Hungarian University of Agriculture and Life Sciences

The Analysis of Relevant Indicators and the Effects of Multilateral Environmental Agreements on the Economy

The Thesis of the PhD dissertation

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CONTENTS

1. BACKGROUND OF THE WORK AND ITS AIMS

1.1. Introduction

For our world the Sun is by far the largest source of ultraviolet radiation. Solar emissions include radiation from the visible light, heat, and ultraviolet (UV). Much as visible light consists of different colours that are apparent in a rainbow, the spectrum of UV radiation is divided into three regions called UVA, UVB, and UVC. When sunlight moves through the atmosphere, ozone, water vapour, oxygen, and carbon dioxide absorb all UVC, and much UVB. UVA is not absorbed by the environment as greatly.

The ozone layer serves as a natural shield, blocking most ultraviolet rays from the Sun. The depletion of stratospheric ozone leads to an increase in UV-B which reaches the surface of the Earth where it can disrupt biological processes and damage a number of materials.

Human actions since before the 1980s have had a major impact on the production and distribution of stratospheric ozone globally. When the extent of ozone depletion over Antarctica was revealed, the international community quickly came to an agreement on what needed to be done. If the problem had been left unchecked, ozone-depleting chemicals would have continued to accumulate in the atmosphere, increasing the size of the Antarctic ozone hole and thinning the ozone layer elsewhere: if the problem had been left unchecked, populated areas in the south, such as New Zealand and Australia, and in the north, would have seen significant increases in UV radiation exposure. Through the 1970s and the 1980s, the international community became increasingly concerned that ozone depleting substances (ODS) would harm the ozone layer. In 1985, the Vienna Convention for the Protection of the Ozone Layer formalized international cooperation on this issue. This cooperation resulted in the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. The Montreal Protocol is the landmark multilateral environmental agreement governing the production and use of nearly 100 man-made chemicals, known as ozone depleting substances.

Emissions of greenhouse gases, particularly carbon dioxide and methane, are the primary cause of present climate change. When fossil fuels are burned, these are mostly discharged. Meat and dairy farming, cement manufacture, and other industrial operations, such as fertiliser production and consumption, all produce greenhouse gases. Climate change has different effects in different places. Although the earth is generally warming, some locations and seasons might be briefly cooler. Seasons will be longer in certain regions, while extreme weather will be concentrated in others. The Framework Convention on Climate Change is the first binding international instrument to address the issue of climate change directly. The Convention was adopted at the 1992 Rio Earth Summit and entered into force in 1994, when it was ratified by more than 160 nations.

The Kyoto Protocol is the next major milestone in climate legislation. The Kyoto Protocol was signed in 1997. It took effect in 2005 after a lengthy ratification procedure. The Kyoto Protocol now has 192 signatories. The Kyoto Protocol puts the United Nations Framework Convention on Climate Change (UNFCCC) into action by committing industrialized countries to restrict and reduce greenhouse gas (GHG) emissions in accordance with individually agreed-upon targets.

1.2. Aims

The objective of the dissertation is to deal with the economic impact of international environmental agreements. In the first segment I explore the development, function, characteristics and the problems of international agreements. I put special emphasis on the environment-related agreements. In the following section I will focus on the economic effects of these agreements by analysing GDP growth.. The dissertation covers two specific environmental problems. The first one is ozone depletion, the second is greenhouse gas emission. Both environmental problems were caused by human activities. The impact of these phenomena can be disastrous for our planet. Fortunately we recognised the importance of these issues and measures were taken to prevent the harmful effects. These measures were defined in legal documents, this paper concentrates on the economic impacts of the regulation. The world had a difficult choice in 1987, between the costs of protecting and restoring the ozone layer and the

costs of doing nothing and living with the consequences. Costs occur when limits on the usage of CFCs and halons are imposed. There are also costs of implementing and dealing with policy enabling regulations.

Economic trade relations between countries would transmit the impact of greenhouse gas reduction steps taken by a group of nations to countries that may not have agreed to share the regulation burdens. For example, pollution restrictions under the Kyoto Protocol would increase the cost of using carbon-emitting fuels to developed regions, thus increasing the cost of exporting their energy-intensive products, some of which may be exported into developing countries. The restrictions would also limit global demand for carbon-emitting fuels, pushing down their international prices. Furthermore, emission controls that depress economic activity in countries subject to emission restrictions, reducing the demand for imports from those countries, some of which come from developing countries. Such changes in trade volumes and prices may have dynamic effects in turn, affecting some developed countries while benefiting others.

I have formulated my research questions as follows:

1. What is the relationship between oil price and economic growth on countries with different development level?

2. Do carbon abatement policies have impact on GDP growth?

3. Have carbon abatement policies had impact on petroleum, natural gas, coal and renewable energy use?

4. Has the ratification of Montreal Protocol had an impact on the atmosphere?

5. Has the ratification of Kyoto Protocol had an impact on the atmosphere?

6. Is there a relationship between the development level of a country and the number of international agreements the country ratified?

7. Is there a relationship between the rule of law status of a country and the number of international agreements the country ratified?

To answer my research questions I have defined my hypotheses as follows:

H1: The impact of oil price changes on GDP growth is less significant in developed countries, and this impact is more significant in developing countries.

H2: Applying carbon abatement policies will reduce GDP growth in developed countries, but it will rise GDP growth in developing countries.

H3: By applying carbon abatement policies total petroleum and coal use will drop and natural gas and renewable energy use will intensify in both developed and developing countries.

H4: The Montreal Protocol and its extensions on Substances that Deplete the Ozone Layer have reduced ozone depleting substances in the atmosphere and have produced significant environmental benefits to protect the earth's ozone layer.

H5: The Kyoto Protocol and its extensions to the United Nations Framework Convention on Climate Change have reduced greenhouse gas substances in the atmosphere and have produced significant environmental benefits to protect global warming. The Protocol has played a significant role in the reshaping the economy of developed and developing economies.

H6A: Developed countries are more involved in international environmental agreements than developing countries.

H6B: Participation in international environmental agreements is related to the rule of law in a country. Countries with higher rule of law index are involved in larger amount of international agreements.

1.3. The background of the work

Environmental protection has been a major issue around the globe since the middle of the 20th century. Air pollution, lack of clean drinking water, and disposal of toxic materials, soil degradation, global climate change and the loss of biodiversity have created widespread demands for preventive and remedial action to ensure that natural conditions remain conducive to life

and human well-being. Policymakers reacting to these demands have accepted the need to tackle environmental protection in a comprehensive and inclusive way. Local issues cannot be isolated from developments at state, international, or even global levels (SHELTON-KISS 2007).

A de facto 'framework' of international environmental law and governance has widely been recognized (FREESTONE 1994; BOYLE 1999; NAJAM 2004; BODANSKY 2006). However this recognition has not always existed. From the fourteenth century on the European continent, environmental diplomacy evolved cautiously through bilateral agreements (between England and Portugal, England and France, etc.) for the management of fishery resources. Several of those deals examined the access to some territories and rivers in Europe and North America during the seventeenth and eighteenth centuries. In addition to these particular resource and territorial arrangements, it was only in the nineteenth century that the world took on a more multilateral aspect (BALZACQ et al. 2020).

Antarctic explorers reported observations of peculiar veil-type clouds in the polar stratosphere as early as 1912, although they could not have realized how important those clouds would become at the time. In 1956, in preparation for the 1957 International Geophysical Year the British Antarctic Survey established the Halley Bay Observatory on Antarctica. Measurements of the ozone using a Dobson spectrophotometer started that year. Such measurements provided the initial hints that the ozone layer was having trouble (NASA 2018).

Concerns about the possible destruction of the ozone layer by human activities were first raised about supersonic transport in the early 1970s. While initial scientific research on stratospheric chlorine did not draw conclusive conclusions in Europe and the United States, they gained public interest, and a political debate on ozone erupted. One of the problems and contradictions between actors was that there was a need for scientific evidence to justify policy action to protect the ozone layer (PARSON 2003).

The Montreal Protocol aimed to achieve a 50 % reduction in both output and consumption of the ODSs. This target was upgraded in 1990 to achieve a complete phase-out of these ODSs by the year 2000. In addition, the protocol gave developing countries special conditions so as not to hinder

progress in their growth. Repeated international agreements, consultations on different draft proposals, and compromises in the final agreement to meet individual countries' unique needs and desires can be viewed as a effective diplomatic mechanism (ANDERSEN-SARMA 2002). One year after the entry into force of the protocol in 1990, fifty-eight parties had signed it, which accounted for 90 % of global CFC and halon production and consumption. Over time, new countries have joined, and the Montreal Protocol has at present achieved universal adoption by 197 parties. One critical feature of the Montreal Protocol was its effectiveness in resolving the issues of collective action. Widespread involvement was essential, as no major consumers or producers of ODSs could remain outside the agreement if the agreement was to work. The treaty contained trade provisions to avoid the transfer of production facilities to countries that did not join the agreement, and to create an opportunity to participate. Those regulations restricted trade with non-parties in CFCs and ODSs (WETTESTAD 2002).

