Department of Business and Management.

Teaching: International Finance.

Crude oil: history, market analysis and effects on advanced economies.

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A.A. 2014/2015

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Three main effects of crude oil exporters on global economies: three different points of view.

Introduction.

Crude oil is a widely traded and important commodity in the world. It is a ware of great importance and one of the most significant production factors in many economies. In the 20th century easy availability of energy has been a key driver of growth and industrialization. Bulk of this energy has been generated from non-renewable fossil fuels; today oil is the single most demanded commodity in the modern world. Therefore, crude oil has a significant position in society as a crucial input to global, national and individual production and consumption. For this reason, it is a strategic resource that attracts the interest and the attention of nearly everyone on the planet. Modern society is heavily reliant upon fossil fuels more than any other energy resources, like natural gas or nuclear power or renewable energy or etc. Oil has powered the great economic boom of the past century and continues to drive the global economy affecting every aspect of daily life, since we use it for electricity, transportation and in every single fundamental step. Heavy dependence on oil, however, causes much concern more especially as regards to its scarcity, energy security and the climate change impacts of its use.

The international market of crude oil is well established and very competitive. Large numbers of producers compete to satisfy an enormous demand, implying that the price is determined in the world oil market. Crude oil is also one of the most liquid and strategically important commodity assets whose prices are the subject of intense interest for many various groups of people. Crude oil markets are continually expanding, transforming this fundamental commodity from just a physical asset into sophisticated financial products. This market is characterized by highly uncertain and volatile prices. Thus, understanding its price movement is crucial for successful economic and business decisions. Moreover, crude oil and energy commodities, in general, have very liquid futures contracts that are traded in exchanges every day in the financial markets.

The first section of this work introduces the crude oil market with a specific concentration to the history and its actual composition. Then, it will analyse the main derivatives market of oil with particular attention to the futures exchange structure, operation principles and size.

The second section of this study is dedicated to analyze three main effects of crude oil exporters on global economies. This section of the work will consider different points of view. In the first part it will consider the effects of crude oil crisis on the advanced economies. In the second part it will study different specific cases to describe the Dutch disease. At least, we will observe the petrodollar recycle effects on the global economies.

History and structure of crude oil market and its derivatives market.

1. History of crude oil market.

Before speaking about the history of crude oil market it is necessary to mark the difference about crude oil and petroleum products. Petroleum is the broad category which includes both the two commodities and the terms "oil" and "petroleum" are sometimes used interchangeably. The different terms are related to different stages of production. Crude oil is a mixture of hydrocarbons that exists as a liquid in natural underground reservoirs and remains liquid when brought to the surface. The petroleum products are produced after the extraction and the refineries process of crude oil and the extraction of liquid hydrocarbons at natural gas processing plants.

The previous distinction is really simple but also useful to speak about the history of crude oil and petroleum product markets. Because, until the 1900th century, the world didn't understand the real importance and possibilities of oil, this commodity was underexploited and the two differences didn't exist. But after 1800 all developed economies started an impressive growth and the rapid industrialization helped the boom of oil production and demand. Finally, this distinction was born in 1900th century because until this period all the oil was crude and the global market wasn't present, therefore we can divide the oil's history in two big parts, the first from ancient to 1800 and the second from 1900th century until now.

From ancient times to the beginning of 1900th century.

The first trace of the long crude oil history with humans started in the 6th Century BC when the army of Kir II, first shah of Achaemenid Empire (today Iran), used Absheron oil in weapons of fire to invade castles and cities. Another important proof of oil used by ancient peoples was in 450 BC when Herodotus described oil pits near Babylon. We know that oil was very important in many ancient and great civilizations of the world. Also, according to Herodotus, more than thousands years ago asphalts was used in construction

of walls and towers of Babylon. The historians of 325 BC described Alexander the Great used flaming torches of petroleum products to scare his enemies. After two century in the c100 AD, in his book *"Vite Parallele"* , Plutarch described oil bubbling from the ground near Kirkuk, in present day Iraq.

Source: http://www.amange.net/ ©Amanj Sharif 2012

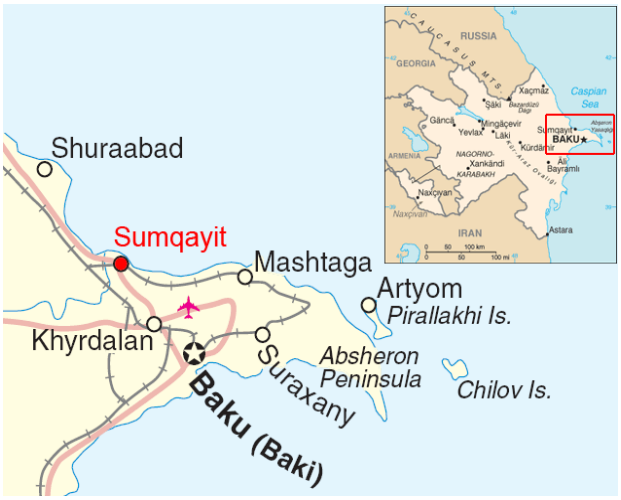
The Eternal Fire of Baba Gurgur is a name used to describe the flames of the Baba Gurgur oil field. It is estimated that the burning flames have been around for more than 4,000 years. The Eternal Fire was first described by Herodotus and after by other ancient Greek authors, such as Plutarch. The burning flames are the result of an emission of natural gas through cracks in the Baba Gurgur area's rocks.

In the first parts of oil's history the ancient Eastern peoples were really important. In the 347 AD Chinese reported to have drilled holes in ground using bamboo to extract oil[1].

[1] Brian C. Black (2012), *Crude Reality: Petroleum in World History (Exploring world history)*, Rowman & Littlefield Publisher Inc.

Baku and Absheron's importance.

The Absheron is a peninsula in Azerbaijan. It is host to Baku, the biggest and the most populous city of the country and also the town metropolitan area, with its satellite cities Sumgayit and Khyrdalan. Today Baku is the capital of Azerbaijan, as well as the largest city on the Caspian Sea and of the Caucasus region.



Absheron peninsula map.

Source: http://en.wikipedia.org/ (2014)

Today Azerbaijan have proven crude oil reserves at seven billion barrels in January 2014, this according to the Oil & Gas Journal (OGJ). In 2013, the Azerbaijan production was 881,000 barrels per day of petroleum and other liquids, but the consumption was only about 85,000 bbl/d[2]; this data can better explain the importance of oil in this country's economy. The long history of this state and oil started in the 8th Century AD when the historians described the Baku people used ground impregnated with oil for heating because of absence of wood in the regions. A hundred years later an Arabian traveler Baladzori described in his *"The Conquest of the countries"* that political and economic life on Absheron peninsula had been long connected with oil. Indeed in this region people were really related with oil, not only for energy, such as in the 12th Century AD when a unique medicinal oil from the Naftalan, an Azerbaijan region, was used to cure various health problems.

[2] Data provided by http://www.eia.gov/ , US Energy Information Administration.

Furthermore it was carried out in the other countries of the world. In the 1273 also Marco Polo recorded to have visited the Persian city of Baku and to have seen oil collected from seeps to be used in medicine and lighting. The importance of oil in the region's economy was soon clear. A lot of documents testify that it was cheap and brought lots of income to the Shah (the Persian controlled the regions until the 1722) every year. Azerbaijan is one of the world's oldest producing countries and has played a significant role in the development of today's oil industry. The turning point was the Persian campaign (1722-1723) of Peter I that resulted in Baku and Derbent being annexed to Russia. The same year the Russian Zar issued special decrees about the order of oil extraction. In a letter to major-general Michael Matyushkin, who governed Baku, he demanded sending *"one thousand poods*[3] *of oil or as much as possible, and to look for increase in production"*. In little time the Occidental started to understand the value of crude oil and this region was, in this period, the forefront of the oil's industry. Thus a lot of essays were written about the structure, the production and oil commodity characteristics. At the beginning of 1800 Europe and USA still used coal to illuminate the streets and to power the steam engine. In the same time in Absheron in the 1803 there was the first offshore oil extraction reported near Bibi-Heybat Bay from two hand-dug wells 18 and 30 meters away from the shoreline. The first offshore oil field ceased existence in 1825 because of a huge storm.

Until the middle 1800 in the Occidental world oil and petroleum products hadn't commercial and strategic values. Oil was available with vast reserves but the period was characterized by small-scale use. It was employed to produce drugs and medicines, but the mass production didn't exist and all the people could extracted it from the petroleum seep, a place where natural liquid or gaseous hydrocarbons escape to the earth's atmosphere and surface, normally under low pressure and flow. The main difference of this period was the impressive economic boom in the developed countries. The second

[3] The Poods are an old Russian unit of measurement equal to 40 pounds, or 16.3805 kg.

industrial revolution[4] changed, again after the first revolution, the life styles and the capitalism started to dominate the economy. It was not until the 19th century that scientific and entrepreneurial innovations began to change the world of oil. The following years saw an oil boom in the American West, the mass-production of the automobile and other technological developments that created an explosion of oil excavation, distribution and use. From the 1800 the new world equilibrium has been also created by this new commodity that would became strategic, in war or peace periods, for all the states and their economies all over the world.

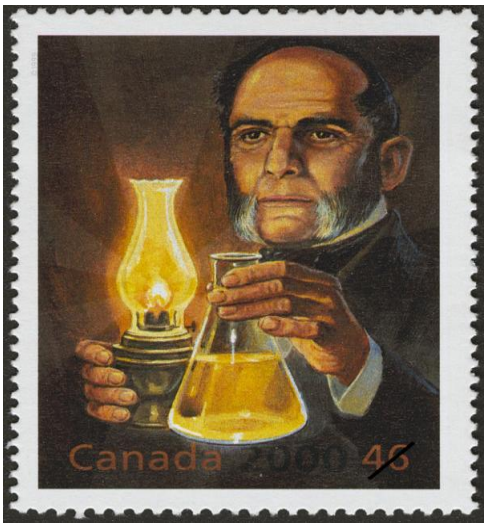
The great oil rush in North America and the Rockefeller empire.

The 1849 is the crucial date in the Western world oil's history. In this year North America countries discovered the oil possibilities. Before this date they had started the oil exploitation: in 1814 one of the first wells that produced oil, which was marketed, had been drilled near Marietta in Ohio. It had been drilled for salt water and the oil was considered as an useless by-product which often spoiled the well. Another pit had been discovered in the 1818 in the south-eastern Kentucky and it was known as the *"Beatty Well"*. According to some reports it produced upwards of 100 barrels/day. By 1820, oil from this well had been shipped to Europe and other southern states. However in 1846 in Baku there was the first ever well drilled with percussion tools to a depth of 21 meters for oil exploration. The great distance between the eastern and western oil's production was filled after the 1849 in short time by the future biggest economy in the world, the USA.

In the 1849 a Canadian geologist Abraham Gesner distilled a new lamp fuel from petroleum that he called kerosene. This revolutionary discovery has changed the crude oil market. The new cheaper, cleaner-burning fuel will eventually replace the use of whale oil in lamps. Thus the crude oil became attractive to all the common uses, like city illumination, a crucial market of the

[4] The first industrial revolution: 1780-1830.

1800 century. The margin of the oil company growth and this new market segment increased the production in short time where the new fundamental commodity was easily available, like the USA.



GESNER, **ABRAHAM** 1797-1864 physician and surgeon, geologist, and inventor. Though he never became wealthy from his discovery, Gesner will later be known as the "Father of the Petroleum Industry" and his invention was credited with helping save the whales.

Source: Library and Archives Canada/MIKAN 2266910
Credit: Library and Archives Canada; Copyright: Canada Post Corporation

The rapid expansion of oil market was impressive in the USA. In 1859, after ten years from the kerosene invention, a lot of studies indicated the possibilities that wide range of useful products could be made from petroleum. Different reports lend credibility to the idea that oil could be a profitable commodity. In 1859 the American entrepreneur George Bissell, by the Pennsylvania Rock Oil Company of New York, drilled oil near a well-known oil seep on Oil Creek in Titusville, Pennsylvania. On August 27, the company struck oil at a depth of 70 feet[5]. This is often cited as a key moment in the birth of the commercial era of petroleum in the USA.

The rapid expansion of crude oil market was crucial to a well-know American family, the Rockefeller. John Davison Rockefeller became a leading figure in the U.S. oil industry thanks to his entrepreneurial instinct and his genius to organize companies. In 1863, he and a partner founded an oil refining company in Cleveland. Rockefeller bought out his partner and in 1866

[5] The 70 feet are 21 meters. 1 foot = 0,3048 meter.

opened an export office in New York. The following year he, his brother William, S.V. Harkness, and Henry Flagler created what would become the Standard Oil Company. Several discovered wells had led to the creation of numerous firms and the Rockefeller company quickly began to buy out or combine with its competitors. Their purpose was to unite skills and capital thus by 1870 Standard became the dominant oil firm in Pennsylvania and the young formed company in little time controlled ten per cent of American crude oil refining and was the largest corporation in the country, with $1 million in capital. Pipelines early got a major consideration in Standard's drive to gain business and profits. Rockefeller observed this and he began to acquire pipelines for his company. Soon it owned a majority of the lines, which provided cheap and efficient transportation for oil, thus Cleveland became the main center of the refining industry. In 1877, after only seven years, the Rockefeller strategy, based on acquisition or fusion of competitors and integration horizontally and vertically inside the company of all the oil productions and transportations, enabled Standard Oil to control ninety per cent of American refining. After the oil production crisis because of the civil war (1861-1865) between North and South states, another recession damaged the oil's market. This time in 1879 Thomas Edison invented the electric light bulb; this new discovery made the kerosene lamp obsolete and thus the oil industry entered a recession[6].

