



A Geographical Analysis of the Influence of Climate Changes and Agreements on Iraqi Oil Export Trade

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Abstract

Climate changes and related climate agreements have an influence on the Iraqi oil export trade because Iraq is one of the most prominent crude oil exporters. Therefore, the present study aims to clarify how climate change with its various components and climate agreements affect in a way that leads to reducing greenhouse gas emissions resulting from fossil fuels, which are among the most prominent challenges facing global oil exports trade in general and Iraqi exports in particular, by influencing the quantity and amounts of oil exports and then their reflection on the Iraqi economy.

key words

weather changes, oil exports, climate agreements, hurricanes, oil prices

Introduction

The study of climate change and climate agreements is among the most important challenges facing the economies of global countries. There is an influence of climate elements on various human activities, including commercial activity.

Global oil trade is one of the most types of trade that is influenced by offer and request. Global oil trade and markets were exposed to shocks that affected global oil prices. Climate changes and climate agreements to reduce greenhouse gas

emissions from fossil fuels are among the most prominent challenges that have had repercussions on crude oil exporting countries, especially developing countries, including Iraq.

Therefore, the present study attempts to analyze the damages of climate changes and the agreements related to them. It attempts to show how they affect the global oil trade, especially Iraqi oil exports, taking the period (1996-2020) as a period of time due to the climatic changes witnessed, especially tropical cyclones, and their role in influencing the centers of crude oil production and marketing closure, which motivated the operating companies to seek alternatives represented in importing quantities of crude oil to fill the deficit and compensate the consumer from storage.

Because Iraq is one of the most important crude oil exporting countries, its exports have been indirectly affected by the global oil prices as a result of hurricanes and climate treaties.

Problem of the Study

The current study tries to answer the following questions

1. Do climatic changes and their components have an impact on the amount of Iraqi exports, especially towards the countries importing crude oil?
2. Is there a relationship between the amount of Iraqi oil exports and climate changes and agreements?

Hypothesis of the Study

1. The climate and its components are one of the most important challenges facing economies, as it shows the influence of climate elements on various human activities, including the global oil trade, and through the data, it becomes clear that there is an almost synergistic relationship between the amount of Iraqi oil exports and weather changes, especially storms that occur in many countries of the world, most notably the United States, which is among the most prominent importing countries of Iraqi oil.
2. As for the relationship between oil exports and climate treaties related to climate change and the reduction of emissions from fossil fuels, it had a role in influencing global oil prices and affecting both the supply and demand sides, and then their impact on the amount of Iraqi oil exports.

Objective of the study

The research aims to identify the reality of the oil export trade and the extent to which it is affected by the climate changes and agreements witnessed by the countries importing Iraqi oil?

Methodology of the study

The study relied on the analytical and inferential approach, which depends on the availability of information and data, and then arriving at mental conclusions through data analysis.

1. The concept of climate change

Climate change and the agreements that come with it are as much an economic and political challenge as it is a scientific and technological one. The nature of the problem requires a coordinated approach among the countries of the world (Baumert, et al. 2002). Climate change can be terminologically defined as the

continuous change in the Earth's climate, which is caused by either cosmic, natural, or human reasons. This change has a negative impact on the atmosphere and then leads to devastating disasters (Harga, 2009). Climate change results in long-term shifts in temperature and weather patterns. These shifts may be natural, for example through changes in the solar cycle. But since the 19th century, human activities have been the main driver of climate change, mainly due to the burning of fossil fuels such as coal, oil, and gas (climatechang, <https://www.un.org>).

The climate of any region represents the outcome of the interaction of a group of variables, and the controls affecting it that distinguish it from other world climates.

The influence of these variables varies according to the varying weather and spatial conditions. Some of these conditions have a simple effect that can be easily identified, and some of them are complex and difficult to identify and divide, because they affect more than one element of the climate as well as their impact on the atmosphere (Howard, 1960).