Climate change" and "global warming" are often used interchangeably but are of distinct significance. Global warming is the long-term heating of the Earth's climate system observed since the pre-industrial period (between 1850 and 1900) as a result of human activities, mainly the combustion of fossil fuel, which raises the heat-trapping greenhouse gas levels in the Earth's air

It was concluded (RHODE 2019) that 2019 was Earth's second warmest year since 1850. In 2019 the global mean temperature was cooler than in 2016, but warmer than any other year explicitly measured. Consequently, 2016 is still the warmest year in historical observation history. Year-to-year rankings are likely to reflect natural fluctuations in the short term but the overall pattern remains consistent with a long-term global warming trend. This would be predicted from global warming caused by greenhouse gases, temperature increase across the globe is broadly spread, impacting almost all areas of land and oceans. In 2019, 88 percent of the Earth's atmosphere was slightly warmer than the 1951-1980 average temperature (RHODE 2019).

General history of the issue of climate change (CLARK-DICKSON 2001; WEART 2003; HECHT 1995) typically starts with ARRHENIUS (1896) or earlier scientific studies. But it wasn't until the mid-1970s that a larger group of experts, including policy-makers, started to concentrate on how, when, and how to reduce warming. In the late 1980s, climate-change plans

coalesced into two somewhat different strategies, one focused on environmental priorities, and the other based on political and economic viability. The feasibility strategy was inspired by the 1987 Montreal Protocol (BENEDICK 1998; AGRAWALA 1999). The problem seemed to be more alarming year by year. Nations have realised that international cooperation is a must in order to tackle the harmful impact of the toxic gas emissions.

The following milestone in climate regulation is linked to Kyoto Protocol. In1997 the Kyoto Protocol was adopted. It came into force in 2005, because of a complex ratification process. Currently the Kyoto Protocol has 192 Parties. The Kyoto Protocol operationalizes the United Nations Framework Convention on Climate (UNFCCC) Change by committing industrialized countries to limit and reduce emissions of greenhouse gases (GHGs) in line with agreed individual targets. The Convention itself only calls on those countries to adopt mitigation policies and measures and to report regularly. The Kyoto Protocol is based on the Convention's principles and rules, and maintains its annex-based structure. It only links developing countries and imposes a heavier burden on them under the " common but differentiated responsibility and respective capabilities" concept, as it acknowledges that they are primarily responsible for the current high rates of atmospheric GHG emissions.

2. MATERIALS AND METHODS

I have decided to use secondary research to examine the relationship between oil prices and various macroeconomic variables. I chose this type of research method because I expected to gain insights into methods and findings from previous studies, which would help me define my own research process. Secondary research also aids in identifying knowledge gaps that can be used to name my own research. Secondary research is a common method of conducting a systematic investigation in which the researcher relies solely on previously collected data during the research process. In order to reach valid research conclusions, this research design includes organising, collating, and analysing data samples.

Secondary research, also known as desk research, is the process of synthesising existing data from the internet, peer-reviewed journals, textbooks, government archives, and libraries. The secondary researcher looks at previously established patterns in previous studies and applies that knowledge to the specific research context. Secondary research entails assimilating data from multiple sources, i.e., using existing research materials rather than creating a new pool of data using primary research methods. Data collection via the internet, libraries, archives, schools, and organisational reports are all common secondary research methods. I have decided to use online data for my analysis. The term "online data" refers to information obtained through the use of the internet.

Qualitative research provides insights and understanding into a problem setting. It is an unstructured, exploratory research method that studies highly complex phenomena that quantitative research cannot explain. It does, however, generate ideas or hypotheses for future quantitative research. On the basis of observation and interpretation, qualitative research is used to gain an in-depth understanding of human behaviour, experience, attitudes, intentions, and motivations. It is a type of research in which the researcher gives more weight to the participants' opinions. Qualitative research methods include case studies, grounded theory, ethnography, history, and phenomenology.

Quantitative research is a type of research that uses natural science methods to generate numerical data and hard facts. It seeks to establish a cause-and-effect relationship between two variables through the use of mathematical,

computational, and statistical methods. Because the research can be accurately and precisely measured, it is also known as empirical research.

The data gathered by the researcher can be classified or ranked, or it can be measured in terms of units of measurement. With the help of quantitative research, raw data graphs and tables can be created, making it easier for the researcher to analyse the results.

Because my research topic is entirely data-driven, I chose a quantitative secondary research method for my analysis.

In my dissertation, I primarily sought answers to my hypotheses and focused on the six hypotheses by analysing them using various statistical indicators. The data used in the study were gathered from a number of international statistical public databases. Every year, BRITISH PETROL (2019) publishes the Statistical Review of World Energy for the preceding period, and I used the 2019 issue. Another large set of data was gathered from the World Development Indicators (WDI 2019) database. This database is the WORLD BANK's premier compilation (2019). The database contains 1,600 time series indicators for 217 economies and more than 40 country groups, with data for many indicators dating back more than 50 years. It is the most widely used database because it works with a wide range of indicators. This information is available to the public and can be accessed in a variety of ways. Some sections include ready-made statistical indicators, while others collect data beginning in 1968. The database also makes use of graphical representations, which have been used to test some hypotheses. Because both publications and sources are based on internationally accepted and secure data, I have met the research's reliability requirement. Because the WDI database is based on a conversion to the 2010 US dollar, my research also met the objectivity criteria.

With the publication of its first annual Human Development Report (HDR) and the introduction of the Human Development Index in 1990, the United Nations Development Program (UNDP) changed the landscape of development theory, measurement, and policy. HDR 1990 presented the concept of "human development" as progress toward greater human well-being.

During my research I used HDI index, the data were collected from Human Development Report 2020. The HDI was created to emphasise that people and their capabilities, rather than economic growth alone, should be the ultimate criterion for assessing a country's development. The HDI can also

be used to question national policy choices, such as how two countries with the same per capita GNP can have such disparities in human development outcomes. These contrasts can spark discussion about the government's policy priorities.

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development, such as living a long and healthy life, being knowledgeable, and having a good standard of living. The HDI is the geometric mean of the normalised indices for each dimension.

The HDI simplifies and captures only a portion of what it means to be human. It makes no mention of inequalities, poverty, human security, empowerment, or other issues. The HDRO provides the other composite indices as a broader proxy for some of the most important issues in human development, such as inequality, gender disparity, and poverty.

I started my study by selecting the groups of countries I want to study based on the Human Development Report. The selection was based on the HDR 2020 (HDR 2020) list, where the countries were ranked according to several criteria. I chose the 2020 data because the indicators that form the basis of the methodology are always the numbers that form the basis of the previous year and the 2021 data were not yet public at the beginning of my research.

The Human Development Report distinguishes 4 groups of country categories:

1. Very high human development
2. High human development
3. Medium human development
4. Low human development

As the medium and low group included a total of as many countries as the high and several underdeveloped, small or newly formed underdeveloped countries, it was very difficult to choose from them. That is why I decided to merge the medium and low categories and examine them together.

3. RESULTS AND DISCUSSION

3.1. The analysis of hypothesis 1

H1: The impact of oil price changes on GDP growth is less significant in developed countries, and this impact is more significant in developing countries.

I first examined the time-series figures to see what kind of relationship I can discover. As I have plotted the two data sets in parallel in Figure 1, it can be seen that until 2004, although there was a large difference between the two factors examined, they nevertheless moved in parallel. Then, oil prices soared and the mean GDP growth hit a low one year later in 2009 and then the two data under review begin to move in the opposite direction. As oil prices are rising, GDP growth is falling, and from 2016 onwards, they are moving parallel. Further statistical studies are needed to examine this relationship.

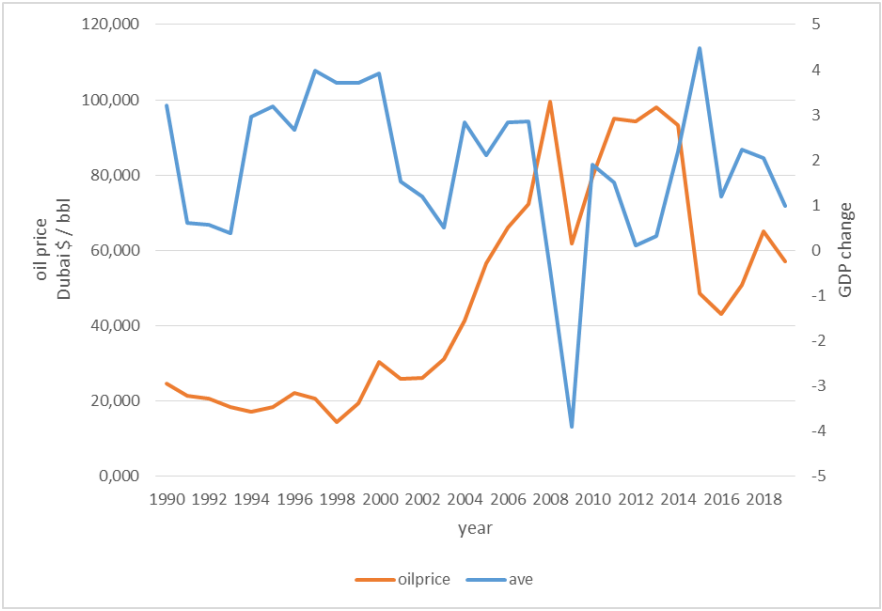

Figure 1: The relationship of oil price and mean GDP growth in very high human development countries
Source: Author's own editing based on WDI 2020

I began my statistical studies by examining the relationship between the price of oil and the mean GDP growth. Table 1 shows that the relationship is very low based on the annual changes, oil, and mean GDP growth, with a significance level of 0.237 for each factor examined, meaning that there is a very low relationship among them.

