BUSINESS MATHEMATICS
SBSD1023
GROUP ASSIGNMENT

GROUP 5

Group Members:

1) LEW YING JIE A21BS0046 (LEADER)
2) LI JUNYI A21BS4018
3) OOI WEI TAT A21BS0125
4) YON WEN TING A21BS0156
5) HEW JUN KANG A21BS0034
6) PUA ZI QI A21BS0128
7) LIU ERN QI A21BS0048

Introduction

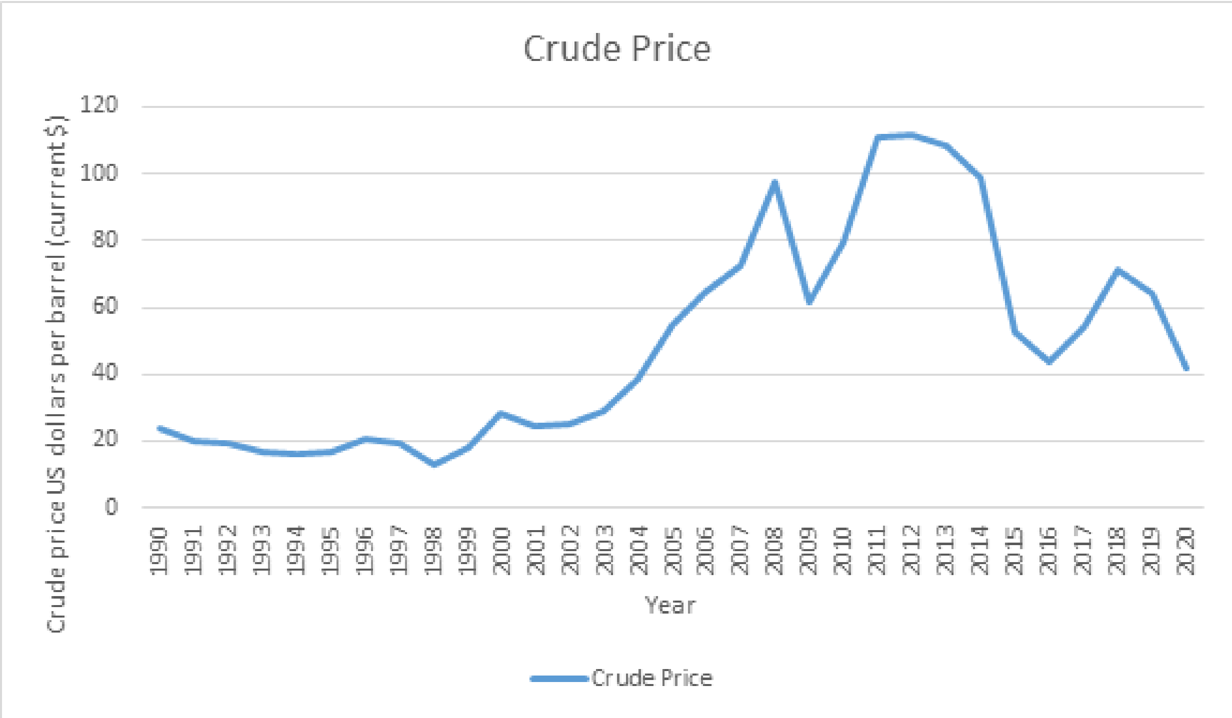
Russia is the third oil manufacturer and the second natural gas manufacturer in the world. It is also the biggest wheat trader in the world. On the other hand, Ukraine is the sixth corn producer and the seventh wheat producer. It is also among the top ten producers in producing soya, rapeseed, sugar beet and barley.

Since the day that invasion began, global financial markets fell dramatically, and the prices charged on oil, natural gas, and food commodities flood up. It can be said that conflict between Russia and Ukraine has left a consequence which is the financial markets disorder around the world. This war surged the uncertainty on the recovery of the global economy. Apart from suffering on humanitarian crisis from the war, the entire global economy will also need to endure the effects on a slower economic growth and faster inflation.