Only the beginning of 20th Century gave an additional push to the crude oil market. Rockefeller's empire grew in the recession period to take advantage of all the small-medium competitors which hadn't sufficient margin to remain competitive in crisis situation. Meanwhile in 1882 the Standard Oil Trust was created and it controlled member corporations principally through stock ownership. The new oil boom in the U.S. was geographically different because of new areas like Mid-Continent states, Oklahoma, Texas and Gulf-

[6] Bennett H. Wall et al. (1988), *Growth in a Changing Environment: A History of Standard Oil Company (New Jersey), 1950-1972, and Exxon Corporation, 1972-1975*, McGraw-Hill.

Coast with California. On 1901 January 10, Spindletop, an oil field located south of Beaumont, Texas, produced a stream that spilled out 100,000 barrels of oil per day. Spindletop would soon turned Texas into one of the U.S. first oil-fueled boom states. Indeed a year after that discovery more than five hundred oil companies were chartered and many smaller companies developed outside the Northeast and the Midwest where Rockefeller and his associates operated. This new well oil ended any possible monopoly by Standard Oil. But as it grew in wealth and power it encountered great hostility from a vast segment of the public opinion. Standard fought competition by securing preferential railroad rates and rebates on its shipments. It also influenced legislatures and Congress through tactics that, though common in that era, were unethical. In 1911, after John D. Rockefeller had retired in 1895, the Supreme Court declared that the Standard Trust had operated to monopolize and restrain trade and it ordered that the trust dissolved into thirty-four companies. The splitting-off of the Standard affiliates proved difficult. But the 1911 decision ensured that, though the industry could have giants, they at least competed with one another[7].

First and Second World war.

The 20th Century started with two great inventions for human but also for the oil's market. The Model T by Ford made the automobile accessible to many Americans and drive consumers demanded for gasoline together with the airplanes demand. The oil industry had a vast new market for what had been for many years a useless by-product of the distilling process. As soon as the internal combustion engines created demand, refiners founded better methods to produce and improved gasoline. The USA companies also took advantages from the Russian revolution which stopped the oil production because of communist uprising. After the 1905 the only greatest players, outside the US, was the British and Dutch oil companies that had to disposal

[7] Brian C. Black (2012), *Crude Reality: Petroleum in World History (Exploring world history)*, Rowman & Littlefield Publisher Inc.

all the Empire to drill the crude oil from different parts of the world. The 1928 Group Agreement, better known as the Red Line Agreement, was a deal between different American, British, and French oil companies concerning the oil resources in the territories that formerly comprised the Ottoman Empire within the Middle East. This deal established the Seven Sisters that dominated the oil's market until the OPEC formation. They were the Standard Oil Company of New Jersey (later Exxon), the Standard Oil Company of New York (Socony, later Mobil, merged with Exxon), the Standard Oil Company of California (Socal, later renamed Chevron), the Texas Oil Company (later renamed Texaco), Gulf Oil (which later merged with Chevron), Anglo-Persian (later British Petroleum) and Royal Dutch Shell. However this great period of economic boom all over the world stopped with the First and the Second World War and the difficult economic period of the Great Depression started in 1929. During World War I, strategists from all the major powers perceived oil as a key military asset due to the adoption of oil-powered naval ships, new army vehicles, such as trucks and tanks, and even military airplanes. The use of oil during the war increased rapidly. Even in the World War II the Allied forces' access to oil was considered a crucial factor in their victory over the Axis powers.

The war period was important for oil's market because of geographical changes in oil's production. In 1932 oil was discovered in Bahrain, in 1938 in Kuwait and Saudi Arabia. The Western companies started to invest in this states where the profit margin was bigger than the original countries. The first example was in 1933 when the Saudi Arabia granted oil concessions to Standard of California that became California Arabian Standard Oil Company (CASOC). The oil discovery in the Middle East has changed forever the world history.

Post war period and OPEC foundation.

When the war ended, the United States engaged the problem of stabilizing the peace. The following years several important crises occurred in

many states where oil played a key role. The American Marshall Plan, created to solve that and other problems, was frustrated by the first Iranian crisis of 1950-1954, when in 1951 the British Anglo Iranian Oil Company was nationalized. In the same time the Saudi Arabia continued to contribute to the agreement with the Western companies. In 1944 CASOC had become ARAMCO (Arabian American Oil Company) and in 1950 ARAMCO had achieved an agreement with Saudi Arabia. The growing number of crisis in the Middle-East was due to a nationalism sentiment and awareness about the oil's importance in the Islamic states. All this factors were fundamental in the 1956 Suez Crisis when Britain, France and Israel attempted to regain control of Suez Canal, that had nationalized by Egypt the previous year. After the fast war resolution in 1960 an Arab Oil Congress was held in Cairo where was signed a "gentleman's agreement" for oil producing countries to have a greater influence on oil production and marketing. On September 14, in Baghdad the Organization of the Petroleum Exporting Countries (OPEC) was founded: the purpose was that of negotiating with Western oil companies on petroleum production, prices, and concession rights. The first five member nations of the cartel was Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela.

From 1960 to nowadays.

The OPEC foundation was the main aspect of 60's but also the oil's discovery in 1968 Alaska, in 1969 in the North Sea and the growing interest of Western companies to the African and South-America states have changed forever the crude oil global equilibrium. In the meantime the expanding conflicts between Occidental countries and the Middle-East, after ten years of nationalization by OPEC's members of the western oil companies operating in that states (1971 Libya, 1972 Iraq, 1973 Iran), founded his peak in the 1973 with the Yom Kippur War when Egypt and Syria attacked Israel. On October 17, OPEC member states declared an oil embargo against the nations that had supported Israel. The energy crisis saw oil prices quadrupled and the New York Stock Exchange lost $97 billion in share value, the worst recession since

World War II. Only on March 1974 Arab oil embargo on oil exports to the US lifted. The Middle-East showed the USA dependence on foreign oil. In 1975 Strategic Petroleum Reserve was authorized in the US and the Alaska oil pipeline completed. Despite these measures a second energy crisis occurred in 1979, after the Iranian Revolution. Iran was transformed from oil-rich autocratic pro-west monarchy, under the Shah, to an Islamic theocracy under the rule of Ayatollah Khomeini. In two years the oil prices rose from $13.00 to $34.00. Even in the 90's the OPEC countries contributed to the oil's price and the global economy instability. On August 1990, Iraqi forces under Saddam Hussein invaded Kuwait and seized control of the oil-rich emirate. Only one year later the Gulf War, Operation Desert Storm, Kuwait oilfields set alight by Iraqi military forces.

Today the middle-east continues to remain an instability areas, like we see the last two year with the Arab springtime. Yet the world changed in 1991 with the collapsed of Soviet Union. The huge Russian oil's market opened to the economy has changed the global economy but the crude oil and petroleum product price remains volatile and Ukraine crisis confirm it.

2. Present structure of crude oil international market.

The present market of petroleum products arise from history, all past and present political decisions, wars, geographic distributions and the most important aspect, not regulated by human decisions, the natural position of oilfields. The combination of all this matters has lead to the actual distribution of commodity all over the world. Furthermore it is continuing to change the productions, the consumptions and the reserves of the different countries. For all that the description of the present market of oil need to fix a specific date to show an effective picture of all its components.

Oil derivatives main different types.

The process of refining crude oil produces the oil derivatives. They are different depending on the composition of the crude oil and prospect uses. Even though the majority of oil refining is focused to the production of fuels oil and gasoline. Conventionally one barrel, unit of measure in this specific market, contains 159 liters crude oil, equivalent to about 135 kilos. The universe of products derived from the refining of crude oil is essential in life of peoples and for a large number of industries. The main derived products are divided in different specific categories that describe the purpose of the products. Typically one barrel of crude oil is converted around 55 % in two main fuels. A 23 % became diesel oil that could be light or heavy, depend on the production method, and 22 % gasoline utilized as general fuel or for home heating. Another 20 % is the fuel oil production useful for industrial and electrical firms and also the car's engine. A 7 % is transformed in the coal oil, a fuel fundamental to airplane. Instead a 5 % is used to produce the liquefied petroleum gas (GPL) and directed to heating necessity. An important 5 % is also dedicated to the asphalt production and its components, bitumen and tar, and 3 % is converted in lubricant. At least the remaining 5 % is altered by refineries and plants to produce manufactured products like petroleum ether, a chemical solvent, or plastic, paraffin and hydrocarbon that are useful to

chemical fertilizers creation and plastic materials[8]. Other important derived products are generated by crude oil refining like the methane, the propane, the butane, the naphtha (heavy and light) and the coke. All these are common fuels but with different form, liquid or gaseous, costs and uses.

This description explains how is important to refine the crude oil. Therefore all countries contemplate this commodity as fundamental.

Crude oil distribution of international reserves.

Crude oil reserves are fundamental to understand this complex market. It fixes the main players of today and future productions. A great quantities of reserves create a large bargaining power and also help to establish the main actors of crude oil price. This explains, only partially, the fluctuations and volatility which characterize the different indexes of crude oil prices, that we can find in the global negotiation every day. Indeed specific regional crisis, like past crisis in the Middle East, started prices increases for long periods, sometimes without control.

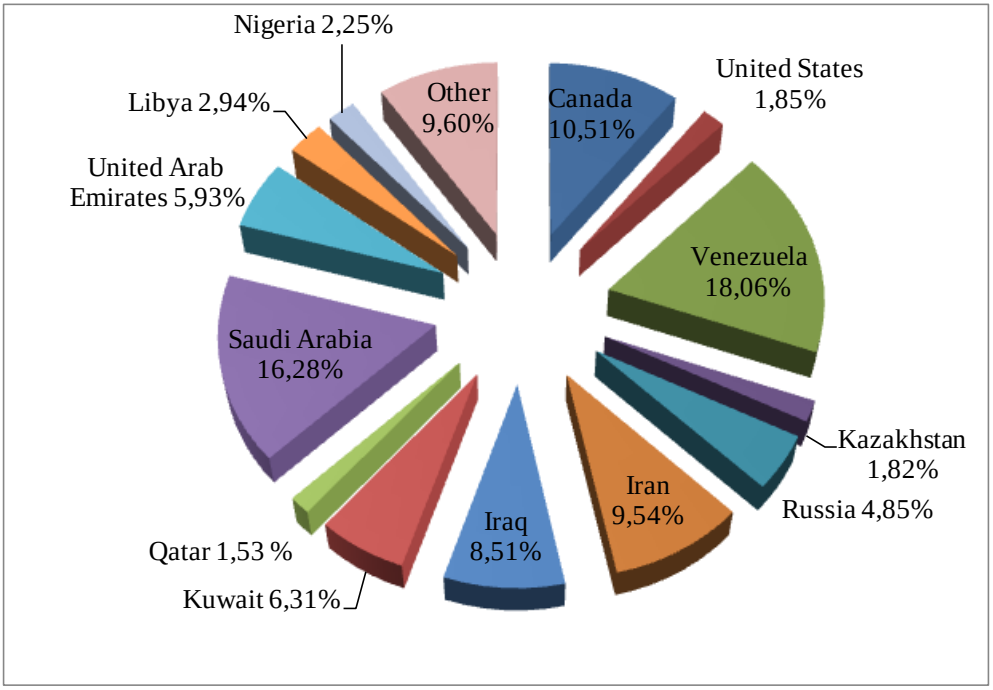
The analysis of quantities of proved reserves in 2014 showed a great disequilibrium in the market that affects countries all over the world and contributes to disclose this commodity as fundamental in the global political and economical balance.

The first and second states with higher reserves are Venezuela with 297,6 and Saudi Arabia 267,9 billion barrels. The other main countries with quantities higher than one hundreds are: Canada 173,1, Iran 154,6, Iraq 141,4 and Kuwait 104. Moreover, among the states with a great proved amount, we can find United Arab Emirates (97,8) and Russia (80,0). An important quantity of billion barrels of crude oil reserves, for market issue and influence, are keeping also by Libya (48,0), Nigeria (37,2), United States (33,4), Kazakhtan (30,0) and Qatar (25,4). Last year, all together, all this

[8] Percentage composition provided by *http://www.gasbuddy.com/Crude_Products.aspx* and *http://www.eia.gov*.