As a result, climate change is one of the main long-term drivers of economic, social, and environmental change. Besides, climate treaties have an influence on climate change and the reduction of emissions from fossil fuels, which had a role in influencing global oil prices. The beginning of the climate summit dates back to the Kyoto Protocol in 1997.

According to the Environmental Protection Agency, burning a barrel of crude oil produces approximately 0.43 metric tons of carbon pollution (Matt Lee-Ashley and Alison, 2015).

Based on global energy economy models and the influence of the Kyoto Protocol on energy exporters, OPEC members believe that implementation of the Protocol will slow the growth of their revenues from oil exports. The models suggest that policies and measures (PAMs) to implement the Kyoto Protocol (such as a carbon tax) will lead to an increase in oil prices for consumers and reduce demand in developed countries, which account for 60% of global oil consumption, which leads to a decrease in global oil demand and the prices obtained by the producers.

In climate negotiations, OPEC members argue that developed countries should reduce these impacts on OPEC. Thus, they implicitly claim compensation for losses (Barnett, et al. 2004).

Pershing explains that the implementation of the Kyoto Protocol is likely to cause a small impact on OPEC oil revenues compared to the basic fluctuations in the global energy market (ibid).

But what is inferred is that the risk of climate change is linked to the increasing combustion of fossil fuels and thus the increase in carbon density in the fuel, which required the conclusion of agreements to reduce the risks of this fuel.

These agreements had a clear impact on the oil-exporting countries, including Iraq (Skjaereth and Skodvin, 2003).

2. Analyzing the situation of Iraqi oil exports and their influence on climate changes and agreements

The exposure of oil-exporting countries to oil prices varies significantly depending on the degree of importance of oil exports and the intensity of oil in their economies. Because Iraq is one of the rentier countries whose oil exports constitute more than 95% of its budget. So, any impact of crude oil prices is reflected on financial revenues and the extent of their impact on Iraqi economy.

The climate and its elements, especially hurricanes may lead to a temporary closure of production centers and export ports, which puts pressure on the increase or decrease in demand for oil, especially if climate changes target production-intensive areas. In addition, the related climate agreements have a clear impact on the quantity and revenues of oil exports. So, the extent to which Iraqi oil exports are affected by climate change and climate agreements will be identified.

By looking at the table and figure data, it is clear that the financial returns of Iraqi exports recorded in 1996 amounted to (797165.7) million dinars.

But after the 1997 Kyoto climate agreement was made to reduce emissions of gases from fossil fuels, and a month after the agreement was concluded, American

Table (1) Values of Iraqi oil exports for the period from (1996-2020)

Oil exports (Million dinars)	Global Oil Prices (USD)	Indicators Years
797165.7	20.29	1996
6295880	18.68	1997
8279820	12.28	1998
23869088	17.48	1999
39659464.2	27.6	2000
32817345.5	23.12	2001
26679291.8	24.36	2002
14556784.0	28.1	2003
25647584.5	36.05	2004

334978470.0	50.64	2005
45084357.9	61.08	2006
50705398.4	69.08	2007
71656577.1	94.50	2008
48867721.7	61.10	2009
61077042.0	77.45	2010
97093737.0	107.46	2011
115609376.4	109.45	2012
109907795.3	100.62	2013
102151713.4	96.2	2014
57201849.5	37.13	2015
51562267.8	26.19	2016
70400321.3	42.48	2017
99069211.8	42.48	2018
92818914.0	61.14	2019
49,689,640	48.44	2020

Source; The researchers depending on

1. Republic of Iraq, Ministry of Oil, various years

2. OPEC (organization of the petroleum exporting Countries), Annual Statistical Bulletin, Statistics for the years (1999, p4-7), (2007, p83), (2016, p48), (2019, p56).

scientists at the National Climate Data Center reported that the average surface temperature worldwide in 1997 was the highest ever. The 1990s are the warmest decade, with reliable readings beginning in the 19th century. They argued that the continuing trend tends to reinforce the evidence that greenhouse gases are the cause (January 1998),), especially crude oil.