Table 1: Chi-Square Tests of very high human development countries

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	870,000[a]	841	,237
Likelihood Ratio	204,072	841	1,000
N of Valid Cases	30		

a. 900 cells (100,0%) have expected count less than 5. The minimum expected count is 03.

Source: Author's own editing based on WDI 2020

According to the results the price of oil and GDP at several points seem to move together with a minimal time difference as shown in Figure 2. The most striking phenomenon is that from 1990 onwards a loose relationship appears, then they develop in a distinct parallel way until 2009, and then it seems that the opposite movement can be observed.

This assumes that GDP growth is more affected by oil price developments than in very high human development countries. But this, of course, needs to be further explored and further statistical indicators need to be examined.

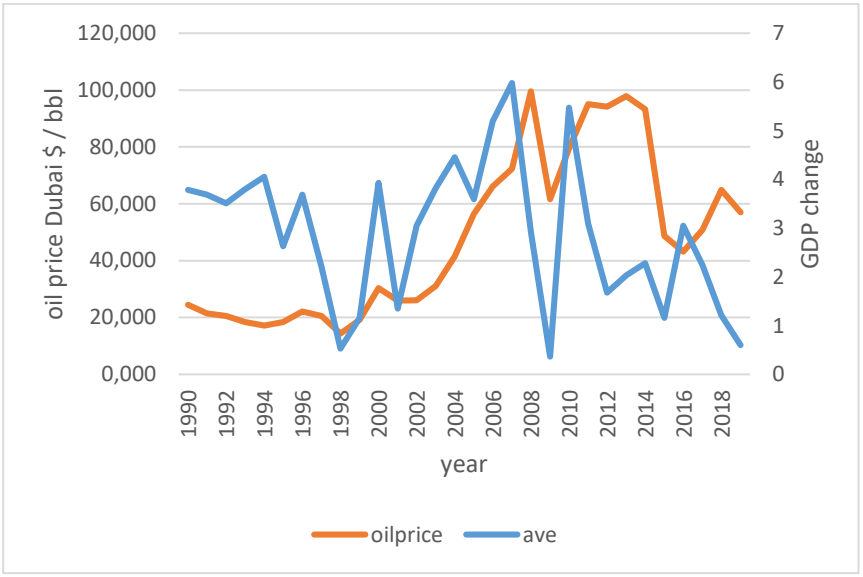

Figure 2: The relationship of oil price and mean GDP growth in high human development countries
Source: Author's own editing based on WDI 2020

As Figure 2 suggests, GDP is more affected by changes in oil prices in high countries than in very high countries.

To confirm the relationship, I first examined the value of the chi-square test as in shown in Table 4. This assumes a relationship between oil prices and 2GDP that is perceptible but not strong.

Table 2: Chi-Square Tests of very high human development countries

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	930,000[a]	900	,237
Likelihood Ratio	212,907	900	1,000
N of Valid Cases	31		

a. 961 cells (100,0%) have expected count less than 5. The minimum expected count is 03.

Source: Author's own editing based on WDI 2020

Continuing my research, I examined how the annual oil price and mean GDP growth in the low and medium human development countries developed. In contrast to the other types of countries studied, a large difference can be observed here and until 2008 no correlation or relationship can be seen at all on the basis of Figure 3. The crisis of 2008 occurred in 2009 and caused major decline. However, no significant relationship can be seen after that, the impact of the events of 2016 can still be seen in the decline in GDP growth. Based on this, I confirm the assumption that I will not find any link between GDP and oil prices.

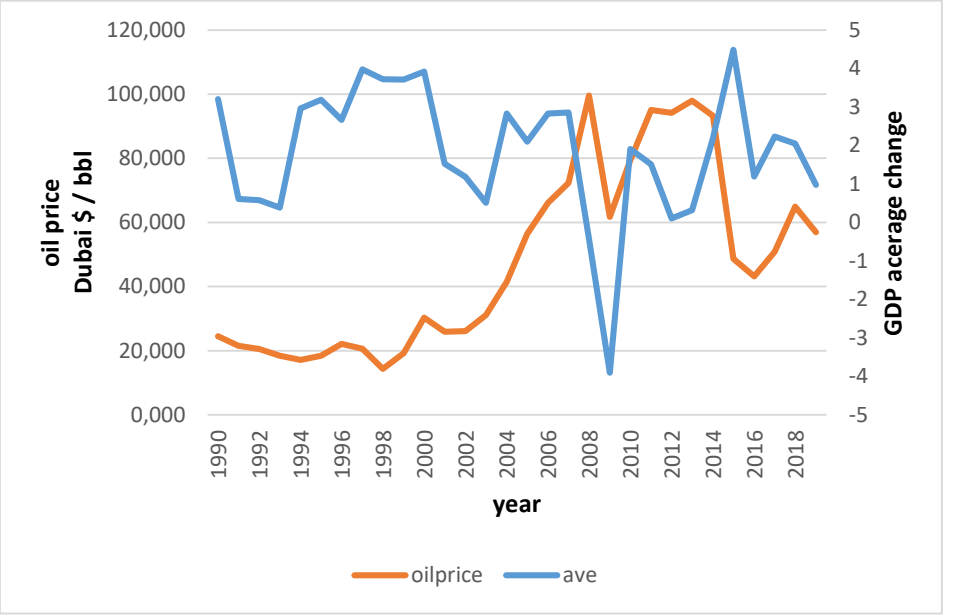

Figure 3: The relationship of oil price and mean GDP growth in low and medium human development countries
Source: Author's own editing based on WDI 2020

To examine my above assumption, I turned to statistical indicators. I first examined what the chi square test showed. As shown in Table 3, we obtained the normal value here as well, i.e. we can expect some relationship between the change in the price of oil and the mean GDP growth, similar to the types of the countries studied.

Table 3: Chi-Square Tests of low and medium human development countries

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	870,000[a]	841	,237
Likelihood Ratio	204,072	841	1,000
N of Valid Cases	30		

a. 900 cells (100,0%) have expected count less than 5. The minimum expected count is 03.

Source: Author's own editing based on WDI 2020

By factor analysis I tried to determine what relationship I find for the countries studied and in relation to the factors.

As shown in Table 4 the very high human development countries are all in factor 1, low and medium human development countries are in the last factor. I could not classify the high human development countries in any of the factors, as there are only 6 countries in the 2, 4 and 6 component at a time.

My hypothesis that the impact of oil price changes on GDP growth is less significant in developed countries, and this impact is more significant in developing countries.

Based on my analysis, I conclude that in the case of very high human development countries, the change in the price of oil has the opposite and stronger effect on the development of the GDP growth. In the case of high-human development countries, this relationship is weaker and opposite. The relationship between the price of oil and GDP growth in low and medium human development countries is significantly weak and can be considered positive. Based on the above H1 hypothesis was not confirmed.

Table 4: The component matrix of the examined countries

Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Netherland	,883	-,177	-,252				-,198	
Switzerland	,878		,207		-,277		,113	
Sweden	,841		,153			-,171	-,204	
Germany	,627	,102		,534	-,346		-,135	-,227
Australia	,600		-,254	-,490	,161	,150		
Mexico	,591	-,157	-,122	,386	-,270	-,111	,337	,132
Norway	,548		-,512	,279	,441		,200	
Egypt	,524			-,513		,221	-,143	
Brazil	,222	,798	-,130	-,151	-,103	-,171		-,252
China		,792	-,182		,345			,193
Colombia		,715	,254	,189			,373	-,106
Uganda	,158	,548	-,135	-,332	,175	,230	-,458	-,164
Ireland	,510	-,543			,350	-,125		
Kenya	,214	,111	,837			-,335		-,200
India	,211		,769	-,273	,378			,185
Pakistan			,531	,453	,434	,153		,329
Iran	,151		,116	,478	-,178	,549	-,405	,247
Nigeria		,241	,287		-,515	,521		,162
Thailand		,253	,104	,460	,386	,478	,128	-,441
Iraq	,383	-,130		-,418		,343	,562	,136
Sudan		,538	-,255	,198		-,366	-,142	,546

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

Source: Author's own editing based on WDI 2020

Finally, I outlined the scatter plot matrix of the countries based on 3 factors:

- on the vertical y-axis I plotted the mean GDP growth of each country based on the amounts achieved during the 30 years under review

- on the x-axis I plotted the values of r2 for the examined countries

- on the z-axis I showed, which HDI classification they belong to (1 = very high, 2 = high, 3 = low and medium)

As Figure 4 shows, China is very different from other countries in all respects and, it is followed by Ireland, where fluctuations in GDP values were also relatively high initially. Iraq differs in mean GDP growth and r2 values because it still had high r2 values. Based on the factors, I can say that the countries in group 1 are more likely to be found together, while the countries in groups 2 and 3 are more diverse.