There are three major channels will be affected. First, higher prices for commodities such as comestibles and necessities will shoot up the inflation, corrode the incomes and demand one at a time. Second, the nearby economies will struggle with the disruption of the trades, the supply chains, and the flows of money as well as a sharply increased in refugee flows. Third, diminishing in business confidence and higher investor uncertainty will be burdened on asset prices, tighten up the financial constraints and potentially stimulate the capital outflows from the markets.

Question 1

<u>The x and y graph for y= Crude Price and x= Year</u>



Question 2

<u>Explanation of the observation from the pattern of graph in 1</u>

The global crude oil prices shown a fluctuating trend. The highest global crude oil prices was $ 111.670 per barrel in year 2012 while the lowest global crude oil prices was $ 12.716 per barrel in year 1998.

Crude price decreased slightly from $ 23.726 per barrel in year 1990 to $ 15.818 per barrel in year 1994, by 33.33% decreased. A decreased of crude oil prices from 1990 to 1994 caused by the government of United States and other OECD countries decide to release crude oil from government-controlled stocks in order to calm down the global crude oil price in the market. Crude price rose gently by 30.66% from $ 15.818 per barrel in year 1994 to $ 20.668 per barrel in year 1996, but fell 38.47% to $ 12.716 per barrel in year 1998. An increased of crude oil prices from 1994 to 1996 influenced by United States economy reinforced and the Asian Pacific region experienced an economic boom. A decreased of crude oil prices from 1996 to 1998 caused by an economic crisis hit Asia. Crude price soared from $ 12.716 per barrel in year 1998 to $ 28.495 per barrel in year 2000, by 124.09% increased. This is because OPEC voluntary make the oil production reductions and set the crude oil price doubled.

Crude price dropped minimally by 14.22% from $ 28.495 per barrel in year 2000 to $ 24.444 per barrel in year 2001, but rose dramatically 297.87% to $ 97.256 per barrel in year 2008. A decreased of crude oil prices from 2000 to 2001 influenced by OPEC overshot oil production. The factors of an increased of crude oil prices from 2001 to 2008 is a weak U.S. dollar; oil consumption by growing Asian economies; and the 2005 Hurricanes Katina. Crude price declined slightly from $ 97.256 per barrel in year 2008 to $ 61.671 per barrel in year 2009, by 36.59% decreased. A decreased of crude oil prices from 2008 to 2009 caused by the Great Recession.

Crude price rose significantly by 81.67% from $ 61.671 per barrel in year 2009 to $ 111.670 per barrel in year 2012, but fell drastically 60.84% to $ 43.734 per barrel in year 2016. The factor of an increased of crude oil prices from 2009 to 2012 is Iran threatened Straits of Hormuz while the factor of a decreased of crude oil prices from 2012 to 2016 is United States increased the oil production through shale oil. Crude price shot up by 63.05% from $ 43.734 per barrel in year 2016 to $ 71.310 per barrel in year 2018, but plunged 41.33% to $ 41.838 per barrel in year 2020. An increased of crude oil prices from 2016 to 2018 influenced by OPEC cut the oil supply. A decreased of crude oil prices from 2018 to 2020 caused by the pandemic Covid-19 reduced demand.

Question 3

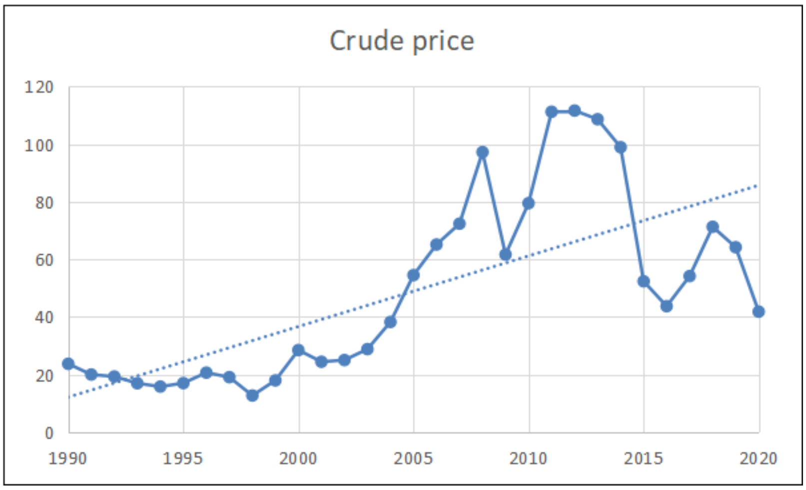
The average rate of changes from 1990 to 2020