Crude oil exports have been affected after the conclusion of this agreement. That

was accompanied by a decline in the values of international oil prices, which recorded (18.68) dollars / barrel. Because Iraq is the most prominent exporting country of crude oil, the financial revenues of Iraqi exports have declined to reach (6295880) million dinars affected by the conclusion of this agreement. In fact, all oil-exporting countries were affected by this agreement.

This is what was indicated at the Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change. OPEC issued a press statement stating that the potential losses to OPEC from the Kyoto Protocol may reach 63 billion US dollars annually (Barnetta, & Dessaib, 2004), especially the main exporting countries, including Iraq.

The drop in temperatures as one of the climatic factors had an impact on the rise in the values of oil exports. International oil prices recorded a high value

as the price of a barrel reached (27.6) dollars / barrel in 2000 due to the increasing demand for crude oil by the United States and Europe as a result of lower temperatures And the cold wave that these countries witnessed (Abdulkareem, 2008). The Iraqi oil export trade was affected by these climatic changes that these countries witnessed because they are one of the main importing markets for Iraq's oil. The value of Iraqi oil exports amounted to (39659464.2) million dinars.

Among the most prominent climate changes were storms and hurricanes. Tropical storms and hurricanes regularly challenge coastal areas and energy infrastructure, especially oil fields production areas throughout the Gulf of Mexico. When severe weather conditions develop, operators shut down production and evacuate personnel before the storm. After the storm makes landfall, crews return to work,

damage assessments are performed, and facilities, if necessary, are repaired before production resumes (Howard, 1960). Such climatic conditions play an important role in the fluctuation of world oil prices.

By tracking the most prominent of these storms, it is possible to refer to Ivan Hurricane, which is one of the most violent hurricanes recorded in the Atlantic Ocean. It began to strike American shores along 400 miles of the Gulf of Mexico coast. It caused the closure of oil companies that produce approximately 1.3 million barrels per day. The ratio of produced oil from these offshore is around 25% of USA's crude oil and gas production in the Gulf (The Irish times, 2004).

The Ivan Hurricane cut off many drilling rigs from their moorings and destroyed seven fixed rigs (Tyson, 2004). This caused the price of light sweet crude oil to rise by \$1.49 and then record \$44.30 per barrel in midday trading on the New York Mercantile Exchange(<https://www.youtube.com/watch?http://www.independent.ie.2004>). Oil prices settled at 36.05 dollars per barrel.

These climatic changes were reflected on the crude oil exporting countries, some of which export to the United States, most notably Iraq, whose crude oil exports rose to (25647584.5) million dinars as shown in the table.

Oil prices rose to a new high price due to the hurricanes that struck the oil-producing areas of the Gulf of Mexico, the most powerful of which was the Katrina Hurricane, which struck in September 2005 the most important places of oil production fields in the United States and caused a rise in crude oil prices. The US strategic plan did not cover the demand as a result of the material losses caused by the hurricane (OPEC, 2007). The Katrina region is one of the main areas for the production and refining of crude oil, which represents $\frac{1}{4}$ of the production of the United States and the largest production and refining plant. This sudden drop in oil production led to the demand of crude oil consumers for supply. Therefore, spot oil prices rose at the beginning of the hurricane to more than \$70 per barrel (SAXTON, 2005). Prices settled at a record rate of \$50.64 per barrel. The share of OPEC in crude oil exports during the hurricane rose to 2 million barrels (OPEC

Bulletin, 9/10/2006), which had repercussions on the increase in financial returns from Iraqi crude oil exports. The US imports of Iraqi crude oil amounted to

813.7 thousand barrel/ day as the most important importers of North American countries (OPEC, 2007). As a result of these changes, Iraqi oil exports achieved an increase in financial revenues amounting to (34978470.0) million dinars, and an export rate

of (1.427 million barrels / day).