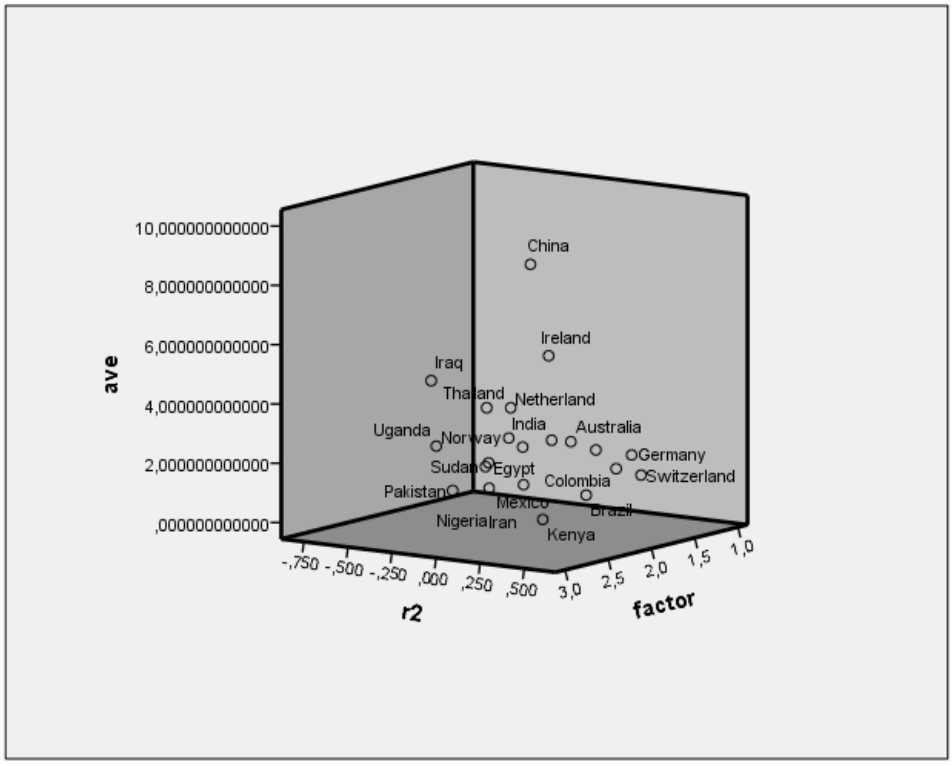

Figure 4: Scatter plot of examined countries
Source: Author's own editing based on WDI 2020

3.2. The analysis of hypothesis 2

H2: Applying carbon abatement policies will reduce GDP growth in developed countries, but it will rise GDP growth in developing countries.

As Figure 5 shows, the average GPD of developed countries is six times that of developing countries, which by 2016 decreased 4 times.

Based on the chart, I found that GDP grew at a slower rate in developed countries than in developing countries, despite the fact that CO2 emissions changed at almost the same rate.

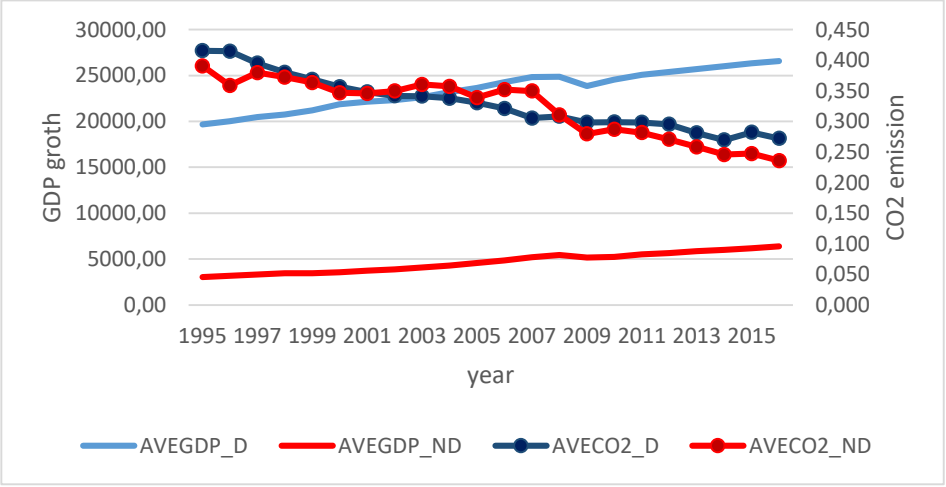

Figure 5: GDP and CO2 emission in developed and developing countries

Source: Author's own editing based on WDI 2020

As I assumed based the results of the significance test for developed countries in terms of GDP and CO2 emissions according to Table 5 are r = -0.980 (p = 0.01), and among developing countries according to Table 6. based on the table it is lower r = -0.915 (p = 0.01). Based on this, there is a strong negative relationship between GDP and CO2 for both developed and developing countries, but it is stronger for developed countries than for developing ones.

Table 5: significance between the GDP of developed countries and CO2 emissions

Correlations

		AVE.DD	AVE.DDC
AVE.DD	Pearson Correlation	1	-,980**
	Sig. (2-tailed)		,000
	N	22	22
AVE.DDC	Pearson Correlation	-,980**	1
	Sig. (2-tailed)	,000	
	N	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

Table 6: significance between the GDP of developing countries and CO2 emissions

Correlations

		AVE.Developing GDP	AVE.Developing CO2
AVE.Developing GDP	Pearson Correlation	1	-,915**
	Sig. (2-tailed)		,000
	N	22	22
AVE.Developing CO2	Pearson Correlation	-,915**	1
	Sig. (2-tailed)	,000	
	N	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

If we examine the relationship between the GDP of developed and developing countries, we get the result that the relationship between the GDP of developed and developing countries is also significantly strong, but in this case we find a positive relationship r = 0.985 (p = 0.01) as can be read from Table 7. However, in the case of carbon dioxide emissions, this

relationship is also strong according to Table 8, but lower r = 0.879 (p = 0.01) and also positive.

Table 7: significance between the GDP of developing and developed countries

Correlations

		AVE.Developed GDP	AVE.Developing GDP
AVE.Developed GDP	Pearson Correlation	1	,985**
	Sig. (2-tailed)		,000
	N	22	22
AVE.Developing GDP	Pearson Correlation	,985**	1
	Sig. (2-tailed)	,000	
	N	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

Table 8: significance between the CO2 emissions of developing and developed countries

Correlations

		AVE.DevelopedCO2	AVE.Develpoing CO2
AVE.DevelopedCO2	Pearson Correlation	1	,879**
	Sig. (2-tailed)		,000
	N	22	22
AVE.Develpoing CO2	Pearson Correlation	,879**	1
	Sig. (2-tailed)	,000	
	N	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

Based on this, I can conclude that developed and developing countries show a strong opposite relationship between GDP and CO2 emissions, i.e. the higher their GDP, the lower their CO2 levels will be. If GDP increases,

so does CO2. In the case of developing countries, the relationship is also similar, but it is weaker, meaning that it is less related to the evolution of GPD.

Our hypothesis was that carbon regulations affect the GDP of developed countries in a way that their GDP is decreasing. This part of my hypothesis was confirmed, however in the case of developing countries, my assumption that the decrease of CO2 emission will increase GDP was not justified. Based on this H2 hypothesis was partially confirmed.

3.3. The analysis of hypothesis 3

H3: By applying carbon abatement policies total petroleum and coal use will drop and natural gas and renewable energy use will intensify in both developed and developing countries.

I found that in almost all countries, 2004 was a year of stagnation. In the case of China, the consumption of natural gases increased dynamically the most after 2009 throughout the period under review. The other country that has steadily increased its reliance on natural gas is India, where looking closely at the period 2009 and 2003, I have seen a sharp increase in their consumption in the years that followed. For some countries with very high human development index, such as Germany, I have seen a marked decline. Overall, I found a steady increase in natural gas consumption, with $R^2 = 0.966$ and $p = 0.05$.

The consumption of renewable energy sources is not increasing to the extent I expect and seems to stagnate in all cases. Norway is the world's largest user of renewable energy, much higher than any other country. The figure also shows how much its consumption is higher than that of any developed country.

The analysis of the data also shows that consumption fluctuates greatly in most countries, which is particularly interesting in Switzerland and Sweden. Switzerland barely reached 3.69 in 2010, before rising almost tenfold in the years that followed. But I also found the same fluctuation in the sum column containing all the data, which clearly shows a cyclicality of 5 years, except for the period after 2015.

Examining all the data, the degree of the correlation coefficient inferred from the trend line was $R^2 = 0.5015$, $p = 0.05$, i.e. we can see an increase, but this is not so significant.

World consumption of petroleum was significantly affected by Chinese consumption, after 2001, China's entry into the world market, its impact on liquid fuel increased sharply. As China's consumption demand grew, so did total consumption, and it can be seen from the bar chart that a stagnation was observed in 2018 and 2019 nonetheless, the use of petroleum has steadily increased.

The significance level in this case is $R^2 = 0.842$, $p = 0.05$, which shows a strong co-effect when examining the total consumption.

Examining the chart, I would like to highlight my next observations.

- India, like China, has steadily increased its consumption of petroleum.

- Petroleum consumption in high HDI countries is relatively low.

- The less developed a country is, the more vulnerable it is to petroleum.

Consumption of coal and coke shows a very similar movement to petroleum consumption. I examined the value of r2 and found a value of $R^2 = 0.816$, $p = 0.05$, i.e. it almost coincides with the consumption of petroleum.

Based on this, I concluded that the consumption of petroleum and coal is strongly influenced by Chinese consumption.

Returning to my research question, I examined the extent to which the decline in non-renewable energy sources and the increase in renewable energy sources can be demonstrated using the above figures and comparing the data.

I took into account the value of r2 presented in each description.

It can be clearly seen from Table 9 that the value of r2 is quite variable and shows a strong correlation between the consumption of each factor and the progress over time. Based on this, I was able to show the strongest correlation when examining natural gases, as the relationship between them

is very strong there. But in the case of coal, coke and petroleum can also be considered as a significant relationship.