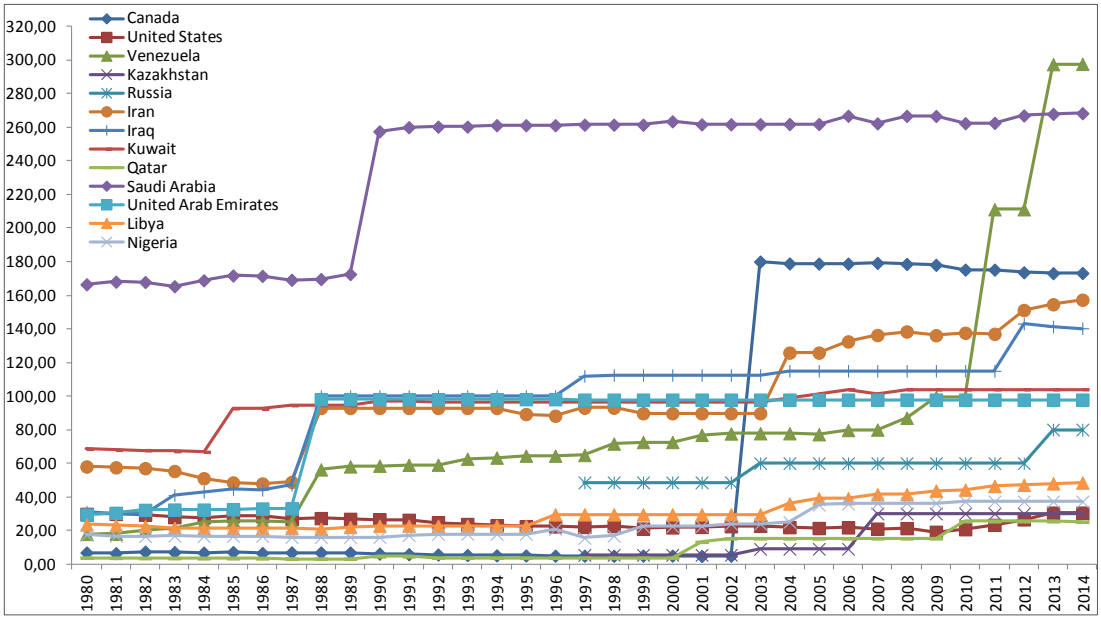
different thirteen countries had the 90,40 percent of total world crude oil proved reserves.

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web site.



The pie chart show the percentage crude oil reserves distributions in 2014.

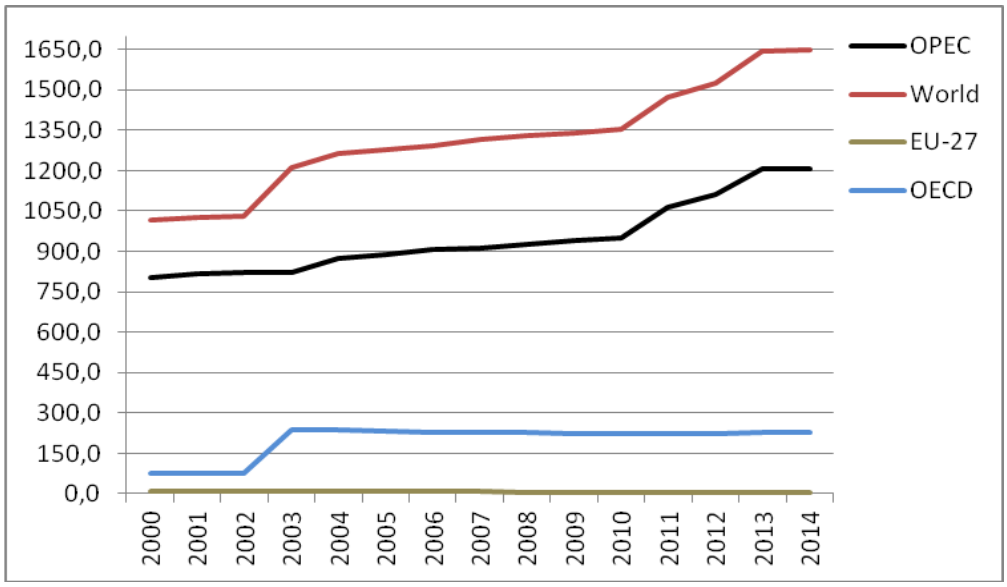
Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web site.



This chart represents the increasing reserves capacity in the 13 main countries. It shows also the periods of major discoveries and sector investments in each states.

Another important observation regarding the reserves distribution around the world is the OPEC organization supremacy versus the other organizations, like Europe 27 and the OECD.

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web



The analysis of reserves distribution contributes to better understand the actual production and demand of crude oil, and it can also help to realize the future scenario regarding this important commodity.

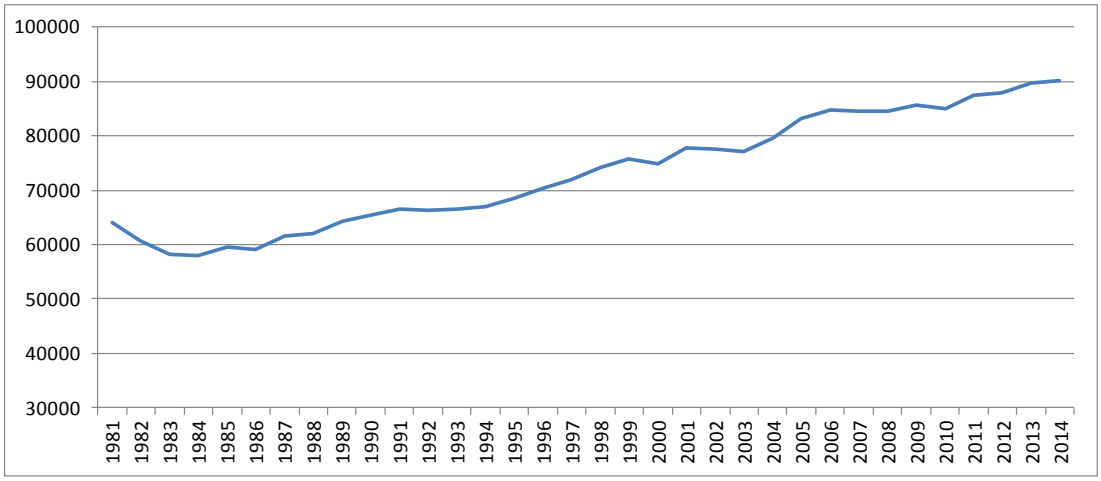
International oil production: main players.

Every year the crude oil production in each states can have two different purposes from an economic point of view. The first one is the use inside the country itself to satisfy the demand from all the national sectors, like domestic industry or family use. The second possible employment of crude oil manufacturing is the sale to other countries. From this last use the states can create surplus or deficit in global balance and also, depending on the quantity

and the price, some states deeply link to this production their positive or negative GDP forecast and national growth prevision.

In 2014 the total oil supply in the world was 90.109,314 thousand barrels per day. In the last twenty years the global aggregate crude oil production increased of 34,288 % and in the period 1994-2014, last ten years, the growth in the total output was the 13,193 %.

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web site.



Global crude oil production from 1981 to 2014, quantity in billion barrels per days.

The data analysis of total oil supply by country defines different facts to observe. In 1981 the larger production countries were only sixteen[9] and also in the last year, 2014, the number increased only barely for a total of nineteen states all over the world. In 1981 the larger producer had the 89,81 % of total world oil supply with an official quantity of 57.469,481 compared to the total amount 63.987,116 of thousand barrels per day. Instead, last year, the 84,34 % of oil production on the market was conferred to the nineteen greater manufacturers, 75.996,131 thousand barrels per day upon the whole, with a slightest decline to the total percentage.

[9] The definition larger means that in the specified year the country production was at least 1.000,00 thousand barrels per day.

Rank of the larger crude oil suppliers in 1981 and 2014. The production quantity is stated in thousand barrels per day.

1981			
Rank	Country	Production	Percentage
1	Former U.S.S.R.	11991	18,74%
2	United States	10809	16,89%
3	Saudi Arabia	10285	16,07%
4	Iraq	2526	3,95%
5	Venezuela	2246	3,51%
6	Mexico	2129	3,33%
7	China	2114	3,30%
8	Nigeria	2060	3,22%
9	Libya	1827	2,86%
10	Canada	1816,231	2,84%
11	Kuwait	1760	2,75%
12	United Arab Emirates	1747	2,73%
13	Iran	1683	2,63%
14	United Kingdom	1674,25	2,62%
15	Indonesia	1659	2,59%
16	Algeria	1143	1,79%
		57469,48	89,81%
	World	63987,12	

2014			
Rank	Country	Production	Percentage
1	United States	12342,501	13,70%
2	Saudi Arabia	11600,355	12,87%
3	Russia	10533,742	11,69%
4	China	4459,4127	4,95%
5	Canada	4073,8684	4,52%
6	United Arab Emirates	3229,5877	3,58%
7	Iran	3192,3704	3,54%
8	Iraq	3057,6915	3,39%
9	Mexico	2907,8338	3,23%
10	Kuwait	2811,8424	3,12%
11	Brazil	2693,8659	2,99%
12	Venezuela	2489,2424	2,76%
13	Nigeria	2371,5132	2,63%
14	Qatar	2067,2991	2,29%
15	Angola	1889,4155	2,10%
16	Norway	1826,0955	2,03%
17	Algeria	1762,746	1,96%
18	Kazakhstan	1658,275	1,84%
19	Colombia	1028,4737	1,14%
		75996,132	84,34%
	World	90109,314	

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web

The previuos table can help to examine the evolution of countries production in two very different moments of the modern history. First of all, the three top states remain the same despite the years spent. They are United States of America, Russia, that in 1981 was URSS, but after soviet collapse remains a greater productor, and at least the Saudi Arabia. Even if these three countries don't lose their position in these years, a deeper insight can evidence the drop in the percentage. Indeed in 1981 they had together the 51,70 % of the total amount production that in the 2014 dropped to a relative small part, the 38,26 %. This data can be explained in different ways. In part, a first reason lies in the URSS division with a split of the reserves and production in different states, that reduced, in the past years, the percentage of Russia and so the three top states presence. However the table represents another fact. Some nations, like China, Canada and United Arab Emirates, in these years, doubled their production and thus their presence on the market. Moreover, other countries entered in the competition with great percentages reached in few years, like Brasil, Qatar, Angola, Norway and Colombia. The increasing competition among the different states is a consequence of new researches, innovative extracting and manufacturing methods and also the growth and the shift of know-how to regions of the world, secondary in the 80's, that now are the main focus of the multinational corporations producing crude oil, like Africa, Middle East, South America and Ex-URSS countries.

As the past years the production geography turned completely given the new players of the market, the new technology, unused oilfields and other political and natural scenario. The next years the world crude oil production map is probably destined to change. Innovative tecniques are intended to transform the way to produce crude oil: the most important seems to be the shale oil[10].

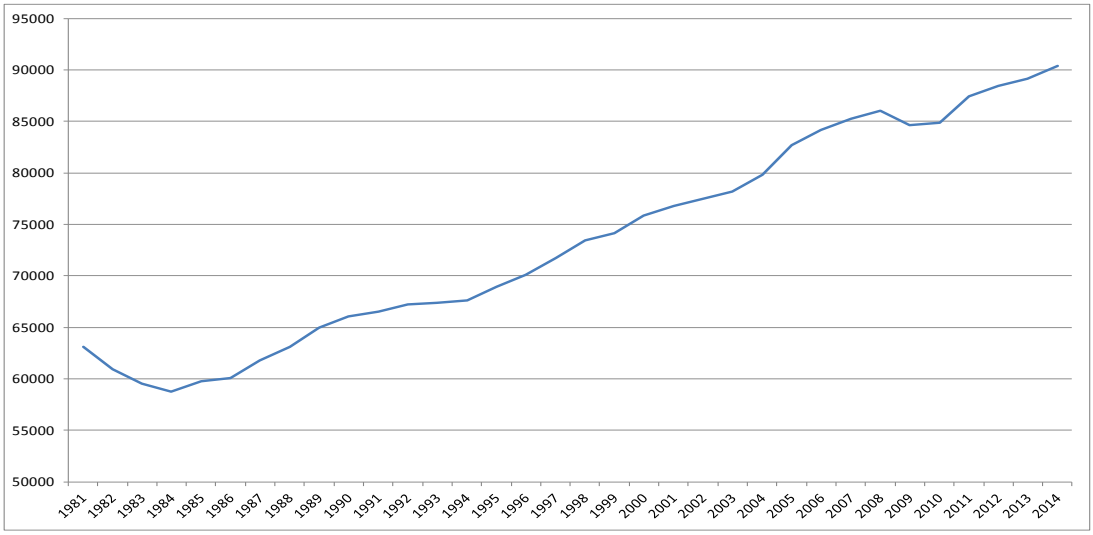
[10] Shale oil is an unconventional oil produced from oil shale rock fragments. This process converts the organic matter within the rock into synthetic oil and gas. The resulting oil can be used immediately as a fuel or upgraded to meet refinery specifications. The refined products can be used for the same purposes as those derived from crude oil.

World oil consumptions.

All along the crude oil and derived product global consumption is strickly tied to the growth rate. Indeed high quantity demand from all the countries is a specific characteristic of the expansion phase in the economic cycle. In reverse, low request is particulary frequent in the recession and depression phases. Despite the fluctuation given by the different economic situations, all the countries show the necessity to supply the quantity indispensable to families and industry uses that remain, in good or bad scenario.

In 2014 the world consumption in thousand barrels per day was 90.375,455. This quantity had a growth in the last twenty years of 43,181 % and in the period 1994-2014 the increasing percentage was a 31.114 %.

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web site.