Year	Crude price	Average rate of change
1990	23.726	none
1991	20.001	-3.725
1992	19.321	-0.68
1993	16.972	-2.349
1994	15.818	-1.154
1995	17.017	1.199
1996	20.668	3.651
1997	19.093	-1.575
1998	12.716	-6.377
1999	17.97	5.254
2000	28.495	10.525
2001	24.444	-4.051
2002	25.023	0.579
2003	28.831	3.808
2004	38.265	9.434
2005	54.521	16.256
2006	65.144	10.623
2007	72.389	7.245
2008	97.256	24.867

2009	61.671	-35.585
2010	79.496	17.825
2011	111.256	31.76
2012	111.67	0.414
2013	108.659	-3.011
2014	98.946	-9.713
2015	52.387	-46.559
2016	43.734	-8.653
2017	54.192	10.458
2018	71.31	17.118
2019	64.211	-7.099
2020	41.838	-22.373

Question 4

Explanation of the average rate of changes from 1990 to 2020



From the average rate of change, it can be seen that in the early 1990s, the oil price showed a stable fluctuation of first falling and then rising. From 1997 to 1998, the average rate of change appeared the minimum of - 6 for the first time, which was due to the outbreak of the Asian financial crisis in 1997. In the 1990s, with the rise of Asian economy and the increasing demand for oil, Asia has become the main consumption area of oil in the world. In 1997, the Asian financial crisis swept the world, the economies of various countries were damaged to varying degrees, and the demand for oil also decreased significantly.

After the Asian financial crisis, the world economy has entered a stage of rapid development at the beginning of the 21st century. According to statistics, the world economic growth rate reached 5% in 2004. The demand for crude oil in various countries is increasing day by day, and the international oil has entered a stage of short supply. At this time, the dollar has depreciated significantly and began to rise all the way. From 2000 to 2008, international oil prices entered a "blowout" growth period. During this period, the oil price soared to 97.265 US dollars / barrel from 28.495 US dollars / barrel in 2000, with an average growth rate of 24.867.

Hidden dangers have long been buried under the economic prosperity. This hidden danger completely broke out in August 2007. With more and more subprime borrowers in the United States unable to repay their loans, the long buried subprime mortgage crisis in the United States broke out in an all-round way and soon swept the world, affecting financial markets all over the world. In terms of crude oil, although the demand for crude oil in emerging developing countries is still strong, the demand for crude oil in North America has decreased significantly by 5%, and the demand in Europe and Japan has also decreased. The sharp decline in demand began to be reflected in the oil price in 2008. In just one year, the oil price fell all the way from 97.256 US dollars / barrel to about 61.671 US dollars / barrel in 2009, with an amazing growth rate of - 35.585

After the subprime mortgage crisis, oil prices stopped falling and rebounded from 2009 to 2014. Governments began to spend a lot of money to help banks solve their difficulties through a package of policies, and adopted quantitative easing policies to varying degrees and active fiscal policies to stimulate consumption and encourage production, so as to get rid of the difficulties of economic depression. After the sharp decline of the subprime mortgage crisis, the oil price began to rise again by taking the opportunity of the world economic recovery.

In 2014, the United States surpassed Saudi Arabia in crude oil production and became the world's largest crude oil producer. The rapid growth of crude oil production capacity in the United States has made the United States a net exporter of crude oil from a crude oil importer. At the same time, the crude oil production capacity of non-OPEC countries such as Russia and Canada have also increased steadily. These phenomena have aroused OPEC's concern about the decline of market share. At the same time, as the oil price stopped falling and rose after the subprime mortgage crisis, the oil price was at a high level of more than US $100 / barrel in the three years from 2011 to 2013, the high oil price caused great damage to the demand, countries around the world are increasingly worried about energy security, and the development of various alternative energy sources is also accelerating. Due to the aggravation of the oversupply of oil, the international oil price began to plunge sharply. Only in the second half of 2014, the oil price fell rapidly from US $98.946/barrel to US $52.387/barrel, a decrease of more than 40%, and the average change rate reached as much as 45. With the settlement of Iran's nuclear issue and the recovery of Iran's crude oil production and export, the situation of world oil oversupply has further intensified, and the international oil price has fallen further and further, once falling below US $50 in 2016.