After the climate conference was held in Indonesia in 2007 to discuss climate change, which 187 countries agreed to on the so-called Bali Road Map, which is a framework for a new agreement to reduce global emissions of greenhouse gases, during the conference, which took two weeks for the period from 3-15 December 2007 (Rajendar Pachauri, 2008) and despite the impact of the conference on global oil prices, but as a result of political events in the Middle East, including the Iranian nuclear file and the unrest in Nigeria, which are among the oil-exporting countries, which required compensation for oil exports to these countries, which led to a rise in export prices to (69.08) dollars/barrel. Thus, the oil markets were not affected. The basic building blocks of the Bali Roadmap included the following:

- Mitigating climate change by reducing emissions;
- Facilitating the transfer of clean technology;
- Adapting to the consequences of climate change such as floods and droughts;
- Financing adaptation and mitigation measures;

Supporting activities such as financing developing countries to prevent deforestation (Burlison, 2008).

As a result of the economic downturn in the world, as well as the United Nations Framework Convention on Climate Change (2009), which indicated that fossil fuels, including coal, oil, and gas are the main sources of carbon dioxide emissions and are responsible for about (56%) of total global carbon dioxide emissions, it is

assumed that the main activities to reduce CO₂ emissions will take into account the consumption of fossil fuels (Dike, 2013).

International oil prices were affected. They recorded a decline of (61.10) dollars / barrel. The values of Iraqi oil exports declined to (48867721.7) million dinars.

On October 29, 2012, climate change affected the global oil trade as the Sandy Hurricane hit the New York and New Jersey region causing damage worth 50 billion dollars (Silver, 2016).

Oil production centers were affected as many refineries in the Northeast were disrupted by floods, winds, and other effects caused by the Irene and Sandy Hurricanes. The region's refineries were also affected by power outages and logistical issues caused by the shutdown of crude oil and petroleum products transportation and distribution systems in the wake of the storms (Comparing the Impacts of Northeast Hurricanes on Energy Infrastructure, 2013).

Sandy traversed an area of the country that accounts for nearly 8% of total US oil refining capacity and at least nine facilities, whose combined capacity is 1.3 million barrels per day were closed at their peak Hess in Port Reading, NJ, Monroe Energy in Trainer, PA, PBF in Delaware City DE and Paulsboro, NJ, Sunoco in Philadelphia, PA, and Phillips 66 in Linden, NJ (AON BENFIELD, <http://thoughtleadership.aon.com>.)

After the hurricane dissipated, its effects appeared on oil exports in the region and its reflection on the main distribution center for the delivery of oil to consumer markets, as well as its impact on US oil stocks. The American standard crude, known as WTI, decreased by 13% since the last month that followed the hurricane (Silver, 2012). The oil product of the United States was affected, which was reflected on the strategic storage, which required covering it through imports. This had a reflection on the amount of Iraqi exports with the trends of the United States. The volume of Iraqi exports increased to 559 thousand barrels / day, an increase of 22.6% compared to 2011. Therefore, it had an impact on the rise in the values of

Iraqi oil exports, which amounted to (1,15609376.4) million dinars as shown in Table (1).

The year 2015 was full of challenges for the oil industry as it is a period of readjustment for all producers and investors who had to face the changing situation of the global oil industry after the political and economic events that the world witnessed.

In 2015, the Paris Summit was held and was adopted by nearly 200 countries in the French capital on December 12, 2015 and entered into force on November 4, 2016. The participants in the Paris Climate Summit approved a global agreement to confront global warming, whose main objective is to limit the rise in global temperatures to 1.5°C, keeping it 'well below' 2.0 above pre-industrial times (<https://www.bbc.com/news/science-environment-35073297>)

As well as working to enhance resilience to climate change and build resilience, aligning all financial flows with "the right track through low greenhouse gas emissions and climate-resilient development" (Anna, 2021).

As a result of the political and economic events that the Middle East witnessed, international oil prices were not affected by the Paris summit, due to the continuation of OPEC in its June 2015 meeting not to reduce production, which led to an increase in supply and its arrival to (2.060 million barrels / day), in addition to Saudi Arabia being the first producer In the world, by offering quantities of oil at prices that are several dollars less than the selling price to buyers, which led to a severe deterioration in prices (Saifan, et al. 2015).