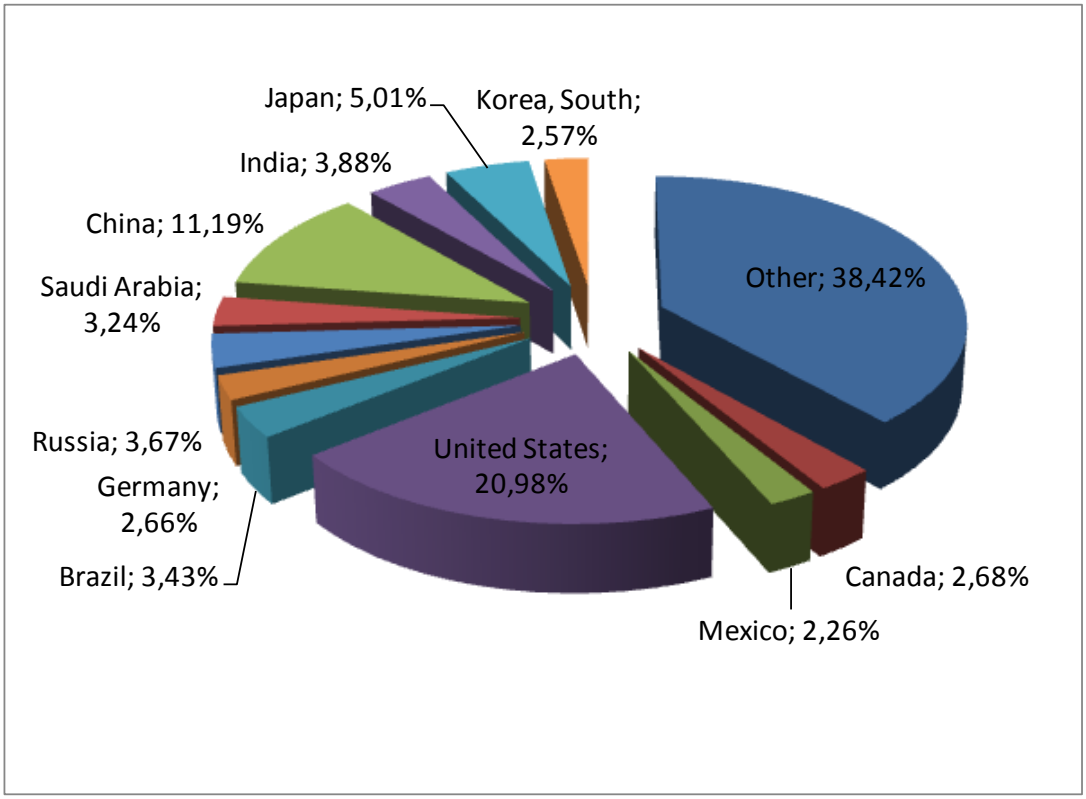


Global crude oil consumption from 1981 to 2014, quantity in billion barrels per days.

Last year the main consumer countries was the United States of America and China with huge quantities, over the 10.000 thousand barrels per day. The depression economic phase in Europe but, all over the world, the lack of growth didn’t contribute to the crude oil consumption. The other larger

users are located in different areas but with a majority in the North-Central America, where besides the USA, there was also Canada and Mexico with 2424,346 and 2044,27 thousand barrels per day. Another area of great importance was Asia where beyond China, India (3509,00), Japan (4530,825), Saudi Arabia (2925,00) and South Korea (2324,013) was a powerful consumer. The remaining great consumer countries was scattered in different areas like Russia (3320,00), Germany (2403,156) and Brasil (3097)[11].

Source: http://www.eia.gov/countries/ ; U.S. Energy Information and Administration web site.



The pie chart shows the percentage crude oil consumption in 2014.

[11] All the quantities indicated in the bracket are expressed in thousand barrels per day and are attributed to the 2014 for each different countries.

3. Main international market of crude oil and others commodity derivatives market.

Commodity market: real operating mode.

Despite the high profile and the importance of the trade items, the commodity market is one of the least well-known and more complicated. Probably one of the most popular is the oil market, but a lot of not expert investors don't know different matters like, what are the main trade assets, how this market operates and the reference contracts and structures to work in that specific scenario.

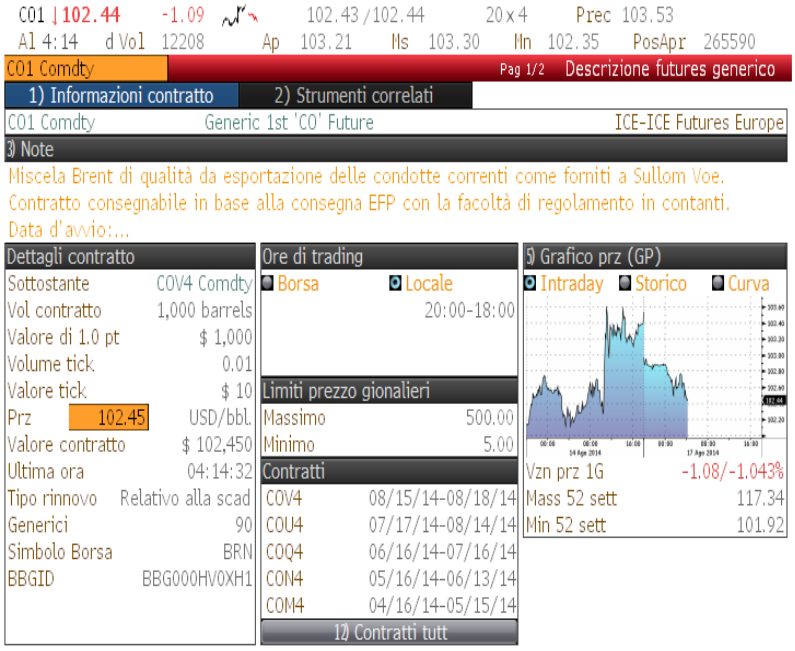
In former times the commodity market was not really developed, but it was present from centuries or millenials. The first idea and necessity behind their formation were really simple. In the 1900th all the farmers had to hedge the exposure to the low selling price and the acquirers wanted to protect their businesses from high prices. Even though the necessity was significant, the structures and terms of the contracts didn't hedge all the situations and the standardisation of quality and delivery of the commoditities was inadequate. Just in 1848 in the USA, the CBTO, Chicago Board of Trade, was founded. It was the main brokerage center between the farmers and acquirers. The great climb was given by the new contract established to fix some difficult matters, like the delivery date and price. The futures contracts were born and after the wheat a lot of new commodities started to negotiate in the market all over the world[12].

Nowadays the commodity tenses are traded in the exchanges markets, that can be regular or over the counter (OTC). The prime need to hedge the businesses risks is again the main motivation of trade, but from the Tulip

[12] Morgan Stanley IQ (2007), *Commodity Book, Guide to investments in commodity*, Morgan Stanley.

Mania[13], and the consequent bubble burst, it was clear that a new type of investors entered these specific markets, the speculators.

Today the real trading mode can happen in two different ways: spot and future contracts. The spot contract is *" a transaction where delivery and payment of the underlying asset take place immediately."* Instead the future contract is *" an agreement where two parties agree to buy or sell a specific asset in a future date. The price is fixed and it is called strike price. Also the quantity is decided in the settlement date but the delivery and the payment occurs at the future date."*[14]There are also other indirect ways to invest in the commodity markets, like purchasing or selling stocks in corporations whose price and business rely on their prices. Different instruments can be used to these specific investments, like mutual, index or exchange-traded funds, but the most common ways remain the direct buying or selling of the futures contracts.



The Bloomberg frame contains the description of a Brent futures contract.

Source: Bloomberg Platform.

[13] Tulip mania was a period (1636-1637) in the Dutch Golden Age during which contract prices for bulbs of the recently introduced tulip reached extraordinarily high levels and then suddenly collapsed. It was the first provided documentary evidence of bubble burst in the history of the world.

[14] F.S. Mishkin, S.G. Eakins, G. Forestieri (2010), *Istituzioni e mercati finanziari, Seconda edizione*, Pearson, Prentice Hall.

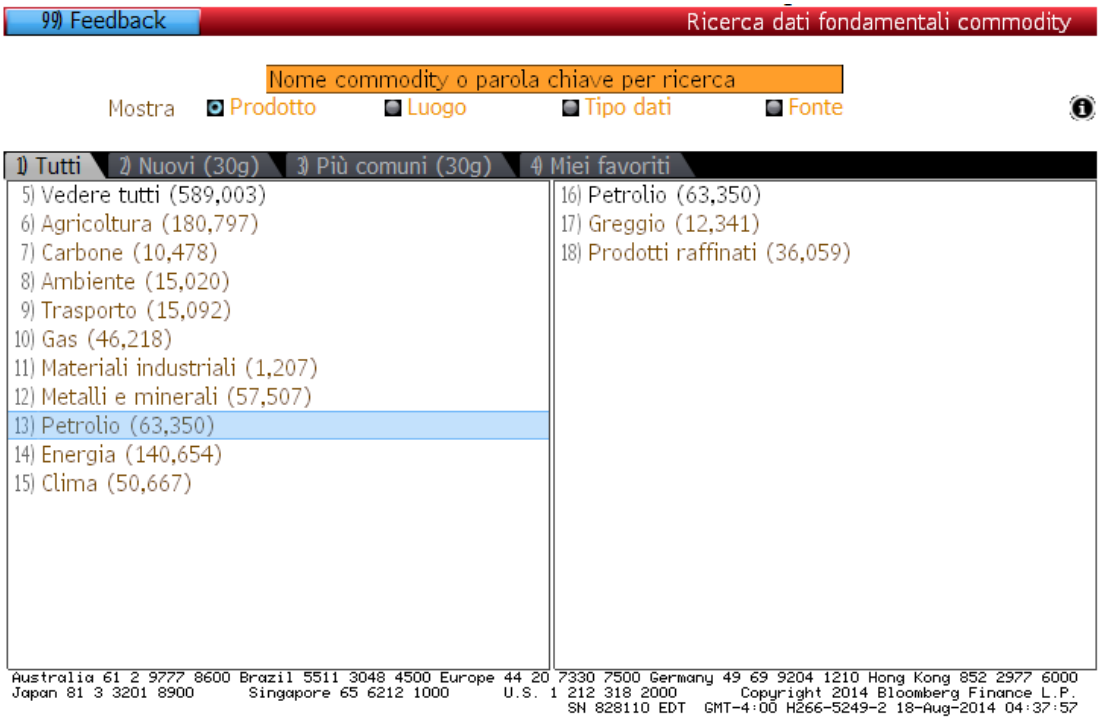
Description of all different commodity assets and main commodity exchanges.

The word commodity is generally widespread all over the world. Despite the English form derives from the French *commodité*, the meaning remains roughly the same. The term indicates a class of goods for which there is demand in the market, but the suppliers can't show qualitative differentiation between the same products; like also Marx expressed *"From the taste of wheat it is not possible to tell who produced it, a Russian serf, a French peasant or an English capitalist.*[15]*"* How the meaning of the word indicates, the commodity demand is the principal function of the price formation, given the inability to create differentiation inside the same base product.

Nowadays in the global market exist a lot of tradable commodities. A first and simplistic classification indicates two types: hard and soft. The hard commodities are tipically natural resources that must be mined or extracted. Instead the soft goods are agricultural products or livestock. Although the first distinction can be useful, a more deepen division can offer a complete view of the market possibilities. It's important to specify that the different commodities exchanges can trade various goods, depending on the region peculiarity and the most produced and common commodity. Therefore a full, global, specifical and joint complete list of all the available commodities is not possibile and useful to produce. Instead we can categorize the most important and traded goods. The metals can be divided in precious: silver, gold, palladium and platinum, but we find also the industrials like aluminium, nickel, copper, tin and zinc metal. An important energy section contains the natural gas, naphtha, gasoline, kerosene, heating oil and, obviously, the crude oil. Instead the agricultural commodities are: oats, wheat, corn and soybeans, also soybean mean and oil. We can also observe a specific section of livestock

[15] Karl Marx (1859), *"A Contribution to the Critique of Political Economy, part one, the commodity",* Progress Publishers, Moscow.

with different meats procuced and traded on each market. As last we find the colonial and tropical goods divided in cocoa, coffee, cotton, lumber, orange juice, tobacco and sugar.



Source: Bloomberg Platform.

The Bloomberg screen contains the commodity general division in that platform. Also it shows the numbers of specific trade possibilities for each different asset, with a total of 589.003.

The commodity exchanges markets all over the world are distributed in the different continents, each one with its specific characteristics, volumes and particular numbers of traded assets. Each year these markets negotiate approximately six hundred millions of futures contracts. The ancient one is the Chicago Board of Trade (CBOT) and still now it remains one of the greatest exchanges markets in agricultural products. Moreover it is included in the world most important commodities group the CME Group that represents the fusion between different US markets. The merger was done in 2006 between the CME (Chicago Mercantile Exchange), CBOT, NYMEX (New York

Mercantile Exchange) and COMEX (Commodity Exchange, the national market). Today this group represents the most important commodity market all over the world. Nevertheless outside the USA other exchanges markets are influential like the European London Commodities Exchange (LCE) and London Metals Exchange (LME). In Asia there are different powerful markets. In Japan the TOCOM (Tokyo Commodity Exchange) negotiate a large quantities of futures contracts relating to the crude oil and its derivatives products and metals too. Other Asiatic markets are the Chinese Dalyan Commodity Exchange, the Indian Multy Commodity Exchange that contains probably the highest numbers of tradable commodities. These are the most important, but a lot of small or medium markets are distributed in the different continents and countries, each one with its specific main products. As last outside the continental division system we find the ICE (Intercontinental Exchange), an American corporation that manage an important telematic commodity market.