Table 9: R2 value of examined elements

element	***r2 value (p=0,05)***
coal and coke	$R^2 = 0,816$
petroleum	$R^2 = 0,842$
renewable energy	$R^2 = 0,501$
natural gas	**$R^2 = 0,966$**

Source: Author's own editing based on WDI 2020

Renewable energy sources showed less significant relationship during the period under review. Based on the above H3 Hypothesis was not confirmed.

3.4. The analysis of hypothesis 4

H4: The Montreal Protocol and its extensions on Substances that Deplete the Ozone Layer has reduced ozone depleting substances in the atmosphere and has produced significant environmental benefits to protect the earth's ozone layer

Examining the aggregate data, I examined CFC emission level for each HDI country.

I first analysed the trend values, and Table 10 shows that CFC emission decreased in all three country types, most notably in the very high HDI countries, and this declining trend was observed throughout each study period.

In comparison, in both high and medium / low countries, this showed an increase between 1986 and 1996, and after 1997 the trend became negative. That is, very high HDI countries reacted sooner to agreements to reduce CFC consumption than other countries.

Table 10: Trend change in CFC emission by country type

trend value	Very high HDI	High HDI	medium and Low HDI
between 1986-2019	**y = -547,56x + 12541**	**y = -478,01x + 13119**	**y = -56,903x + 1701,1**
between 1986-1996	**y = -3276,2x + 28885**	**y = 884,95x + 6730,9**	**y = 171,35x + 357,41**
between 1997-2019	**y = -1,472x + 2,8877**	**y = -498,11x + 8891,4**	**y = -99,242x + 1776,3**

Source: Author's own editing based on WDI 2020

Table 11 provides an answer to the assumption of trend-setting and the lowest overall values for the very high HDI countries with the highest 71% and slightly higher than the 50% for the low and medium human development countries.

The breakdown by sub-period shows that the very high HDI countries almost completely reduced their CFC consumption in the first period, the high, medium and low HDI countries decreased CFC consumption after 1997.

Table 11: Analysis of r2

r2 value	Very high HDI	High HDI	medium and low HDI
between 1986-2019	**R^2 = 0,4843**	**R^2 = 0,7133**	**R^2 = 0,5104**
between 1986-1996	**R^2 = 0,9538**	**R^2 = 0,3731**	**R^2 = 0,7371**
between 1997-2019	**R^2 = 0,4006**	**R^2 = 0,8139**	**R^2 = 0,8065**

Source: Author's own editing based on WDI 2020

3.5. The analysis of hypothesis 5

H5: The Kyoto Protocol and its extensions to the United Nations Framework Convention on Climate Change has reduced greenhouse gas substances in the atmosphere and has produced significant environmental benefits to protect global warming. The Protocol has

played a significant role in the reshaping the economy of developed and developing economies.

I examined the relationship between the development of countries and total GHG emissions with Pearson's significance test. The strongest connection could be detected in 1990, where the significance rate was 0.768 and the value of the degree of freedom F was 0.268 (Table 12).

By 2008, the significance level decreased to 0.644, which is the lowest but still considered high and this number has increased to 0.666 by 2012.

In other words, it can be said that the level of total GHG emissions depends on the period examined in each country, the highest in 1990, but the data for 2008 and 2012 show that regardless of the fact that all countries have signed the Kyoto Protocol a common improvement can be seen, but it also depends on the HDI index of each country.

Table 12: ANOVA test total GHG emission

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
total ghg1990 * code	Between Groups	(Combined)	106492,597	2	53246,298	,268	,768
	Within Groups		3577098,860	18	198727,714		
	Total		3683591,457	20			
total ghg 2008 * code	Between Groups	(Combined)	372517,436	2	186258,718	,451	,644
	Within Groups		7439729,297	18	413318,294		
	Total		7812246,733	20			
total ghg 2012 * code	Between Groups	(Combined)	349093,442	2	174546,721	,415	,666
	Within Groups		7564541,757	18	420252,320		
	Total		7913635,199	20			

Source: Author's own editing based on WDI 2020

Examining the mean and standard deviation values (Table 13), I observed that the per capita mean of each country type is highest in the very high HDI countries and lowest in the low and medium HDI countries. So the higher a country's development rate, the more GHG its population consumes, and this is supported by the standard deviation rate. Time has shown in this case that 2008 is the lowest in the low and medium HDI country and they fail to meet the 5% Kyoto threshold.

Table 13: Total GHG per capita

Report

code		ghg pc 1990	ghg pc 2008	ghg pc 2012
1	Mean	14,17957	12,11557	11,14843
	N	7	7	7
	Std. Deviation	8,926422	8,377566	8,217389
2	Mean	4,92700	5,98586	5,35900
	N	7	7	7
	Std. Deviation	3,096071	2,843315	2,753122
3	Mean	2,41071	2,37129	2,58357
	N	7	7	7
	Std. Deviation	1,254390	,848650	1,413352
Total	Mean	7,17243	6,82424	6,36367
	N	21	21	21
	Std. Deviation	7,357827	6,378239	6,041371

Source: Author's own editing based on WDI 2020

To the question of whether there is a correlation between total GHG per capita and output, I used the significance test.

Table 14 shows that although the degree of freedom is quite high (F = 8,879, 6,451 and 5,201), there is no demonstrable relationship between them in which country the GHG per capita changed between 1990 and 2012.

Table 14: ANOVA test total GHG per capita

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
ghg pc 1990 * code	Between Groups	(Combined)	537,711	2	268,856	8,879	,002
	Within Groups		545,041	18	30,280		
	Total		1082,752	20			
ghg pc 2008 * code	Between Groups	(Combined)	339,709	2	169,855	6,451	,008
	Within Groups		473,930	18	26,329		
	Total		813,639	20			
ghg pc 2012 * code	Between Groups	(Combined)	267,347	2	133,673	5,201	,016
	Within Groups		462,616	18	25,701		
	Total		729,963	20			

Source: Author's own editing based on WDI 2020

Examining the data obtained in total GHG per capita, I was able to create a scatter plot figure (Figure 6) that shows that the countries with the highest GHG per capita emissions are Australia, Ireland, Germany, the Netherlands and Brazil. Very high human development countries have the highest GHG rates per capita in all three periods studied.

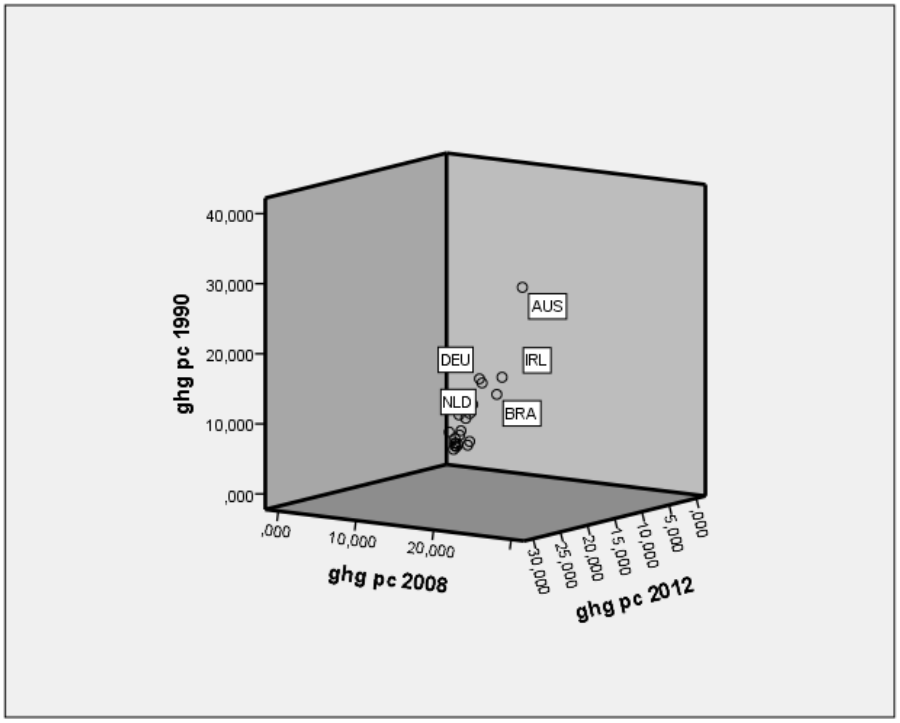

Figure 6: Scatter plot of GHG per capita 1990-3012
Source: Author's own editing based on WDI 2020

Comparing the commitments made in the Kyoto Protocol with the very high, high low and medium human development countries I concluded that from very high group, most countries were able to meet the 5% reduction in the Kyoto agreement, but the reduction was less as in their original commitment.

This was even more the case in the high development countries, they were able to reach the reduction commitment only if we look at total GHG per capita data.

The already low-consumption low-HDI countries did the opposite, increased their total emissions.

We do not consider the Kyoto Treaty to be the most successful, which has been proven in terms of CO2 and total GHG emissions, but in terms of per capita GHG emissions, there has always been an effort to comply with it.

3.6. The analysis of hypothesis 6

H6A: Developed countries are more involved in international environmental agreements than developing countries.

H6B: Participation in international environmental agreements is related to the rule of law in a country. Countries with higher rule of law index are involved in larger amount of international agreements.

I have examined the relationship I can make between the number of international treaties and the demonstrable links between each country in the HDI rankings.