After that, OPEC had to give up its plan to destroy shale oil and reach a new round of production reduction agreement. The international oil price gradually entered a period of supply-demand balance, the oil price began to pick up and entered a long-term stable adjustment stage.

After the agreement on production reduction was reached in December 2016, the international oil price began to rise steadily since 2017. A large decline occurred in October 2018, and the international oil price began to decrease again from the high point of US $71 / barrel. The reason should be the calm treatment of the market for the excessive rise of prices in the early stage. On May 9, 2018, trump announced that he would withdraw from the Iranian nuclear agreement and resume economic sanctions against Iran. At the same time, he hoped that all countries would join him in imposing sanctions on Iran. After the news came out, the market linked to the US sanctions against Iran in 2012-2015, Iran's oil exports plummeted by 1 million barrels / day. The fear of tight supply triggered the rise of oil prices, resulting in the price peak in October 2018: US $71.31.

However, after entering October, due to the slowdown of world economic growth and economic downturn, the market demand for oil could not meet expectations, and the oil price began to fall. In addition, after Iran's economic sanctions came into effect, China, India and other countries were exempted for 180 days and could still import crude oil from Iran. The oversupply market pattern was further increased, and the international oil price was further lowered to the end of 2018.

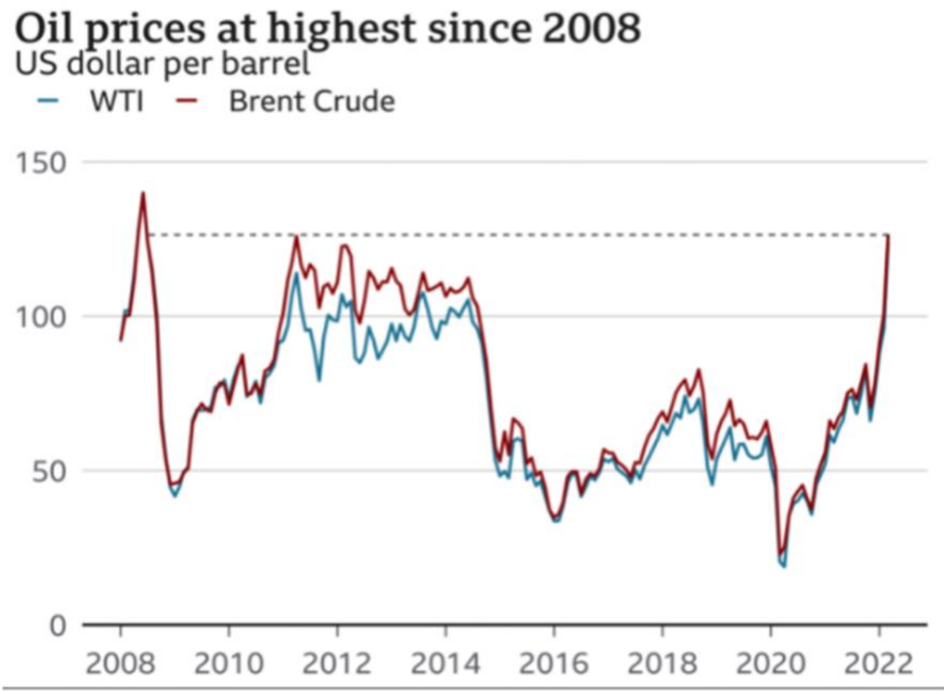
In 2019, OPEC further deepened its production reduction, and the international oil price stopped falling, stabilized and rose in shock. Throughout 2019, the international oil price fluctuated around us $64 / barrel, but operated smoothly.