Main international market of crude oil.

The crude oil and its various derivatives are the most commonly traded commodity. There are a lots of markets all over the world that exchange these products but the admitted landmarks indexes of crude oil prices are essentially two: the New York Mercantile Exchange (NYMEX) shares the WTI quotation and the ICE Futures in Europe gives the Brent valutation. These two qualities are the most important in the global trade and every day offer the price scenario in the world crude oil markets.

The WTI or West Texas Intermediate is the main benchmark of crude oil futures market and its price is fixed in New York. The great quality of this raw material is given by the low quantity of sulphur, that is a feature of the light sweet crude oil qualities. For this reason it produces, with the refining process, a high percentage of derivatives products. This specific crude oil is extracted in Texas and the primary exchange market is Cushing in Oklahoma, that it is also the delivery point. Indeed beyond the futures contracts, that

remain the main traded types, it is also accessible as spot contract by the international market with oil pipeline or direct delivery. The spot contracts minimum quantity is composed by one thousand barrels, and the May 2015 future contract has actually the value of 47,57 Usd/barrel, dollars per barrel.

This chart represents the one year price of the WTI crude oil stated in Usd/barrel, from the 25/03/2014 to the today date of 25/03/2015.

Source: http://www.marketwatch.com/

The Brent crude oil quality is the second important market all over the world. Its price is fixed by the ICE Futures and it is negotiated in London from the 23 June 1988. This specific crude oil is extracted from the North Sea and it is delivered directly by the Sullom Voe site, in the Shetland Island in the North of the Scotland. Also this variety of crude oil has the faculty to be traded like spot or future contract. In the spot contracts the minimum unity of negotiation is one thousand barrels and its multiples. The quotations are expressed tipically in dollars per barrel, but also the British pound could be

present. The May 2015 futures contract has actually the value of 55,36 Usd/barrel.

This chart represents the one year price of the Brent crude oil stated in British Pound/barrel, from the 25/03/2014 to the today date of 25/03/2015.

Source: http://www.marketwatch.com/

Outside these two important indexes and market the crude oil has a lot of other different variety, marketplace and quotation. Even though the benchmark role of the WTI and Brent crude oil, nowadays other important producing countries all over the world has their specific trading place. The price is not always the same within the great numbers of possible reality. However it is a simple explanation of different variables that can adjust the value of the underlying asset. Some prices can reflect the states condition, the trasport cost, the currency differences and other main types of possible various situations.

Three main effects of crude oil exporters on global economies: three different points of view.

1- Crude oil price crisis and its effects on advanced economies.

Brief history of oil crisis.

From the late 1940s, after the World War II, to the early 1970s, the price of crude oil was very stable, moving up only lightly. The price volatility didn't exist. In the USA, from 1948 to 1972, the price of oil produced was influenced by the production quotas. These quantities were established by state regulatory agencies, like TRC (Texas Railroad Commission). They made forecasts of petroleum demand for the following month and set the production quotas to meet its objectives. Obviously, the quantity of oil produced was adjusted to meet demand and, in this manner, the price of oil remained highly stable.

The first oil price shock happened in the 1973. The reasons of that were different: the USA production declined with the beginning of 70's, the OPEC formation started to restrict the Western power on the quantities and prices decisions and, in August 1971, the end of Bretton Woods agreement didn't peg the dollar value to price of gold; thus the currency depreciation damaged the oil producers interests, because the crude oil value was priced in dollars. Even though these different motivations the real trigger event was the Yom Kippur War between Israel and Egypt and Syria, which started in the October 6th 1973. The United States and many countries in the Western world showed support for Israel in the conflict against the Arab side. Several Arabian exporting nations, including Iran, imposed an embargo on the Western countries supporting the enemy. The same year the US ally, the Shah of Iran told to the New York Times: *"Of course [the world price of oil] is going to rise. Certainly. You [Western nations] increased the price of wheat you sell us by 300%, and the same for sugar and cement. You buy our crude oil and sell it back to us, refined as petrochemicals, at a hundred times the price you've paid*

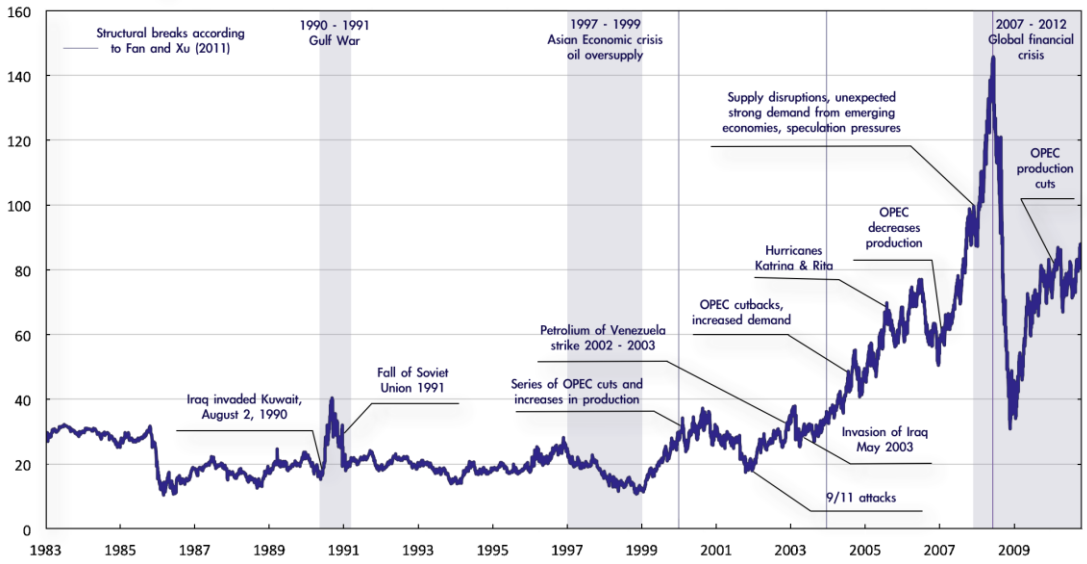
to us. It's only fair that from now on you should pay more for oil. Let's say ten times more."[16] The price of crude oil rose and quadrupled from the starting $2.48 per barrel in 1972 to over $11.58 per barrel in 1974. The Yom Kippur War ended in defeat for the attackers the same years in the October 26th but the embargo, and its effects, continued until the January 9th 1974 when Israel recalled the troops from Egypt.

From 1974 to 1978, the world crude oil price was relatively stable around the range $11.58 to $14.02 per barrel. The second oil price shock struck squarely the United States of America. Even other Western countries were hit by this crisis but the major effects could be founded in the USA. The economic situation was difficult, given the recession and high inflation all over the world; this new situation was called stagflation. In 1979 and 1980, events in Iran and Iraq led to another important round of crude oil price rose. Sure enough after massive protests, the Shah of Iran, Mohammad Reza Pahlavi, escaped his country in early 1979. The protest soon appointed as new leader the Ayatollah Khomeini. Protests disrupted the Iranian oil sector, with production being greatly cropped and exports suspended. Furthermore another conflict burst in the Middle East between two important producers and exporters Iran and Iraq. These two nations were important but the effects could be smaller considerated the little part of exportation in the USA. However the latest past crisis led to an excessive reaction by the American citizens. The combination of all these situations, the Iranian revolution, the Iraq-Iran War, provoked crude oil prices to more than double increasing from $14 in 1978 to $35 per barrel in 1981.

After the OPEC controlled the oil prices in the '70, several Western countries started different national energy programs to fight the high dependence of economies from imported crude oil. Furthermore new states began to discover, with new techniques and investments, a lot of oilfields, and

[16] Smith, William. D. (1973), *"Price Quadruples for Iranian Crude Oil at Auction"*, New York Times December 12.

introduced other supplier outside the OPEC organization. From 1983 to 1986 the effects of weakening demand and higher supply (some OPEC states didn't respect the quotas production) led the crude oil price to collapse and reach the low value $8 in May 1986. Later the price downfall there was relative stability at around $18 per barrel between 1987 and 1989, thus the price remained stable until 1990.



Source: Bc. Julia Mustivaya (2012), *Crude oil co-movement with other representatives of energy and non-energy commodity markets*, Charles University in Prague.

This graph represents crude oil prices movement correlated to main historical events all over the world, from 1983 to 2012.

In 1990 the Iraq invasion of Kuwait generated the Gulf War. This conflict was provoked by the outstanding debt that Kuwait had collected during the Iraq-Iran War and, in addition, from oil overproducing that, in Iraqi idea, continued to lower prices and hurt oil profits in a time of financial stress. The war lasted only nine months after the NATO intervention and victory against the Iraqi forces. Despite this fast conclusion the price of oil hiked to $40 barrel in little time. At the end of the war in 1991 the oil prices entered a period of steady decline falling to lower value of $14.74 per barrel in 1994. The price then turned up mainly due to a strong growth of US economy and a

fast booming of the Asian Pacific region[17]. From 1994 to 1997, these events led the world oil consumptions to increase, and also the prices recovered value but only with a vertical, constant and stable movement.

In 1997 the rapid price increasing ended. The main explanation was the Asia economic crisis. The impact of this continental instability was undervalued by the OPEC and non-OPEC suppliers. The Asia oil consumption declined after a long period of incessant growth, thus the lower demand in the global market beat the producing countries. Indeed the production exceeded the needs and only a great quantity of reduction in the supply stopped the price decrease. After two years the crude oil value touched the bottom and started to increase. In the period of 1999-mid 2001 the price remained in a large band of value, 20-40 per barrel, given the growing of USA and world economies and the suppliers movements to regulate the prices.

The break point was the September 11, 2001, the day of four attacks by the terrorist group of al-Qaeda against the United States. It was the started point of the third oil crisis. Indeed the crude oil price started to growth for different motivations and for a long periods of time, from the 2001 to the 2008. The geo-political events and natural disasters, indirectly related to the global oil market, had strong short and medium terms effects on oil prices. The terrorist attack created a mood of tension between the Middle East and the USA. This climate led to the American declaration of *"War on Terror"* with different successive wars or interventions in countries like Afghanistan, Iraq, Yemen and Pakistan. These events contributed to the price rose but not only these was guilty. Political events like North Korean missile tests, Iranian nuclear plan in 2006, conflict between Israel and Lebanon and also natural disaster as Hurricane Katrina had continued to maintain and expand the tension and changeable situation around crude oil productions. From different points of view, other events carried the situation to the limit. Meanwhile,

[17] Mahmud Suleiman (2013), *Oil Demand, Oil Prices, Economic Growth and the Resource Curse: An Empirical Analysis*, Surrey Energy Economics Centre (SEEC) University of Surrey.

inventories remained low in the US and other OECD countries: the global economy and the US demand was increasing, while also Asian was growing rapidly. The 2004 price rose was caused by unexpectedly strong demand and growth from China. Moreover also the high market speculation guided the price's increase. Thus a great fear was connected to the impossibility of satisfying the growing demand. Following all these situation, the oil price reached record levels in July 2008 with the benchmark of European crude reaching $147 per barrel.

The situation changed completely from July to December 2008. The economic crisis started and the global oil demand collapsed. Oil prices fell down from the July 2008 high of $147 to a December 2008 low of $32 per barrel, more than 75 % value loss at the end of the year. The following years the prices recovered a great parts of the loss value. In the period 2009- end 2010 the volatility increased but also the price returned to high levels. The values pegged in a range between 80-110 $ per barrel in the period 2011- end 2014. Actually all the commodity price experienced a high value decline. Also the crude oil main benchmarks are quoted to low levels, because the suppliers quantities are larger than the current demand necessity and because the dollar strength affects the commodities prices that, at present, lose their ensure quality against dollar depreciation.

Different types of oil crisis.

The historical analysis points out the existence of different types of oil shocks and crisis. The macroeconomics effects and dynamics affect and create the distinction between the different kinds of oil shock. The main and most common distinction is between supply and demand crisis. Many of the oil price shocks prior to 90's were clearly linked with interruptions in physical supplies from major countries in the Middle East, like Iran, Iraq, Kuwait and Saudi Arabia. These situations contrast suddenly with today's oil market, where the rapid demand growth by Asian countries, like China and India, bolstered by demand expansion in the United States, have been key drivers of

recent oil price movements. In essence, oil price shocks have become a demand rather than supply phenomenon.

The supply oil shock derived from the 70's experience of oil crisis. An easy definition states that they are unexpected events that modify the oil supply resulting in a sudden change in its price. They can be negative, when supply decreases, or positive, when it increases. If we want to simply explain the effects, we assume that the aggregate demand is unchanged or inelastic. In this case a negative supply shock will rise price upward, while a positive supply shock will exercise a downward pressure on it. The two 70's oil crisis were all originated from a low supplies level against higher demand quantities in the global market.

The demand oil shocks are typically introduced and studied from the modern oil crisis. The Asia economic fell down of 1997 and the following period of overproducing of crude oil was the first example of oil demand shock. A general definition states that a sudden surprise event that temporarily increases or decreases demand for goods or services, is a demand shock. A positive type increases demand, while a negative one decreases it. In both cases they have a directly proportional effect on the prices of the underlying assets. Nowadays the crude oil price is experiencing a global demand decline together with the production increasing all over the world; thanks to new technologies' introduction, this is the typical situation of negative demand oil shock.