First, I examined the simple descriptive statistical analysis as described in Table 15 shows the number of ratifications of international conventions, then the average number of international treaties is 122, the standard deviation is 65, and the value of RLI 2021 is 73. The Rule of Law: Percentile Rank is 56 and the standard deviation is 32.

Table 15: Descriptive Statistics

	Mean	Std. Deviation	N
ratification	122,0476	64,85328	21
RLIrank2021	73,9524	52,07348	21
averank	55,8258	31,80609	21

Source: Author's own editing based on WDI 2020

For this purpose, I examined the previously obtained results with the SPSS program. Since I was looking for a relationship between two values, I first conducted a bivariate study between ratification and the HDI code of the countries. Very high HDI countries received code 1, high HDI countries code 2 and low and medium countries code 3.

Based on this, I assumed that the higher the code in the HDI index for countries, the lower the number of international treaties ratified. I expected an opposite correlation based on this. As Table 16 shows that my

assumption was confirmed, as I found a very strong correlation level r2 = -0.817 (p = 0.01). Based on this, I justified the first half of my hypothesis, according to which HDI is significantly related to the number of international conventions.

Table 16: Correlations between the number of international contracts and the HDI classification

		ratification	code
ratification	Pearson Correlation	1	-,817**
	Sig. (2-tailed)		,000
	N	21	21
code	Pearson Correlation	-,817**	1
	Sig. (2-tailed)	,000	
	N	21	21

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI2020

I continued my research and examined the relationship between the HDI index and the rule of Law 2021.

I used the same coding system as before. I expected the result that if the code for the HDI of the country is low, the 2021 rank of the rule of law index will also be low. That is, I expected a positive correlation relationship here.

My research verified my expectations and I experience a very strong significance here, as shown in Table 17. In this case, the value of the correlation is r2 = 0.874 (p = 0.01) and this also means that the more developed countries had a higher level of rule of law in 2021.

Table 17: Correlations between the rule of law ranking and the HDI classification

		code	RLIrank2021
code	Pearson Correlation	1	,874**
	Sig. (2-tailed)		,000
	N	21	21
RLIrank2021	Pearson Correlation	,874**	1
	Sig. (2-tailed)	,000	
	N	21	21

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

In the third step, I examined the average rule of law: percentile rank between 2000 and 2020 and expected a negative correlation here as well, as the relationship between the two values is opposite. Based on the previous results, I expected that the relationship between the two factors will be strong here as well, as the previous two results predicted the result.

The result obtained in this way exceeded my expectations, as the level of significance r2 = -0.916 (p = 0.01) is very strong, as shown in Table 18. The lower a country's HDI, the lower its value in the average percentile rank.

Table 18: Correlations between the rule of law percentile ranking and HDI classification

		code	averank
code	Pearson Correlation	1	-,916**
	Sig. (2-tailed)		,000
	N	21	21
averank	Pearson Correlation	-,916**	1
	Sig. (2-tailed)	,000	
	N	21	21

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's own editing based on WDI 2020

In my research, I also examined whether there is any other relationship between the three factors based on the fact that the HDI code of countries is the control factor. Based on this, I explored further correlations. As can be seen, there is a negative significant relationship between the number of international treaties and the RLI 2021 rank. That is, the number of international contracts determines their ranking in the RLI rankings. The lower the rank level, the more ratified international treaties belong to the countries. The significance level of the relationship is r2 = -0.545 (p = 0.01) and there is a positive relationship between their average level because the two numbers are equally considered high. This relationship is no longer so significant, the level of significance is r2 = 0.389 (p = 0.01) (Table 19).

Table 19: Correlations of rule of law, percentile rank and ratification

Control Variables			ratification	RLIrank2021	averank
code	ratification	Correlation	1,000	-,545	,389
		Significance (2-tailed)	.	,013	,090
		df	0	18	18
	RLIrank2021	Correlation	-,545	1,000	-,689
		Significance (2-tailed)	,013	.	,001
		df	18	0	18
	averank	Correlation	,389	-,689	1,000
		Significance (2-tailed)	,090	,001	.
		df	18	18	0

Source: Author's own editing based on WDI 2020

Finally I plotted the average of international treaties and the rule of law: percentile rank.

For the graphical representation, I chose the scatter plot (Figure 7) and showed the two factors side by side to show that the high HDI countries with a code of 1 coincided with the countries that had both ratification and the average rule of law: They also achieved high results in terms of percentile rank. I separated 4 groups, while the very high HDI countries would clearly form two smaller groups, while justifying the partial correlation, the high and low groups in groups 2 and 3 are less separated.

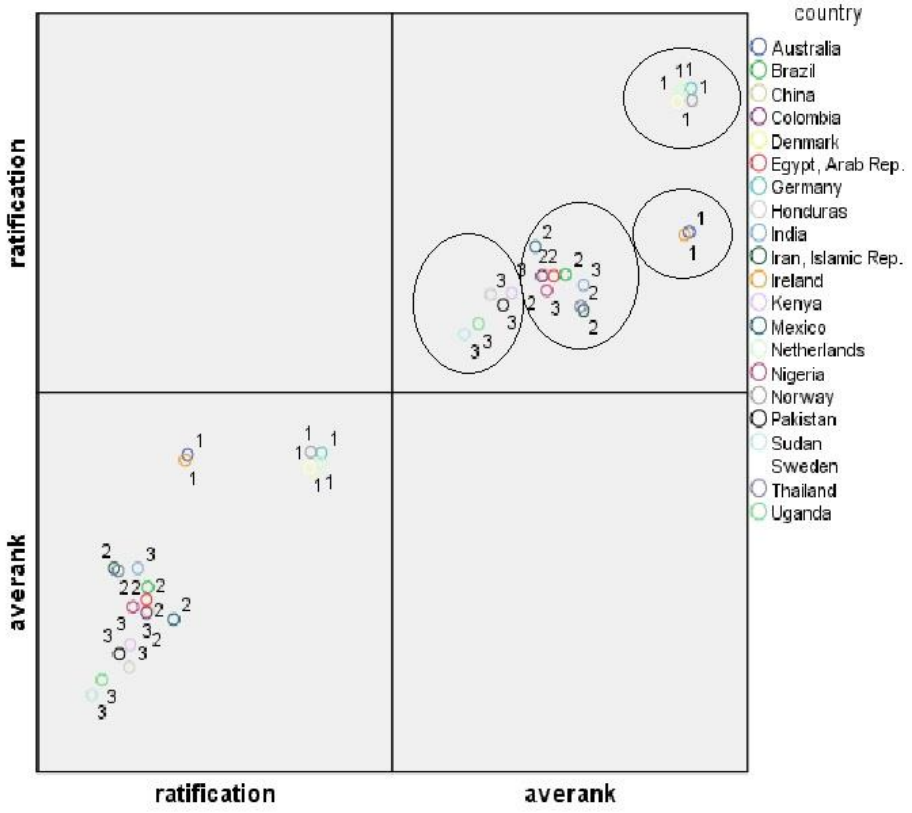

Figure 7: Ratification and rule of law index
Source: Author's own editing based on WDI 2020

We get almost the same figure when I compare the number of ratifications and the 2021 RLI rank, with as many differences as it is depicted in Figure 8. It can also be seen that I did not separate the high and low HDI countries in groups 2 and 3. This also shows how strongly the rule of law and the number of international conventions determine a country's HD Index.

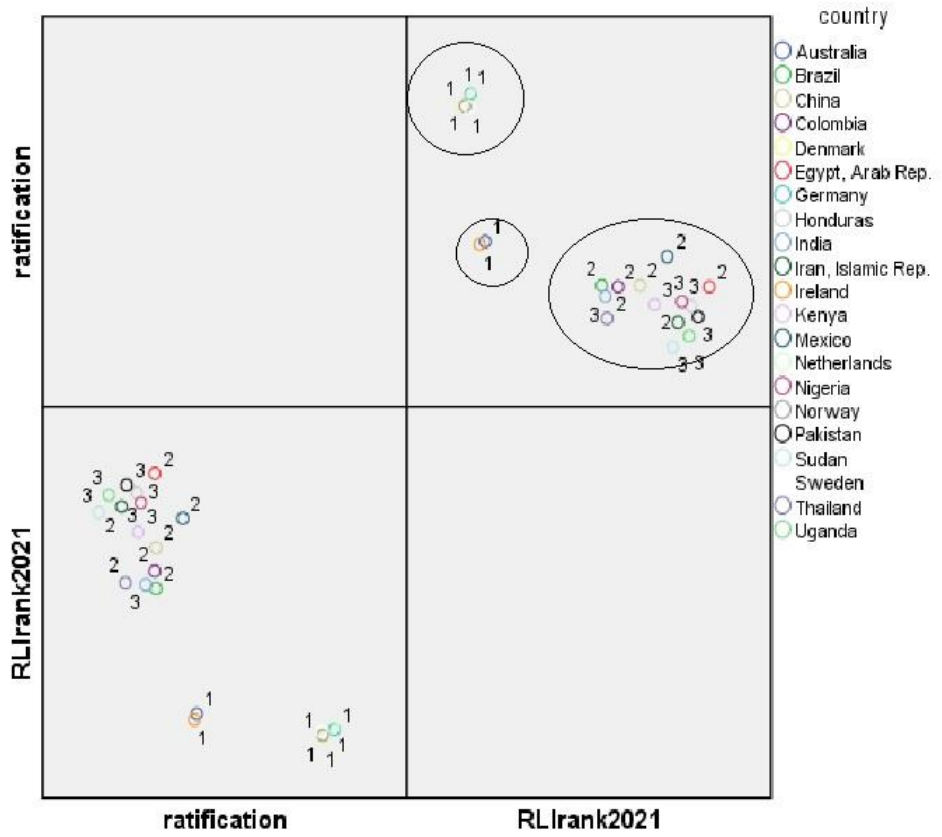

Figure 8: Ratification and 2021 RLI rank number
Source: Author's own editing based on WDI 2020

In the last step I analysed how factors affect each other. I set up a dendogram based on cluster analysis. As Figure 9 shows the 2021 RLI and the average rule of law are closest to each other, then the percentile rank and finally the ratification.