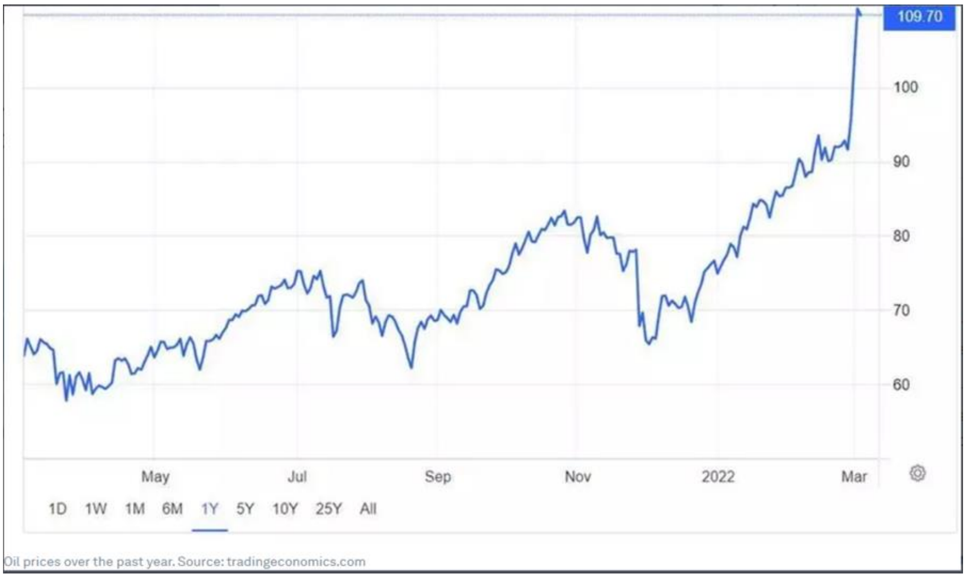
In 2020, public health emergencies have brought haze to the global market. The world economy, which is already in a downward cycle, has further deteriorated under the haze of health events. Oil prices also fell to 41.83, with an average rate of change of -22.37.

Question 5

<u>How does Russian-Ukraine war affect crude oil prices?</u>

It caused an serious global supply shock.





Oil prices over the past year. Source: tradingeconomics.com

U.S. oil prices have reached records above $4 a gallon. Oil prices that have already increased dramatically by a rebounding economy after the COVID-19 pandemic, were pushed even more higher when Russia's invasion of Ukraine happened.

Sanctions

The prices of oil increased because of the invasion of Russia has led to sanctions by many countries against the Russia. Russia is the second-biggest exporter of oil and the world's largest natural gas exporter. They cut off the world's second largest oil producer from global supply chain. The countries that are trying to get their oils have to pay at a very high price. The countries that get affected the most are mostly countries in Europe, because Europe highly dependant on Russian natural gas.