Other theories and analyses consider important also the distinction between the external or internal shocks sources. The supply or demand crisis can be really different, in terms of intensity and macroeconomics effects, depends on the origins of the critical situations. A great distinction there is especially among the internal demand driven shocks that should be examined quite differently from either the external demand driven or the other supply driven shocks. At least in terms of macroeconomics studies it is also important the distinction between the exporter and importer countries. Clearly different

kind of shocks can damage in different ways the most important, namely the countries with higher weight in the market, importer or exporter nations, depending on the different possible combination of crisis situations.

The macroeconomic analysis.

Brief literature review.

The tool we will use in these macroeconomic analysis is the New Keynesian Phillips Curve (NKPC). This theory and formula emerged from the studies about the Dynamic Stochastic General Equilibrium (DSGE) model. However the history of NKPC formation had as fundamental the 70's oil shock effects, the stagflation.

The first important result is the evolution of the original Phillips Curve. In 1958 Phillips found that in the United Kingdom, from 1861 to 1957, there was a stable and negative relation between the inflation and the unemployment rate. Also Samuelson and Solow confirmed the new discovery using USA data. In little times, in the 1960's, this instrument became an integral part of advanced countries macroeconomic policy, in their pursuit of low unemployment rates. Even though the theory's great success, the same years two important academics, Edmund Phelps and Milton Friedman, challenged independently their theoretical support. They proposed an expectations-augmented Phillips curve where the expected inflation played a fundamental role. In the original version the inflation expectations were modeled, adaptive and geometrically distributed lag of the past actual inflation. In reverse, the new theory stated that, to obtain a constant actual inflation rate, the expected rate would finally converge to the actual and, also, the unemployment rate would lay down at its natural rate[18]; in this way, they introduced the idea of "*non accelerating inflation rate of unemployment"* or NAIRU. In this new model there wasn't long run tradeoff between inflation and unemployment.

[18] Andreas Hornstein (2008), *Introduction to the New Keynesian Phillips Curve*, Federal Reserve Bank of Richmond Economic Quarterly.

The 1970's provided a large confirmation of Friedman's and Phelps's theory and their argument became more widely accepted because of this long periods of simultaneous high inflation and large unemployment. Thanks to these events the macroeconomic studies accomplished two fundamental steps. The first one was about rational expectations. They play a crucial role in the new theory concerning the Phillips curve. Previously it seemed necessary to turn some arbitrary assumptions on the expectations mechanism, but the new ideas stated that the expectations are such that they don't lead to systematic mistakes, given the available information. For this purpose, macroeconomists started to assume that expectations are rational. The second innovation concerned about the macroeconomists work with model-consistent expectations. They started to study the optimal choices of economic agents in explicitly specified environments, the general equilibrium analysis.

All these changes led to several improvements in the macroeconomics models and studies. The general equilibrium program in macroeconomics started with Lucas, in 1972, and continued in that period with the real business cycle theory that, as its name suggests, obtained the prices behavior over the business cycle, thus indirectly assuming that money is neutral. In the middle of 1990's the economists worked on the assumption that the money isn't neutral. Then they started to introduce nominal price rigidities into these models, now known as Dynamic Stochastic General Equilibrium (DSGE) models[19]. These different researches created the New Keynesian Phillips curve, that relates actual and expected inflation, not to the unemployment rate, but to a measure of the aggregate marginal cost. Even the NKPC model has two different types. The first one is the model inspired by Calvo price-adjustment, where the firms get to adjust its price that is fixed over time, with some probabilities. The other one is the NKPC hybrid form the evolution of Calvo's idea about the firms price model. In this new type the firm has a *"rule of thumb"* that simply indexes their price to the aggregate inflation rate. Thus we have two different

[19] Karl Whelan (2005), *Topic 7: The New-Keynesian Phillips Curve*, EC4010 Notes.

forms of this theory where in the second one, the lagged inflation rate is included in the formula and analysis.

The New Keynesian Phillips Curve model.

Different empirical and theoretical studies underlined the effects of oil shock on advanced economies. The great point of interest was the mechanism of propagation of these events to the inflation rate in these countries. However after the oil crisis modification, the shift from supply to demand oil shock, other questions arose, like whether the effects on the gross domestic products (GDP) and inflation rate of advanced economies changed, and the reason why it happened.

According to Blanchard and Galí studies (2010), the definition of oil shock involves an episode of cumulative change in the log price of oil above the 50 % and sustained for more than four quarters. There is also a large acceptance regarding two issues about oil shock. The first one is that, in 1970's crisis, the supply oil shock was driven by political or war events in the OPEC countries, but in the recent periods the shocks are driven by augmented or decreased demand from emerging economies.

Table 7.2 Oil shock episodes: Change in inflation

	O1	O2	O3	O4
Canada	4.7	1.8	2.2	0.5
Germany	0.1	2.6	1.1	–0.2
France	5.4	3.1	1.3	0.5
U.K.	10.2	4.3	0.0	0.5
Italy	7.7	5.6	1.0	–0.1
Japan	7.9	1.0	–1.7	0.9
U.S.	4.9	4.0	1.7	–0.2
G7	4.8	1.9	0.3	0.0
Euro12	4.3	2.7	1.3	–0.5
OECD	4.9	1.8	0.1	–0.5

Table 7.3 Oil shock episodes: Cumulative GDP change

	O1	O2	O3	O4
Canada	–8.3	–1.0	–1.5	3.2
Germany	–9.6	–3.5	1.3	–2.5
France	–7.6	–4.4	0.6	1.2
U.K.	–16.4	–9.2	0.4	2.5
Italy	–8.6	0.4	3.0	–2.0
Japan	–16.1	–4.4	7.6	3.3
U.S.	–13.3	–11.8	–3.7	7.1
G7	–12.6	–7.7	–0.2	3.9
Euro12	–9.1	–2.9	1.0	–0.4
OECD	–11.2	–6.5	0.1	4.1

Source: Olivier J. Blanchard, J. Galí (2010), *The Macroeconomic Effects of Oil Price Shocks:Why are the 2000s so different from the 1970s?*, University of Chicago Press.

These two tables represent the effects on advanced countries of four different oil shocks. Where O1 indicates 1973–1974, O2 the 1979–1980, O3 1999–2000 and the O4 2002–2007.

The second one is that the macroeconomics effects on advanced economies have changed and reduced over time. The main empirical study about oil shock fixed these issues in the economist world[20].

The New Keynesian Phillips Curve original equation is:

$$\pi_t = \pi_{t+1}^e + \lambda mc_t + \varepsilon_t$$

The different variables in that formula are:

π_t = inflation rate in period t.

π_{t+1}^e = inflation expectation in the period t+1.

λ = structural parameter, capturing the Phillips curve's slope.

ε_t= a random variable that considers the possibility of exogenous shock. In our consideration this variable will be zero, thus we excluding this possibility because we aren't interested regarding the shock outside the oil market.

mc_t = the marginal cost of the firms in the economy. This variable is structured in this specific and fundamental formula:

$$mc_t = (1 - \alpha_m)(w_t - p_t) + [\alpha_m + (1 - \alpha_m)\phi]o_t + (1 - \alpha_m - \alpha_n)n_t$$

Where these variables represent:

α_m= the part of oil in the advanced economy (m) production.

w_t= the nominal wage level in the period t.

p_t = the price level in the period t.

ϕ = the part of oil in the advanced economy (m) consumption.

o_t = the real price of oil in the period t.

[20] Olivier J. Blanchard, Jordi Galí (2010), *The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s so different from the 1970s?* , University of Chicago Press.

n_t= employment in the period t.

Before applying the NKPC model to the macroeconomic effects of oil price crisis in the advanced economies, we need to clarify the different mechanisms of propagation of these shocks. We found two main rounds effects. The first one includes the fuel increased or decreased price. Goods and services are a direct content of oil, for example through the transportation, thus they perceive directly the change in oil prices. They are included in the consumer price index (CPI), influencing the inflation rate. Other effects are the direct impact of oil shock on the energy components of the index together with the indirect elements that have large content of it. The second round effects are strictly related with the macroeconomic reactions to a change in oil prices. The two most important impacts are typically related to the wage indexation to inflation and the lack of central bank credibility after an inflation tension.

Oil supply shock.

Substituting the mc_t formula in the main NKPC model, we can analyze the effects of the different oil shocks in the advanced economy, m. Now we suppose an exogenous contraction in the oil world supply, driven for example from some tensions in the Middle East, like the 70's oil crisis. This shock will increase the oil price, o_t. The substitution highlights the first consequences in the formula. The inflation directly increases its value, giving the high price that impacts the α_m and ϕ costs. The first round magnitude effects in the m economy depend on different parts. The first one is the coefficient of o_t, the:

$$\alpha_m + (1 - \alpha_m)\phi$$

This part of the formula contains the oil consumption and production parts in the economy, thus large level of this two main quantities lead to strongest consequences. The other variable responsible of the force of oil shock is λ, the structural parameter, and its size directly proportional to the inflation raise. The other two secondary effects observed in the 70's oil crisis were the

nominal wage indexation and the lack of central bank credibility. Our model makes simple the observation of these impacts. In 70's, for example in Italy, the wage indexation to inflation was widespread. We observed that, after an oil shock, the oil price increases and directly, in the short time, also the inflation rate. This first effect if the economy m has some degrees of nominal wage indexation (larger degrees are worst), leads to nominal wages' rise in the medium and long periods. When w_t increases, together with the o_t rising, the α_m suffers a double impact. The oil price is already discussed in the first round effect and it will boost the inflation rate. The wage effect has essentially the same result. However this time the coefficient hit is the economy oil's production part:

$$(1 - \alpha_m)$$

it will increase the marginal cost in two sides. The wage indexation leads to a spiral second round effect on the inflation rate, where after to a wage increasing, it follows an inflation augmentation that nullifies the wage real impact on the economy; typically it hurts the consumption level. A radical view may consider that these double effects, wage and oil prices increasing, on the marginal cost and inflation rate, could lead to the great reduction of the production part in the m's economy.

The other secondary effect that affected the advanced economies in the 70's was the lack of central bank credibility. This scarcity is strictly correlated to the inflation expectations control. Now we continue to consider the m's economy situation. The oil shock drives high the price and the actual inflation rate. Like the formula indicates, this value is related to the inflation expectations besides the marginal cost part. While the first round effect and the nominal wage indexation hit the economy, another problem appears. The shock leads the inflation higher and whether the central bank isn't able to show the capacity to tie the inflation fixed target to the inflation expectation of the period t+1, π_{t+1}^{e}, the market agents could anticipate the movements

directly discharging the expectation effect on the actual inflation rate. This lack of credibility will be expensive to stop. Moreover the inflation expectations increase will lead the inflation to a spiral process, similar to the previously wage effect.

Thus we see that the oil supply shock in this advanced economy, like in the 70's, damages different parts. Typically the price increased first effect was the inflation rate increasing. After it beats the consumption and the production sides of the economies and, at least, also the unemployment rate increased.

Some empirical studies indicate that the macroeconomics effects of oil shock have reduced after the crisis in the 1970's. The m's economy representation indicates some possible reasons. The first motivation is outside the advanced economies control, it is the change from oil supply to demand shock type. The other considerations concern the mechanism of propagation which was protagonist in the 70's. There are important structural changes in the advanced economies that justify the smaller effects of recent oil shock. The first one regards a minor value of share oil production and consumption in the different countries; this declines the economy exposure to the oil prices increasing and the intensity of the shocks. The other two differences are related to the second round effects. The lower or none nominal wage indexation helps the economy to eliminate the risk of inflation spiral increasing. This is a natural consequence of the globalization which raises the competition in the labor market and decreases the labor or trade unions power in the advanced economies. The last improvement regards the monetary policy. A lot of institutions introduce a systematic response to the inflation, with the entry of new rules. Furthermore they increase their credibility to anchor the agents inflation expectations to the fixed and decided value.

Oil demand shock.

Consider the NKPC model and a world economy where two countries have trade relationship. The first one is the advanced economy m, that we

analyze beforehand. The second one is the fast growing emerging economy, eme. The formula of NKPC inflation is working for all the two states.

$$\pi_t = \pi_{t+1}^e + \lambda mc_t + \varepsilon_t$$

And also the marginal cost formula has the same efficiency.

$$mc_t = (1-\alpha_m)(w_t - p_t) + [\alpha_m + (1-\alpha_m)\phi]o_t + (1-\alpha_m-\alpha_n)n_t$$

However the different economic maturity leads to different assumptions that characterize the different variables in the marginal cost formula.

The first variable α_m indicates the part of oil production in the two countries. The economy m has great maturity and a smaller part of its economy is based on the oil production. On the contrary the growing eme economy uses a large part of oil production in its firms. Thus the first assumption is that:

$$n\alpha_m < \alpha_{eme}$$

where $n \geq 2$.

