industrial development and serious climate changes, no wonder why environmental regulations play an increasingly serious role in the preservation of man's environment. When it comes to theoretical and empirical findings on the impact of environmental regulations on export, a positive effect of these regulations has been questioned. These doubts are mostly associated with an increase in production costs arising from environmental taxes and other environmental measures. However, the empirical part of this thesis came to the conclusion that an increase in stringency of environmental regulations indeed has a positive and significant impact on exports, at least for countries undergoing a transition period.

This thesis consists of theoretical and empirical part. The theoretical part explains some of the basic classical and neo-classical theories of trade with special reference to Porter's Competitive advantage theory. The main reason why special attention was paid to Porter's theory is that Porter speaks in favor of stricter environmental regulations, saying that such regulations create an opportunity for a company to develop itself and to create innovative solutions. It is clear that Porter's statement supports the main hypothesis of this thesis which says that stricter environmental regulations of the exporting country have positive and significant impact on exports. It also contains a brief review of some of the most important studies that have examined the relationship between environmental regulations, trade and competitiveness. Theoretical studies mostly stress the negative impact of environmental regulations, representing a view that such regulations have negative impact on exports. However, empirical studies gave mixed results. According to most empirical studies, environmental regulations not only to have a positive impact on export but also stimulate it. Generally, there is no clear position on whether environmental regulations have positive, negative or neutral impact on trade flows. Neither statement is clearly rejected nor accepted.

To obtain a complete picture about the state in environmental politics the theoretical part also refers to the environmental regulations in EU and transition countries. It could be seen that, in the last two decades, EU has become the leader in international environmental politics. EU succeeded thanks to their green parties whose influence became much stronger than the influence of green parties from the United States, a former leader in environmental politics. As for the transition countries, having in mind all their problems such as old technologies, under-developed market structures, different social problems, no wonder why environmental issues are not at the top of their priorities. But transition countries today become more aware of the benefits of EU member countries. Therefore they are willing to do anything to be part of it. What is necessary for them is to incorporate environmental issues into their decision processes. The most important thing for them is to select the most appropriate tools and to do that in a right way.

As for the empirical part of this thesis, its goal was to examine the influence of environmental regulations on export in transition countries and to make a comparison with the same influence in the case of developed EU countries. The analysis uses gravity model of trade as the most appropriate model for this kind of analysis. The sample includes 16 Central and Eastern Europe transition countries and data relate to the period from 2007 to 2009. As for the environmental stringency variable the analysis uses survey data rating environmental stringency from World Economic Forum's Travel and Tourism Competitiveness Report. It turned out that these data were the most appropriate for the environmental variable because they reflected the individual attitude of managers from a given country. Also, these data were available for all countries from the sample which further facilitate the research process. Data for other variables (export, geographical distance, GDP) were also available and easy to reach for. Eurostat provided data for exports and GDP. Geographical distance is considered to be an important variable because of the possible greater influence of transportation and transaction costs in the case of already weakened budgets of transition countries. These data were also available on the internet.

The first hypothesis of this thesis says that stricter environmental regulations of the exporting country have positive and significant impact on exports. The empirical analysis, conducted on the sample of 16 Central and Eastern Europe transition countries, has reached the conclusion that regardless of whether the exporting country is a member of EU or not, an increase in stringency of environmental regulations really has a positive impact on the export of that country. So, in this case, there is a place for the Porter's hypothesis which speaks in favor of stricter environmental regulations. Countries will continue to import from their trading partners despite higher environmental regulations and negative effects of transition process itself. The obtained results can be interpreted through the increase of innovation for companies in countries with stricter environmental regulations. Today countries are willing to pay more for so called 'green' products, which speaks in favor of the fact that prevention and protection of the environment and man's health are at the respectable high level.

As for the second hypothesis which states that the an increase in stringency of environmental regulation has greater marginal effect on exports in the case of EU member countries than in the case of non-EU member countries, analysis also leads to positive results. EU membership in fact does change the effect of environmental regulations of EU export. When it comes to an increase in stringency of environmental regulations, it increases the exports in both cases, but this increase in exports is higher in the case of EU member countries than it is in the case of non-EU member countries. There are lots of facts which could speak in favor of these findings. It is possible that developed technologies, stable governments and higher consumer preferences regarding 'green' products in developed EU countries, neutralize negative effects which came from higher production costs due to more stringent environmental regulations. Also, countries will import from EU member countries despite higher regulations, because they are more confident in their products. Of course, this confidence is based on the fact that these countries are in such influential group like the European Union.