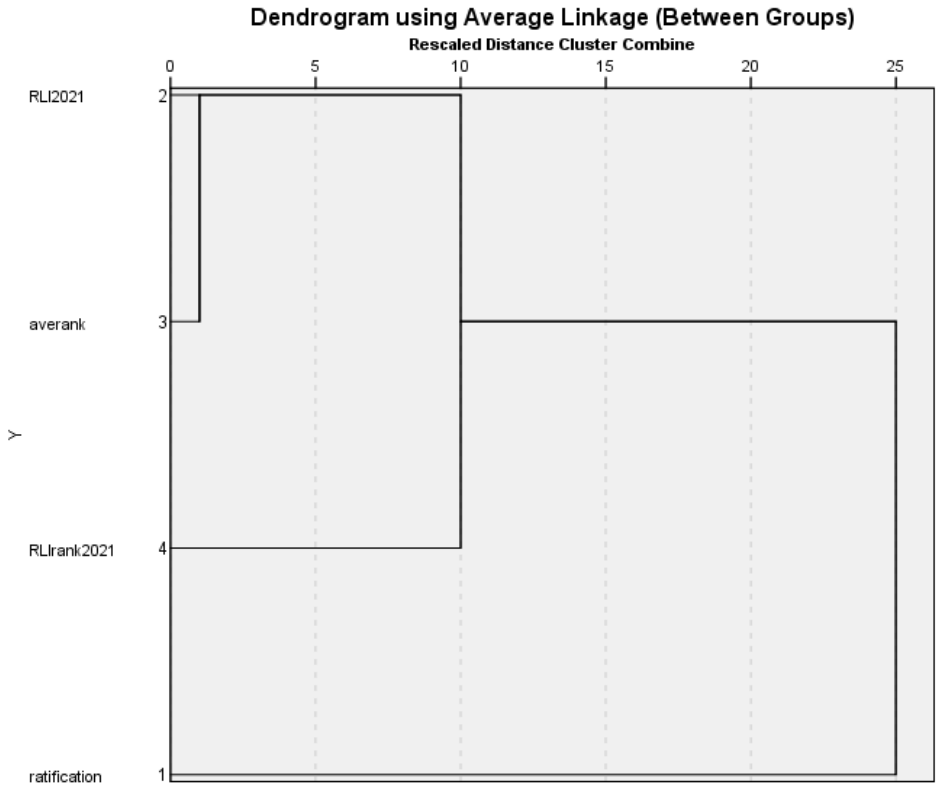

Figure 9: Cluster analysis of examined factors
Source: Author's own editing based on WDI 2020

Based on these, I confirmed my H6 hypothesis. Countries with a high HDI Index enter into more international agreements and have a higher rule of law index with higher ranking. The relationship between the examined factors is considered to be particularly strong and significant.

4. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, I summarise my ideas based on my research, answer my research questions, and present the results of my hypotheses testing. I also discuss the research's future directions. I draw conclusions that may be useful in the future based on their practical applicability.

Research Question 1 and the connecting hypothesis were as follows:

What is the relationship between oil price and economic growth of countries with different development level?

The relationship between oil price and economic growth in developed countries is linear and negative. The relationship between oil price and economic growth in developing countries is linear and positive.

H1: The impact of oil price changes on GDP growth is less significant in developed countries, and this impact is more significant in developing countries.

In the case of very high human development countries, the change in the price of oil has opposite and more significant effect on the development of the GDP growth (Pearson correlation from -128 to -622). In the case of high-human development countries, this relationship is weaker and opposite (Pearson correlation from -0.009 to -246). The relationship between the price of oil and GDP growth in low and medium human development countries is significantly weak and can be considered positive (Pearson correlation from (040 to551). Based on the above H1 hypothesis was not confirmed.

Research Question 2 and the connecting hypothesis were as follows:

Do carbon abatement policies have impact on GDP growth?

Carbon abatement policies have an impact on GDP growth

H2: Applying carbon abatement policies will reduce GDP growth in developed countries, but it will rise GDP growth in developing countries.

Developed and developing countries show a strong opposite relationship between GDP growth and CO2 emissions (r = -0.980 (p = 0.01) . The higher their GDP growth is, the lower their CO2 levels will be. If GDP increases, so does CO2. in the case of developing countries, the relationship is also similar, but it is weaker r = -0.915 (p = 0.01)., meaning that it is less related to the evolution of GPD. Based on the above H2 hypothesis was not confirmed.

Research Question 3 and the connecting hypothesis were as follows:

Do carbon abatement policies have impact on petroleum, natural gas, coal and renewable energy use?

Carbon abatement policies do not have impact on petroleum, natural gas, coal and renewable energy use.

H3: By applying carbon abatement policies total petroleum and coal use will drop and natural gas and renewable energy use will intensify in both developed and developing countries.

According to my findings total petroleum, coal and natural gas use is rising. Renewable energy consumption is fluctuating in both country types. Based on the above H3 hypothesis was not confirmed.

Research Question 4 and the connecting hypothesis were as follows:

Did the ratification of Montreal Protocol have impact on the atmosphere?

Montreal Protocol has had impact on the atmosphere.

H4: The Montreal Protocol and its extensions on Substances that Deplete the Ozone Layer have reduced ozone depleting substances in the atmosphere and have produced significant environmental benefits to protect the earth's ozone layer.

Countries with very high human development almost completely reduced their CFC consumption by 1997. High, medium and low HDI countries decreased CFC consumption after 1997. The Montreal Protocol has

reduced ozone depleting substances in the atmosphere. Based on the above H4 hypothesis was confirmed.

Research Question 5 and the connecting hypothesis were as follows:

Did the ratification of Kyoto Protocol have impact on the atmosphere?

The ratification of Kyoto Protocol has not had impact on the atmosphere?

H5: The Kyoto Protocol and its extensions to the United Nations Framework Convention on Climate Change has reduced greenhouse gas substances in the atmosphere and have produced significant environmental benefits to protect global warming. The Protocol have played a significant role in the reshaping of the economy of developed and developing economies.

Comparing the commitments made in the Kyoto Protocol with the very high, high, low and medium human development countries, I concluded that from very high human development group, most countries were able to meet the 5% reduction in the Kyoto agreement, but the reduction was less as in their original commitment.

This was even more the case in the high human development countries, they were able to reach the reduction commitment only if we consider total GHG per capita data. The low and medium human development countries increased their total emissions. The low and medium human development countries increased their total emissions. Based on the above H5 hypothesis was not confirmed.

Research Questions 6 and 7 and the connecting hypothesis were as follows:

Is there a relationship between the development level of a country and the number of international agreements the country ratified?

Yes, there is. The relationship between the development level of a country and the number of international agreements the country ratified is linear and positive.

What is the relationship between the rule of law status of a country and the number of international agreements the country ratified?

The relationship between the rule of law status of a country and the number of international agreements the country ratified is linear and positive.

H6A: Developed countries are more involved in international environmental agreements than developing countries.

Countries with a high HDI Index enter into larger amount of international agreements.

H6B: Participation in international environmental agreements is related to the rule of law in a country. Countries with higher rule of law index are involved in larger amount of international agreements.

Countries with a high HDI Index enter into more international agreements and have a higher rule of law index with higher ranking. The relationship between the examined factors is considered to be particularly strong and significant. Based on the above H6B hypothesis was confirmed.

4.1. Recommendations

Some argue that fluctuations in oil prices increase output, thereby driving growth; others argue that price fluctuations reduce output, thereby impeding growth. Oil price increases are widely thought to increase inflation and slow economic growth. Oil prices have a direct impact on the prices of goods manufactured with petroleum products in terms of inflation. Oil prices have an indirect effect on costs such as transportation, manufacturing, and heating. Increases in these costs can affect the prices of a wide range of goods and services, as producers may pass on production costs to consumers. The extent to which increases in oil prices lead to increases in consumption prices is determined by the importance of oil in the production of a particular good or service.

Changing oil prices can have different impacts on a country depending on the development of the country. Governments should implement different policies to stop the pass-through indirect effect. In countries with deregulated prices governments can suspend pricing policy so as not to pass

higher world prices fully to consumers. Governments can lower taxes or fees levied on petroleum products. It is also possible to subside fuel prices directly from the budget. Oil product price stabilisation funds can be established. There are other ways to attempt to lower end-user prices: threatening to withdraw licenses, boycotting firms that raise prices, requiring that justification be provided for price increases, forcing oil companies to absorb losses from under-pricing fuels. Prices can be set lower for certain consumers, for example fishermen, farmers, power producers. Energy efficiency measures can be made. Cash transfers or other compensations mechanism can be introduced. Switching to alternative sources of energy can also be an effective policy.