The world oil prices reached (47.11 dollars/barrel), which affected the financial returns of oil exports, including Iraq as shown in Table (1).

The global oil trade witnessed a clear change in its quantities and prices as a result of climate changes. The most prominent of these changes was the Harvey Hurricane, which struck on August 25, 2017 and landed on the coast of South Texas

as one of the most destructive storms in the world. It is a Category 4 storm (Harvey and Irma Hurricanes: Impacts to U.S., November 15, 2017). It hit one of the largest cities in the United States, the center of the Texas refining industry, which processes about a third of US oil. It is the worst storm to hit Texas in half a

century, with 130 mph winds and up to 50 inches of rain across Houston (Oyedele, 2017).

FG Energy estimates that Harvey has shut down around 380,000 bpd of production in the Gulf and 400,000 bpd at home (Egan, 2017), forcing shutting down about 900,000 bpd of the country's refining capacity, mostly around Corpus Christie's according to Standard & Poor's Global Platts. It included the Valero Energy plant, which produced 293,000 barrels per day, as well as the Citgo refinery, which produced 157,500 barrels per day (DISIS, and EGAN, 2017).

The shutdowns have rocked global fuel markets. European and Asian traders have funneled millions of barrels of gasoline and diesel to the Americas to help fill the gap. But, supplies from those distant markets may not arrive fast enough to avoid a crisis (Seba, and Kumar, 2017). This crisis was accompanied by a decline in global production of crude oil by 0.9%, which contributed to the improvement in global oil prices, which amounted to (52.43). (dollars/barrel (OPEC, 53rd edition, 2018). This contributed to the rise in Iraqi oil revenues, which amounted to (70400321.3) million dinars.

After the great losses that the global markets witnessed as a result of the spread of the Covid-19 virus in 2019, global oil exports, including Iraq, did not achieve any significant gains. But, the impact of climate change appeared on Iraqi oil exports after the Laura Hurricane hit the coast of the Gulf of Mexico. Its speed reached about 185 km / h according to the National Hurricane Center. The storm stopped around 1.5 million barrels per day of the production of crude oil, which is equal to 82% of the production of the Gulf of Mexico. It stopped refineries that process at least 1.17 million barrels of oil per day, or 6% of the total energy of the United States according to Reuters statistics (Reuters Staff, 2020) in conjunction with the suspension of oil production in many American companies and cities due to the Laura Hurricane and the consumption and decline of oil reserves. This led to a rise

in Iraq's exports from zero to 177 thousand barrels per day in just one week. This is what Iraq exported of oil to the United States of America according to the data of the US Energy Information Administration (Sönnichsen, 2020). This led to an increase in the values of Iraqi oil exports during the month of August to 3492.2 million dinars (Republic of Iraq, annual export report for 2020, 2021). This rise comes after the suspension of Iraqi oil exports to the United States due to the Corona virus and the need of the United states for crude oil due to the hurricane.

Conclusions

1. The present study showed the indirect link between climate changes and the trade of Iraqi oil exports, especially the areas of hurricanes that strike the

- centers of production and refinement of crude oil in the United States of America, which cause a shortage of production and American stocks that is then compensated by imports. Iraq is one of the most prominent trading partners Which contributes to increasing the volume of Iraqi exports and thus increasing financial returns.
2. The present study showed that specialists in the energy industry assert that the hurricane seasons that strike the United States lead to several risks, including low prices, threatening production volumes, and increasing borrowing costs, as well as rising operational costs, and increasing the volume of imports of crude oil to compensate for the consumed stock.
 3. Despite the conclusion of many climate agreements to reduce fossil fuels, a specific formula was not agreed upon, especially the industrial countries with the highest consumption of fossil fuels, in addition to the absence of a formula that reduces the rentier losses of the oil-producing countries in the event of reducing their oil exports.
 4. Hurricanes are among the most prominent climate changes that imposed great costs on global economies by destroying the infrastructure of global oil and gas production centers.

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