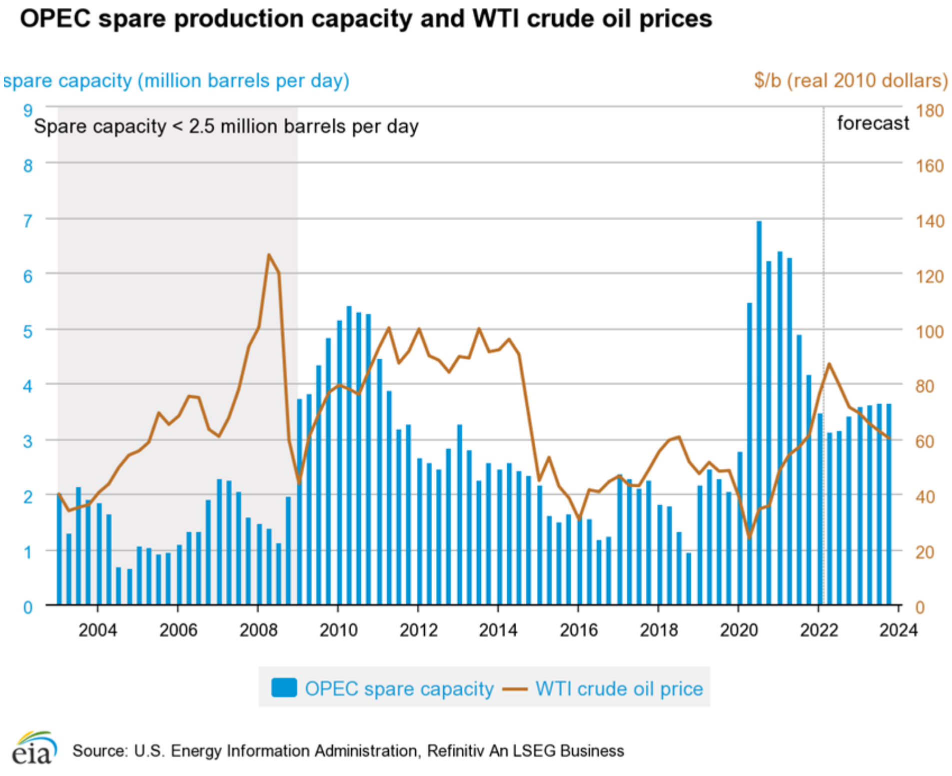
Question 6

<u>Causes of higher crude oil prices</u>

1. Supply quota adopted by Organization of the Petroleum Exporting Countries (OPEC)

The Organization of Petroleum Exporting Countries (OPEC) is an intergovernmental organization of 13 major oil-exporting countries. Its major goal is to control the oil supply to set the price on the worldwide market. Since OPEC members produce over 40% of the world's crude oil and export 60% of all petroleum traded worldwide, they can influence crude oil prices. Therefore, OPEC attempted to affect crude oil prices by limiting crude oil production.

OPEC's spare production capacity also influenced the crude oil price. When OPEC's spare production capacity is low, the group's ability to respond to increased demand is limited, which leads to a rise in crude oil prices. On the other hand, OPEC will suspend production despite its large spare capacity to maintain a relatively higher price in the global market.



2. Demand

Crude oil is essential in our daily life. We use crude oil for multipurpose transportation, heating, electricity generation, petroleum products, and plastics. Thus, the crude oil price will rise when demand increases, especially during economic growth. For example, when the economy is growing, the transportation sector will also be stimulated as the demand for goods and materials increases. Almost all transportation types in the world depend on petroleum products such as gasoline and diesel fuel, so their price will always fluctuate according to economic status. For instance, during summer, the demand for crude oil will rise as it is school vacation, similar to winter as more crude oil is needed to heat houses. Thus, during these two periods, the price of crude oil is expected to increase due to the high demand.

3. Geopolitical events and disaster

When a natural disaster occurs in specific countries, this will influence the crude oil prices. First, when a natural disaster occurs in the crude oil production sites, it will interrupt the transportation of crude oil. Since all the roads are impassable, electricity and internet are down, and the crude oil companies cannot transport all the crude oils to another area. For example, Hurricane Harvey that hit Texas in August 2017 had badly impacted the crude oil price. The Gulf of Mexico, responsible for about 30% of US oil production and distribution, was forced to shut down during and after the storm, including several oil refineries.

The majority of the world's crude oil reserves are in areas exposed to political instability or in areas where oil production has been hindered due to political events. For example, Saudi Arabia and Iraq are rich with crude oil, but at the same time their political situation also instable. For instance, 1973 oil crisis was caused by embargo proclaimed by Arab countries during the Yom Kippur War. While the Iran-Iraq war in 1980s also contributed to spike in oil prices.

Consequences of higher oil prices

Overall, higher crude oil price will somehow lead to inflation. Oil is an important element for transportation. When the transportation cost rise, it will absolutely increase the marginal cost of production, thus rise the production cost of mostly of the industry in the world. Then, producers will pass the increasing cost to the consumers by lift the price of goods and services in the market. Here is how the cost-push inflation happen. Meanwhile, higher input price will induce the producers to produce less, which result in closing of production branch, downsizing, and eventually cut staff. At the end, the unemployment will increase, and economic growth will be declined.