Therefore, taking into account the findings of this thesis, the introduction of environmental regulations, if done properly, can have a huge positive impact on country's export and thus improve its economic development. Also, this conclusion should not disregard the power of regional blocs such as the European Union. Many countries are afraid of the consequences of the stricter environmental measures imposed by powerful regional blocs. They believe that with self regulation of their domestic environmental policies they may affect the competitiveness by lowering environmental measures when they think it's necessary. However the results show the opposite. Not only that, more stringent environmental regulations have positive impact on exports, moreover, this impact is evidently higher in the case of EU countries, than in the case of non-EU countries. So, EU membership could definitely be an additional motive for Balkan countries and for other non-EU countries, to make 'one step further' when it comes to their environmental policies, and impose more stringent environmental regulations.

It could be argued that this thesis provides a complete explanation of the importance of environmental measures for man's health and the environment, and clarifies the importance of imposing more stringent environmental regulations for the export and the economy of each country, regardless of whether that country is a member of the EU or not. Also, this work raises some new questions and provides opportunities for further research. Other researchers could investigate the influence of environmental regulations on export in the case of different industries, less or more polluting. It may encourage policy creators to think about imposing more stringent environmental regulations in transition and especially in Balkan countries, and thereby make not just a healthier place for life, but also an enormous opportunity for further economic development of these countries and their integration into powerful trading blocs such as the European Union.

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APPENDIXES

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Appendix 1: The Results of OLS Regression Estimation (without Interaction Term)

Linear regression

Number of obs = 160

F(4, 155) = 105.32

Prob > F = 0.0000

R-squared = 0.8038

Root MSE = .80714

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```

	Robust HC3					
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EXPAVLN						
GDPIAVLN	1.060595	.0642116	16.52	0.000	.9337519	1.187438
GDPJAVLN	.2175122	.0670808	3.24	0.001	.0850017	.3500226
STRAVLN	1.305055	.3090655	4.22	0.000	.6945313	1.915579
DISLN	-.6199749	.1483865	-4.18	0.000	-.9130957	-.3268541
_cons	-5.115183	.7730696	-6.62	0.000	-6.642295	-3.588071

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```

Appendix 2: Diagnostic Tests

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

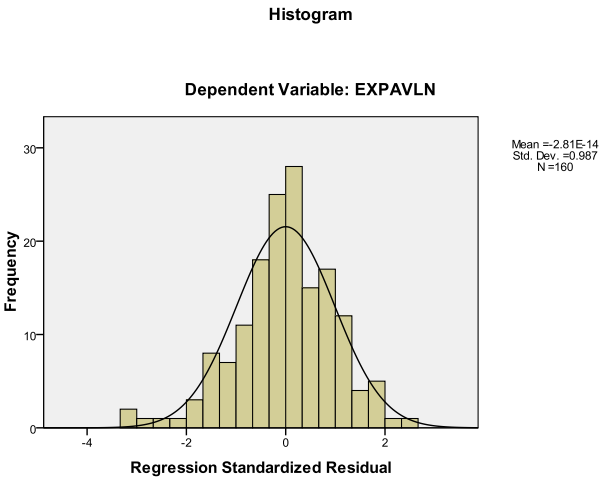
Ho: Constant variance

Variables: fitted values of EXPAVLN

chi2(1) = 33.01

Prob > chi2 = 0.0000

Variable	VIF	1/VIF
GDPJAVLN	1.90	0.525368
DISLN	1.79	0.559940
STRAVLN	1.48	0.677912
GDPIAVLN	1.45	0.690727
Mean VIF	1.65	



Appendix 3: The Results of OLS Regression Estimation (with Interaction Term)

Linear regression

Number of obs = 160

F(5, 154) = 86.20

Prob > F = 0.0000

R-squared = 0.8121

Root MSE = .79249

```

-----
                |               Robust HC3
                |               Coef.   Std. Err.   t   P>|t|   [95% Conf. Interval]
-----+-----
GDPIAVLN |   .9991866   .0650958   15.35   0.000   .8705907   1.127783
GDPJAVLN |   .2135011   .0661177    3.23   0.002   .0828864   .3441158
STRAVLN  |   .9090684   .3605446    2.52   0.013   .1968168   1.62132
DISLN    |  -.6302525   .1421868   -4.43   0.000  -.9111407  -.3493642
INTERTERM | -.1520583   .0532629   -2.85   0.005  -.2572785  -.0468381
_cons    | -3.660095   .8984595   -4.07   0.000  -5.434991  -1.885199
-----

```

Appendix 4: Diagnostic Tests

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of EXPAVLN

chi2(1) = 38.05

Prob > chi2 = 0.0000

Variable	VIF	1/VIF
INTERTERM	1.95	0.512334
GDPJAVLN	1.91	0.524726
STRAVLN	1.88	0.532215
DISLN	1.79	0.559016
GDPIAVLN	1.65	0.605123
Mean VIF	1.84	