Given the circumstances in which developing countries find themselves—different income levels, budgetary situation, amounts spent on price subsidies, availability of indigenous petroleum resources, fuels used for electricity production, and the impact of weather on hydropower, to mention a few—there is no simple or universal strategy for dealing with higher oil prices.

The influence of low-carbon energy on economic development is a vital issue. It is a dilemma we were dealing with. On the one hand, we are aware of the negative consequences of greenhouse gas emissions induced by fossil fuel combustion on ecosystem activity. Energy, on the other hand, is a vital component of economic development that has a direct impact on our basic well-being. The new coronavirus epidemic has had a significant impact on the world economy, with demand for nearly all energy products plummeting. However, in the short term, these negative impacts are likely to fade, and global energy demand is expected to climb.

Governments can use a variety of policy instruments to reduce carbon emissions Emission-pricing mechanisms are the initial part of a comprehensive policy mix GHG taxes and emission trading schemes, such as the EU Emissions Trading System, are included in this component, as are other incentive-based instruments like polluting products taxes. A national uniform carbon price is a cornerstone of mitigation plans since it is extremely successful in lowering emissions in the short term.

Standards and subsidies to accelerate the implementation of low-carbon technologies are the second component of a comprehensive policy mix.

Emission quotas, green certifications, and technology regulations are only some of the constraints that these instruments might impose. They can be especially useful in situations where high-emitting activities or technology must be restricted or phased out by a given date. Although standards and regulations do not set explicit emission prices, the costs they imply can be considered implicit emission prices (contrary to emission-pricing schemes, which set explicit emission prices). The third component of a comprehensive policy mix is complementary and framework policies. All measures that do not directly try to reduce emissions but instead lessen the economic and social costs of policies that do so are included in this category. Complementary policies attempt to hasten the development and implementation of novel pollution-reduction technology. These policies include R&D and innovation incentives, measures supporting business dynamism, promoting data consistency and comparability of environmental, social and governance rating methodologies to crowd-in private capital, higher investment to upgrade electricity and transport networks.

To date, the Montreal Protocol to safeguard the Earth's ozone layer is the only UN environmental pact that has been ratified by every country on the planet. It's also one of the most recognized. The Protocol's parties have phased out 98 percent of their ozone-depleting compounds, saving an estimated two million people each year from skin cancer. It is expected that the ozone layer will return to pre-1980s levels by the middle of the century and the Antarctic ozone hole by around 2060s. The Montreal Protocol is one of the world's most successful environmental treaties, encouraging governments to pledge to phase out the production and consumption of ozone-depleting compounds since its inception. The Protocol's parties agreed to address this after learning that the alternatives, known as hydrofluorocarbons, are significant greenhouse gases that contribute to global warming. The Kigali Amendment was enacted in 2016 after lengthy negotiations. The success of the ozone protection regime was due to the global partnership, stakeholder involvement, and overall commitment of the governments. A effective hydrofluorocarbon phasedown might prevent a 0.4°C rise in global temperature by 2100 while also protecting the ozone layer.

Montreal and Kyoto Protocols addressed different environmental problems. The Montreal protocols put limits on chloroflourocarbons, which were harming the ozone layer. The Kyoto accords sought to limit carbon emissions, which lead to enhanced greenhouse warming.

Fundamentally, both were global agreements to address climate change. Kyoto put the burden on developed nations, and gave a "pass" to developing nations. For this reason it was never ratified by the US Senate, because it was recognized that for it to be at all effective, it must include all nations. Indeed, most growth in GHG emissions are coming from developing nations. We could eliminate developed world emissions and still not address the problem.

This was the fundamental difference, and the difference which made Paris Agreement even more widely adopted. The United States withdrew from the Agreement in 2020, but re-joined in 2021.The US agreed to Paris Agreement because all nations must do their part, with no exception for developing nations. What made this possible was redefining "do their part" to mean voluntary goals set by each participant, so a developing nation could simply set an easier goal, but still be on board with a collective effort. The idea was to gradually increase the goals in future commitments, with peer pressure, once developing nations realize that participation is not hard and goals are achievable.

The Montreal Protocol worked very well - the hole in the ozone layer has already stopped expanding. The Kyoto Agreement was only a beginning toward solving the warming problem.

The rule of law is a governance principle in which all public and private individuals, institutions, and entities, including the state, are held accountable to laws that are publicly promulgated, equally enforced, and independently adjudicated, and are consistent with international human rights norms and standards. It necessitates measures to ensure that the supremacy of the law, equality before the law, accountability to the law, fairness in the application of the law, separation of powers, participation in decision-making, legal certainty, avoidance of arbitrariness, and procedural and legal transparency are all adhered to. The rule of law is essential for international peace and security, as well as economic and social progress and development, as well as the protection of people's rights and

fundamental freedoms. It is essential for people's access to public services, the fight against corruption, the restraint of power abuse, and the establishment of the social contract between people and the government. The rule of law and development are inextricably intertwined, and a stronger rule of law-based society should be a goal of the 2030 Agenda and Sustainable Development Goals (SDGs).

5. NEW SCIENTIFIC RESULTS

1. I have statistically proven that the relationship between oil price and economic growth in developed countries is linear and negative. The relationship between oil price and economic growth in developing countries is linear and positive. In the case of very high human development countries, the change in the price of oil has opposite and more significant effect on the development of the GDP growth. In the case of high-human development countries, this relationship is weaker and opposite. The relationship between the price of oil and GDP growth in low and medium human development countries is significantly weak and can be considered positive.

2. I have statistically proven that developed and developing countries show a strong opposite relationship between GDP growth and CO2 emissions. The higher their GDP growth is, the lower their CO2 levels will be. If GDP increases, so does CO2. In the case of developing countries, the relationship is also similar, but it is weaker, meaning that it is less related to the evolution of GPD.

3. I have statistically proven that by applying carbon abatement policies total petroleum and coal use is not dropped, natural gas use intensified and renewable energy use fluctuated in developed and developing countries during the analysed period.

4. I have statistically proven that countries with very high human development almost completely reduced their CFC consumption by 1997. High, medium and low HDI countries decreased CFC consumption after 1997. As a result of this the Montreal Protocol has reduced ozone depleting substances in the atmosphere.

5. I have statistically proven that from the very high group of human development countries most countries were able to meet the 5% reduction defined in the Kyoto agreement, but the reduction was less as in their original commitment. This was even more the case in the high human development countries, they were able to reach the reduction commitment only if we consider total GHG per capita data. The low and medium human development countries increased their total emissions.

6. I have statistically proven that developed countries are more involved in entering into international environmental agreements than developing countries. The relationship between the development level of a country and the number of international agreements the country ratified is linear and positive.

7. I have statistically proven that the relationship between the rule of law status of a country and the number of international agreements the country ratified is linear and positive.

The results of my research is summarized in Table 42 as follows:

6. SUMMARY

The objective of the dissertation is to deal with the economic impact of international environmental agreements. In the first segment I explore the development, function, characteristics and the problems of international agreements. I put special emphasis on the environment-related agreements. In the following section I will focus on the economic effects of these agreements by analysing different macroeconomic indicators. The dissertation covers two specific environmental problems. The first one is ozone depletion, the second is greenhouse gas emission. Both environmental problems were caused by human activities. The impact of these phenomena can be disastrous for our planet.

The mechanism, process, institution, practise, or norm that supports the equality of all citizens before the law, secures a nonarbitrary form of government, and, more broadly, prevents the arbitrary use of power is known as the rule of law. I dissertation analyses the possible relationship between the concept of rule of law and human development. I formulated 6 hypotheses. In the research, I primarily tested my hypotheses by analysing them with different statistical methods.

Firstly I analysed the relationship between oil price and economic growth of countries with different development level. I concluded that the relationship between oil price and economic growth in developed countries is linear and negative. The relationship between oil price and economic growth in developing countries is linear and positive.

Examining my second hypothesis I have found that Developed and developing countries show a strong opposite relationship between GDP growth and CO2 emissions. The higher their GDP growth is, the lower their CO2 levels will be. If GDP increases, so does CO2. In the case of developing countries, the relationship is also similar, but it is weaker, meaning that it is less related to the evolution of GPD.

In my third hypothesis I have shown that Carbon abatement policies do not have impact on petroleum, natural gas, coal and renewable energy use. According to my findings total petroleum, coal and natural gas use is rising. Renewable energy consumption is fluctuating.

In my fourth hypothesis I have found that Countries with very high human development almost completely reduced their CFC consumption by 1997. High, medium and low HDI countries decreased CFC consumption after 1997. The Montreal Protocol has reduced ozone depleting substances in the atmosphere. Based on the above H4 hypothesis was confirmed.

In my fifth hypothesis I have concluded that Comparing the commitments made in the Kyoto Protocol with the very high, high, low and medium human development countries, I concluded that from very high human development group, most countries were able to meet the 5% reduction in the Kyoto agreement, but the reduction was less as in their original commitment. This was even more the case in the high human development countries, they were able to reach the reduction commitment only if we consider total GHG per capita data. The low and medium human development countries increased their total emissions. The low and medium human development countries increased their total emissions. Based on the above H5 hypothesis was not confirmed.

In my last hypothesis I have found that countries with a high HDI Index enter into more international agreements and have a higher rule of law index with higher ranking. The relationship between the examined factors is considered to be particularly strong and significant

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