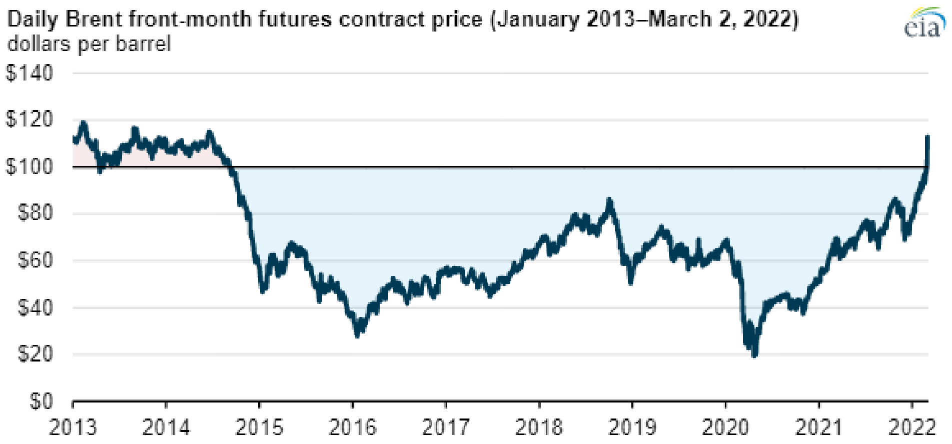
Since crude oil is essential for most households, they are forced to spend more on purchasing crude oil or gasoline when the oil price becomes higher. They need to fill their vehicles with fuel to move so that they will spend less on the other goods and services. Meanwhile, inflation contributes to higher living cost. The purchasing power of money become lower. People’s life quality will become lower amid the spike in oil prices. This is how the higher price of crude oil diminish people’s real purchasing power. When the real purchasing power reducing, people will decline saving in the bank.

Question 7

Opinion and prediction (Malaysia's crude oil Price)

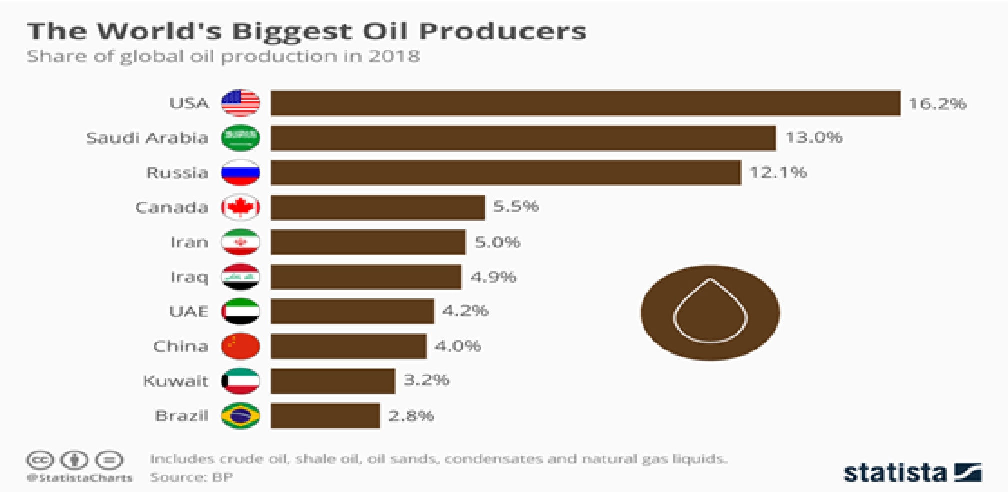
On my perception, Crude oil is mainly used as a raw material for fuel, gasoline, or chemical products. Crude oil is usually measured in barrels and tons and its prices will affect the quantity of supply and demand.

The impact of the epidemic brought about a sharp drop in oil prices, which has a stimulating effect on economic recovery in the short term but should prevent deflation on a global scale in the medium term due to the escalation of the international epidemic. The overall economic impact of the Covid-19 pandemic is difficult to assess, and it depends on the spread and evolution of the epidemic and the decisions of other countries. As people began taking precautions to stay home as much as possible, this also led to a significant reduction in demand for crude oil and thus a decline in its price.



Russia is the second largest crude oil producer in the world, accounting for 13% of global crude oil production. At the same time, Russia is also the Russia is also the largest exporter of crude oil outside of OPEC, accounting for 11% of global crude oil exports and 42% of its own export revenues in 2020, with an average of 4.65 million barrels per day. This represents 11% of global crude oil exports and 42% of its own export revenues. Europe and China are the two largest exporters of Russian crude oil. Europe and China are the two largest exporters of Russian crude oil, accounting for 50% and 32% of Russia's crude oil exports in 2020, respectively.

At the same time, Europe is highly dependent on Russian crude oil imports, and Russia is its top crude oil importer. Europe will import 476 million tons of crude oil from the world in 2020, of which 119 million tons, or 25%, will be imported from Russia.