The other two variables w_t, p_t are also really different in the economies. The nominal wage level in the m economy is higher than eme given the ripeness of the society and the wage protection level of the workers. Even the price level is higher in m than eme because of the great purchasing power that allows a major quantity consumption of the different products present in the price level index. Thus we create other two assumptions:

$$w_{t;m} > 2w_{t;eme}$$

$$p_{t;m>}2p_{t;eme}$$

The other variables aren't really different thus we can accept that they are similar in the two countries. The last main assumption concerns the oil price, o_t. They are both oil importers countries and the price is decided by the exporters that establish the same level for the two countries. Thus the real price level don't differ in the advanced and emerging economies.

In the described situation the marginal cost of emerging firms is really lower than the equivalent in the advanced economy. Given this starting state, suppose the economy eme increases the productivity, the costs of goods produced in eme diminish. At the beginning the trade relation will be a benefit for all the two countries. The m economy will import to minor price the eme's goods, decreasing its inflation rate, and also, given the richer situation in the eme's economy, they will increase the exports amounts. All the gross domestic product in the two countries will increase, given the higher productivity and wealth in the emerging countries, and the exports benefit in the advanced economy. However the growing demand in all the two countries to the goods exports increases the production quantity and necessity. The oil parts of production by all the two countries grow together, despite with different levels. Now suppose that the oil demand increase is too high to be satisfy by the oil exporters countries. The problem this time is in the demand side. Because of its fast growing, demand will surpass the supplier production possibility. The first and clear effect in the market will be the oil price increasing. All over the world the suppliers give higher price level all the countries. Thus the oil demand raising in the emerging countries will lead economic effects also to the trade partner, the m state. The situation will be really different now for the two states. The eme country will suffer higher marginal cost, given the high level of the part of oil in the production, and it will drive the inflation to increase. This economy will probably suffer a great decrease in the GDP and inflation rates rise. However we will concentrate on the effects on the advanced economy m. Previously in the first part of higher productivity by eme state the increased trade with the emerging economy helps to keep the inflation rate low by the decrease in the import price side. Moreover the m's GDP rises given the goods demand by the emerging country. Nevertheless the rapid production increases in the emerging country, where the oil level in the production is double than in m, but it pushes the real oil price up. All importers countries will suffer a production cost increase and a possible inflation rates rise. This time the m states will not hit by the oil

price. Indeed the first effect of higher production costs and inflation rise will be surpassed by the secondary positive reaction given by the depressing importing costs and low oil part in the economy production.

This distinction in two phases effects is one of the solution to the completely different and low consequences in the advanced economies in the oil demand crisis after the 70’s. Several important empirical studies report this results on the advanced economies.

2- Dutch disease: the theory and the case.

Brief history and definition.

Miguel de Cervantes, the celebrated 16th century Spanish author, once said that *"the gratification of wealth is not found in mere possession or in lavish expenditure, but in its wise application.*[21]*"* At that time the Spain's kingdom enjoyed new found access to an extended wealth of natural resources, a great quantity of gold, from the America' colonies. Probably he could have recognized, in his country, the symptoms of what later became known like Dutch disease. If a country discovers substantial amounts of crude oil, gas or other natural commodities, it will begin to export these goods causing a substantial increase in its gross domestic product (GDP). Furthermore this will increase tax revenues, improve the current account and create employment opportunities. However countries, who discovered oil or other commodities, have often gained much less than we might imagine.

The economic term "Dutch Disease" was first stated in the magazine *The Economist* published in November 26, 1977, after the discovery of the large Groningen natural gas field in 1959. This term has been used for other similar cases all over the world since it was coined with the economic crisis in the Netherlands in 1970's and 1980's. This first proven case of Netherlands was originated by the natural gas discovery in 1950's and 1960's, at the deep inside of the North Sea, when they started to extract it dramatically after the developments in its technology. Indeed, in this period there was the primary commodities boom after the World War and the Netherlands experienced a vast increased in its wealth after the discovery of the large natural gas deposits in the North Sea. Unexpectedly, this positive development had serious consequences on several important segments of the country's economy. The commodity booming sector gained a large amount of profits because of its

[21] Miguel de Cervantes Saavedra, Spanish writer, novelist and poet; author of the masterwork "Don Quixote", 1547-1616.

augmented export and, also, the Government profited from increased amount from the taxes revenues. Gas exports had led to a flow of foreign currency, which increased demand for the guilder and thus made it stronger on the currency market. The appreciation of the Dutch currency, the guilder, followed the gas export boom, caused inflation that brought about reductions in competitiveness and profitability of the manufacturing and servicing sectors. Moreover large foreign currency revenues were repeatedly spent for the development of gas production and thus the exchange rate was continuing to raise. In this manner other sectors were put in a difficult situation on the international market, they became uncompetitive because the high exchange rate arose. Loss of competitiveness meant the rapid decline in their outputs, investments and incomes. At the same time, these sectors were forced to raise the wages to keep sufficient amount of labor force meanwhile the booming sector increased its outputs and, thus, their wages. In addition, the government used the vast but temporal revenues from booming natural gas sector to enrich the social welfare services, which would have left the big burden of tax payment after the boom in primary sector has gone. The extra foreign currency entered the country, was converted into local currency, and it was spent on goods that cannot be traded across borders, like construction or certain services. As foreign currency was changed into local, the money supply rose and the extra domestic demand pushed up the domestic prices. That resulted in an appreciation of the real exchange rate and the country was continuing to lose its competitiveness. Finally, in an attempt to stop the guilder from appreciating too fast, the Dutch government kept interest rates low. That provoked investment to spill out of the country, crushing the future economic investments. From 1970 to 1977 unemployment increased from 1,1 % to 5,1 % and the corporate investment fell down. The Dutch economy faced a serious depression due to this inappropriate fiscal and monetary policies that resulted in the economic crisis, containing the increase of unemployment and the decline of export and competitiveness in the international market, especially for the manufacturing industry.

The economic term, Dutch Disease, is today officially accepted not only for the case in Netherlands but for all other countries with same or similar problems. In fact, there are multiple examples, mentioned by different economics studies, that can be considered as Dutch Disease. Such as: gold and other kind of wealth moved from the Americas into Spain in 16th century, the gold rush in Australia in 18th century, the discovery of oil in the North Sea by two European states, United Kingdom and Norway, in 1970's to 1990's, and finally the current oil production in Russia.

This is the history of the first event of Dutch Disease and major effect and consequence on the interest economy. This phenomenon is considered one of the fundamental mechanisms explaining the purported natural resource curse, that include various mechanisms potentially detrimental to growth. However we need to fix the definition of this phenomenon. The most common and complete describes the Dutch Disease as the phenomenon of the contraction of the traditional manufacturing sector, due to the rapid expansion of the extractive sector. It also include all the negative consequences arising from a large increases in a country's income; this is typically associated with a natural resource discovery or a substantial increase in natural resource prices, but it can also result from any large increase in foreign currency, including the foreign direct investment or aid. Another consequences of the process is the increased specialization in the resource and non tradable sector leaving the economy more vulnerable to resource specific shocks. The term disease exactly derives by the appreciation of the real exchange rate and the factor reallocation among the different industrials sectors. In a simplistic description we can note that the currency inflows lead to currency appreciation, making the country's other products less price competitive on the international export market. Also, it leads to higher levels of cheap imports and can lead to de-industrialization; as consequences the industries, apart from the new resource

utilization, move to cheaper locations[22]. These effects are prejudicial to the manufacturing base of the economy, especially the trade exposed and the previous industries emerged before this new discovery. All this factors sometimes can lead to what is called premature de-industrialization. Such a phenomenon is obviously a main threat for resource rich and developed economies and also for the growing economies or the small or not developed countries that found the opportunity to obtain new wealth in a different way from the characteristics or low evolved country's sector. Nevertheless relying the entire economy on raw materials carries a series of risks. Indeed the volatility of the price of raw material are more variable than those of manufactures; so the Dutch Disease, with the increase in the commodity exports that drive up the value of the currency, makes the other parts of the economy less competitive and leads to a current account deficit and creates even greater dependence on commodities, especially to the small or the underdeveloped countries. However sometimes they must accept the opportunity together with its challenges to compete against the possible disadvantages given by the bad uses of this important economic growth fly opportunities.

The macroeconomic studies and analysis.

Brief literature review.

Our macroeconomic analysis will concentrate on the Corden and Neary model of 1983. They found their studies on an hypothetical small open economy where a booming sector can create de-industrialization. However also another important theory develops a different application of the Dutch Disease phenomenon. It is the resource based model of international trade the Heckscher–Ohlin, published for the first time in 1933, where the Dutch disease can be explained by the Rybczynski theorem, developed by a Polish

[22] Michel Beine, Serge Coulombe, and Wessel N. Vermeulen (2012), *Dutch Disease and the Mitigation Effect of Migration: Evidence from Canadian Provinces*, CREA University of Luxembourg and University of Ottawa.

English economist in 1955. Moreover there is another broad literature on the Dutch Disease that, until the mid-1990's, concentrates most of their empirical studies to validate the presence of this phenomenon in a lot of countries. The paradox of plenty is what most social academics use to describe the so-called resource curse that occurs to many resource intense economies. It affirms that a lot of nations with large deposit of natural resource often perform worse with regards to countries with fewer quantities but with higher economic development and good governance. Formerly during the 1970's and 1980's the poor economic performances, despite their abundances in natural resources, of different countries of Latin America and Africa was compared to the economic success of the Asian Tigers, which are poor in that terms. Moreover other observation from different empirical studies indicated that the natural resource extraction supported the raising in the living standard while failing to produce a self sustaining national growth. In addition, to these failures, the observations indicate the high possibility of weak democratic progression, corruption, and even, in extreme cases, civil war. The different empirical studies observed an extensive relation between this phenomenon and diverse examinations like the decrease in output, lose on competitiveness, creation of income inequality and periodic growth collapses correlated to the high price volatility. One of the most important empirical studies was the Sachs-Warner published in 1995. It constitutes the base and most comprehensive empirical work on the Dutch Disease. The authors prove, using an extensive empirical work across different countries research, how, on average, nations with a high value of resource based exports to gross domestic products have inclination to demonstrate lower growth rates[23]. However, the second half of the 1990's was also the period when the general validity of the Dutch Disease was questioned by a large numbers of empirical works. The most important illustrated that the Dutch Disease basic and essential

[23] Bernardina Algieri (2004), *The Effects of the Dutch Disease in Russia* , ZEF – Discussion Papers on Development Policy Bonn.

hypotheses are particularly rigid and contain a large number of specific assumptions that reduce the real application.

Today the empirical analysis is continuing together to the theoretical studies. But the past attention to the effects on the economies and the different developments correlated to diverse countries type (advanced and low resource versus transition economies with a large quantities of resources) leave the field to another and, less examined, parts. Indeed the past attention on the main and directly consequences on the economy is moved to a different points of view where the reason of the long term decrease in nation, with an abundance of natural wealth, is reached in the political decisions and fiscal, monetary and welfare policies. This new studies underline how the extended resources discoveries in all the kinds of countries are an opportunity and the disadvantages' effects on the economies are strictly correlated to the improper political decisions.

The Corden and Neary model.

The original version of the model was entitled: *" Booming sector and de-industrialization in a small open economy."* The title of this work introduce some characteristics of the analyzed economy. The main structure adopted is the small open economy. These two are important characteristics because they establish that the economy is price takers, indeed it participates in the international trade but it is small compared to the rest of the world that its policies do not affect other incomes, interest rates or prices. Now consider this economy has three sectors: two are traded and the last one is a non traded goods sector. The first two sectors are the following. The booming export sector, we assume that it is a natural resource (crude oil), and the traditional export sector, we assume the manufacturing. The last one is the non traded goods sector which supplies domestic residents and might include retail trade, services and constructions. We assume also that all outputs are used in the final consumptions. Now we set the different sectors as:

x_e = the energy sector, related to the natural resources.

x_m = the manufacturing sector, traditional exporting sector.

x_{nt} = the non traded goods sector, related to the domestic market.

All these three sectors have different price levels. The $p_e$and $p_m$are fixed by the international markets, counter the $p_{nt}$is fixed by the domestic demand and supply movements. The first important model assumption derives by this price conditions. Indeed the real exchange rates, RER, is:

$$RER = Y_{nt}/Y_m$$

where the terms are:

Y_{nt} = non traded goods output.

Y_m = manufacturing sector output.

The other model assumptions are:

the full employment in the labor market. This means that:

$$L = a_{e;l} + a_{m;l} + a_{nt;l}$$

where:

L = total labor force in the economy.

$a_{x;y}$ = the quantity of y factor used to produce one output of x factor.

Also the model assumes that there isn't spending for capital accumulation, the international capital are static, thus mobility from abroad capital is excluded and, hence, the capital account and current account in the country are in balance position. At least the model exclude all the possible interferences from the political or monetary decisions. Sure enough the inflation is excluded, there is no monetary and exchange rate policy (exclusion of money and

nominal exchange rate) and there aren't fiscal and industrial policy (no interest rate possible change).