According to my estimates, the rising risk of European and U.S. energy sanctions against Russia in the context of the Russia-Ukraine conflict will push up oil prices. If the Russia-Ukraine negotiations go well and the conflict eases, coupled with the smooth progress of the Iran nuclear deal, oil prices will drop.

Russia is highly dependent on Europe in the field of crude oil trade. Unless the situation in Russia and Ukraine gets out of hand, energy sanctions against Russia will be difficult to sustain. At the same time, the United States cannot afford to continue the high oil price environment. On the other hand, in the context of the expected downward trend in U.S. economic growth, high oil prices raise inflationary pressure, or lead to the Federal Reserve being tightened policy, which is not conducive to the U.S. economic recovery.

In conclusion, the impact of the Russia-Ukraine conflict has increased the safe-haven properties of crude oil, which has led to rising crude oil prices. Besides, supply chain disruptions have caused the supply cannot full fill the demand and led to the rising of crude oil prices.

Suggestion

1. Encourage the development of new and renewable energy

Reduce oil consumption in terms of both open source and cost cutting. Adjust and optimize the production Industry structure, improve the efficiency of oil utilization, and gradually reduce the intensity of oil consumption for economic growth. At the same time, we should continuously improve the energy structure and make full use of renewable energy resources such as hydropower, wind power, geothermal and solar energy. At the same time, we should continue to improve the energy structure, make full use of resource-rich renewable energy sources such as hydropower, wind power, geothermal and solar energy, and establish and improve effective incentive mechanisms in terms of taxation, price, and financing to vigorously promote and facilitate renewable energy. In addition, we should establish and improve effective incentive mechanisms in terms of taxation, price, and financing to vigorously promote and facilitate the development of renewable energy and realize the diversification of energy supply.

2. Introduction of an energy tax

The purpose of energy tax reform is primarily to protect national resources. Energy taxes not only provide an important source of tax revenue for the budget, but also enable energy prices to reflect the externalities associated with energy production. The current sharp increase in energy consumption is due to the low price of energy brought about by long-standing controlled pricing, in addition to the real demand that accompanies economic growth. Consumers have no incentive to adopt various energy-saving measures.

3. Implement the "go out" strategy

Encourage and support domestic enterprises to participate in foreign oil exploration and development cooperation and development and make full use of foreign oil resources. In addition to importing oil directly from the international market, to ensure the stability of oil supply and price, it is also necessary to encourage and support enterprises with the conditions to participate in oil cooperative development abroad and establish long-term and stable overseas oil resources. In addition to importing oil directly from the international market, to ensure the stability of oil supply and price, it is also necessary to encourage and support qualified enterprises to participate in oil cooperative development abroad and establish long-term and stable overseas oil supply channels. To ensure the stability of oil supply and price, it is also necessary to encourage and support enterprises with conditions to participate in oil cooperative development abroad and establish long-term and stable overseas oil supply channels.

Conclusion

Russia and Ukraine are the main commodities farmers. This crisis has obviously given an impact on economic growth as there is various shortages and a thrust on a higher global price, mostly on oil and natural gas. Food costs also have surged. This is due to Ukraine and Russia invented 30 percent of global export activities.

Apart from the spill over in the world, countries which have tourisms, direct trades, and high publicity in financial will experience another secondary pressure. The economies which is more accessory to oil imports will suffer from a further monetary and trade deficits and more inflation pressure on them. Despite the fact that, there are some exporters who is in the Middle East and Africa may earn profits due to the higher prices.

Increasing prices of fuel and food might stimulate a bigger threat of turmoil in some of the countries. For example, from Latin America and Sub-Saharan Africa to the Central Asia and Caucasus. Meanwhile, food unsubstantial can be said to be expected more widen in Africa and the Middle East.

At the end of the day, the war might revise the overall economic status and geopolitical system on the whole. To further illustrate, revise in global economic such as trades shift, supply chains reconstruct, networks payment collapse may happen. Moreover, countries might also will consider to revaluate the retain currency holdings. Soaring in geopolitical tension will bring up the risks in economic fragmentation, mainly on trade and technology.

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