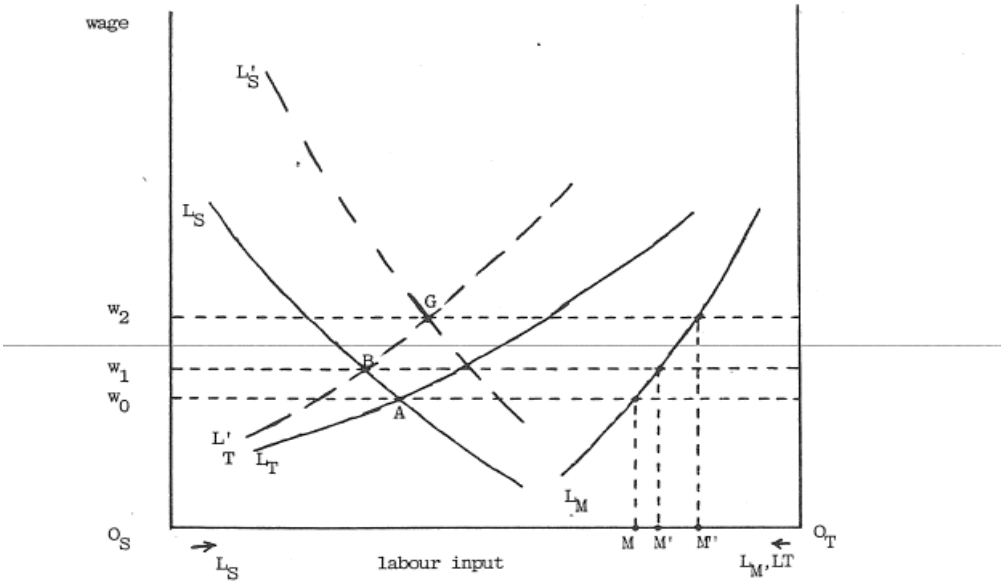


Figure 1: Impact of the Boom on the Labour Market

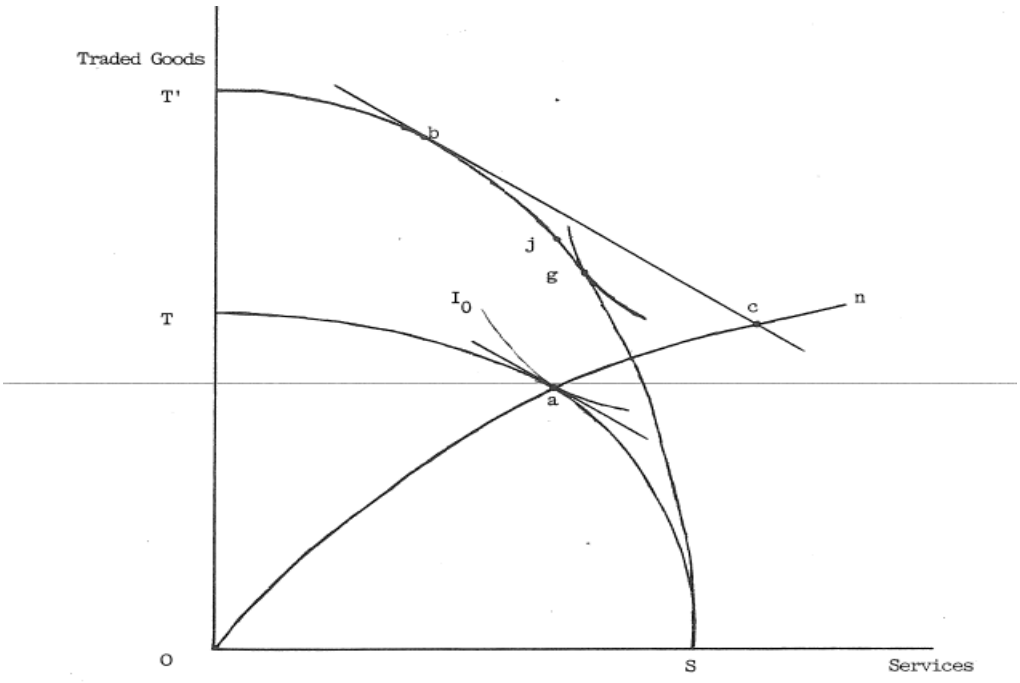


Figure 2: Impact of the Boom on the Commodity Market

These graphs represent the impact of the boom on the labor and commodity market in the Corden and Neary original model.

Source: W.M. Corden and J.P. Neary (1982), *Booming sector and de-industrialization in a small open economy*, Institute per international economic studies, University of Stockholm.

Crude oil discovery and Dutch Disease effects.

Given this model's structure and assumptions we can analyze the effects on the small open economy of a country new large oil field's discovery.

Firstly we have to describe the situation before the boom. The total labor supply is composed by O_{nt}, the labor input to the non traded sector, and the O_t, the labor supply to the energy and manufacturing sectors that have this composition of $O_t = O_e + O_m$. The wages are represented in the y axis and w_0 is the initial value. The labor demands are represented by L_{nt}, the labor demand in the non traded sector, that intercepts the L_t, the labor demand in the two traded sectors, $L_t = L_e + L_m$. At least we have L_m the labor demand in the manufacturing sector. Before the discovery we have an equilibrium in the labor market in the point *A*. Also the commodity market has the equilibrium in the point *a*. This is shaped by the TNT curve (in the graph is the TS curve), that represents the production possibilities curve, and the I_0 curve of the indifference curve. The *a* point of equilibrium indicates also the initial price of services, the national price level, and (given the formula $RER = NER * (\frac{p_{soe}}{p_{int}})$ where NER is the nominal exchange rate, p_{soe} the price level in the small open economy and p_{int} the international fixed price level) the real exchange rates that are given by the slope of the common tangent to the two curves.

Now consider a large oil field's discovery. The first effect is the resource movements, where a jump in the country's oil resources raises the value of the marginal product of labor in the energy sector. Thus it pushes the equilibrium wage level up, generating a movement of labor from both other sectors, the manufacturing and non tradable, to the energy sector. The result is a limitation of the manufacturing sectors. In the model and graphical terms the

booming sector effects crowd out the employment and labor demands in the other two sectors. The wage level increase from $w_0$to $w_1$and the curve of the traded labor demand shifts to L_t^1. However the increasing wage level and the higher request in the labor demand of the energy sector decrease the manufacturing employment level. The new equilibrium in the point *B* which shows the direct de-industrialization effect in the manufacturing sector where the $L_{m;0}$ passes to a new low $L_{m;1}$ level. In the commodity market the discovery of the new oil's field lead to a shift in the TNT curve to T^1NT because the oil sector output increase lead to a new T^1point but the NT level of output decrease, with the initial RER doesn't change. Thus in the commodity market the new equilibrium *b* describes this situation.

After this immediate effect we have another movements depending on the spending effect. Indeed the boom of oil sector leads to increase the national income, which can generate the increase in the imports from foreign nations or to domestic absorption for all the sectors. Assumed that the prices of the two tradable sectors are set on the international market, this effect results in increasing the price level of the country of non tradable relative to tradable and, as consequence, the real appreciation of the exchange rate, that leads to an appreciation of the domestic currency. Finally, a further increase in the wage, together to these new effects, creates another part of bids for labor and capital out of the manufacturing sector; this is the second indirect phase of de-industrialization. In the model market of labor the second step of the Dutch Disease is described by the increase in the wage from $w_1$to w_2a higher level of wage that contributes to deteriorate the manufacturing sector situation. This increase is given by the shift from L_{nt} to L_{nt1} of the non traded sector where the higher price neutralizes the demand raise, given by the incomes increase in the countries. As a consequence the labor demand in the manufacturing sector continues to decrease from the past point of $L_{m;1}$to the new low level of $L_{m;2}$. The commodity market effects lead this time the consequences on the labor market. Indeed the wage and labor demands increased in the market are given

by the national services' demand that, to be eliminated, reaches a higher level of price. This new level leads to increase the RER and appreciate the domestic currency. Following the traditional consumption pattern the point *c* would be reached, as consequence from much more spending for services. However since the non tradable sector become so expensive after the elimination of the surplus demand in the national market, the resource effect will continue to guide the economy, continuing to decline especially the manufacturing sector.

The described effects are the main consequences of Dutch Disease in the described small open economy. The situation doesn't assert that resource boom makes the country poor but, as the real appreciation occurs, a great imports of tradables crowd out the domestic tradable sector, the manufacturing sector, enhancing the production of non tradable and booming sector. Although the country experiences significant economic improvements in the short run due to a substantial raise in revenues from the raw material exports, in the long run the effect may be different. In the model the countries will continue to specialize in that sector where the competitive advantages will drive the profit, thus theoretically the crude oil sector in this economy will continue to grow. However in the real world an unexpected change in the commodity situation can lead to decline in the economy. Furthermore long periods of inactivity lead to lose the competitive advantage in the manufacturing sector, that is founded by the "learning by doing process". The time will consume the country's competitive position in manufacturing from which it may be difficult to recover, given the high importance of the know-how in that sector. In this way this sector will not replace the crude oil in leading the economy, given the loss of competitiveness in the international market. This argument is particular relevant for transition no developed countries which have to define their competitive position in a globalized world.

The possible solution and preventions instruments.

The previous model and a large parts of the assumptions lead to the conclusion that the actual impacts of natural resources discovery and exploitation, or other Dutch Disease phenomenon, on an economy will depend on a large extent on country's policies: fiscal, monetary and exchange rates decisions and, finally, the spending and structural. Different instruments can be used to fix different problems.

The fiscal policy is the main instrument for engaging with the negative impacts of Dutch disease for different motivations. Primary, it is a tool that can make the temporary increase in wealth permanent. Also, it can restrict the spending effect and it can smooth expenditures to reduce the volatility in the country. Different empirical studies evidence that government spending is correlated with the increases in resource revenues. Thus the idea to save these revenues abroad and reduce the aggregate spending or, according to this philosophy, to distribute the spending over time, will reduce the impacts on the country's economy. Another possible choices could be the introduction of fiscal rules that define how much of the resource revenues can be spent and how much saved in a specific natural resource fund. Even though an adequate revenue management doesn't always require to establish a special fund, an increasing number of countries have institutionalized this fiscal rules to create it. A sovereign wealth fund is a government saving scheme where they have a specific decided purposes and strict rules that govern the payments into and out of its; the incomes from oil revenues aren't spent but they are saved to give a future income streams to the national economy. The idea of including these resources into the general budgetary system of the country helps to control the decisions against the impacts of Dutch disease and also to pursue some development objectives. However a fund policy cannot resolve the complex fiscal policy but it can only aid to create a positive one. Another possible linked solution to the fiscal policy is the higher tax on luxury services and luxury imports. This would prevent the economy becoming too deformed

towards a luxury services which may not be sustainable in the long-term. We can assert that a good fiscal policy, when the Dutch Disease should be engaged, would be balanced between two main and totally different needs: the first is to implement development objectives and the second is to constrain the spending effect.

The monetary and exchange rate policies are two really important instruments in the short and medium-long terms. The first important choice, in every national policy, is the decision of an appropriate anchor for the monetary approach. It is especially difficult to locate and fix in a macroeconomic contest of a commodity exporting country. Indeed, the choices to fix a specific target could lead to a nearsightedness decision in the monetary authority, especially, in periods of greater change in the price or demand that can trigger crisis in the booming sector of the economy. The inflation target is an example of good instrument all over the world to adjust the monetary policy according the objectives. Nevertheless it could bring the monetary policy to react strictly when a commodity prices increase could lead some appreciation pressure on the exchange rate. Recently, the researchers developed more appropriate forms of price targeting in commodity exporting countries but some of these indicators are more difficult to make transparent to the general population. Including in the monetary policy the exchange rates decisions are really important. In the model we see that the domestic currency appreciation is a strong and devastating effect in the manufacturing sector because it contributes to reduce the already damaged revenues. Limiting the rise in the real exchange rate is an important decision. It can be limited by purchasing foreign bonds to keep the value of the relatively domestic currency lower. Instead the ideas of reducing foreign capital flows could be reached if a country moved from a budget deficit to a budget surplus, it would attract less foreign investment to purchase the government bonds. Thus the lower capital inflows would limit the rise in the exchange rate. Another difference is founded also in the fixed and floating exchange rates. In the second case the monetary policy decision to keep floating the rates will increase the foreign

purchase of the domestic currency, creating the previously described situation in the model, the disease in the national economy. However the cost and effects of this operation are really uncertain in the long terms movements of the exchange rates without the other policies support.

The spending and structural policies are important and correlated instrument to the other. A country full commitment to the Dutch Disease resolution problem must include these two important strategic steering. If a country spends the proceeds from the booming sector on the infrastructure and education, the government reallocates the taxes to improve the national infrastructures. Also the improving of spend quality to ensure that non tradable sectors productivity increase together to the structural changes is important. A better public transport, education and investing in technologies will create positive effects on the national economy. All these investments help to improve the competitiveness of manufacturing export sector and help them to fight against the higher wages and exchange rate. A country that directly spends to tradable rather than non tradable helps to slow the impact of the spending effect. If the spending effect hits even the private, general policies of the improving productivity of the private firms help to reduce the impact. Politics that encourage imports will reduce the demand pressure on the non tradable sector and, therefore, may be part of the policy response. The countries can start other reforms that don’t necessarily involve a large quantities of expenditures like the improvements in business regulations, the reductions in red tape, reduction of monopolistic barriers that discourages innovation and other improvements in the overall business climate that can create a new discipline about how it regulates and creates a more predictable environment for businesses. Outside the business side also the greater equality of distribution can diminish the effect. They are worse when wealth is concentrated in the hands of a few billionaires because there is a market increase in luxury goods and services. Also a greater income distribution enables a more diverse economy. Finally, different studies reported the immigration as weapon to many economies to keep the real wage growth

down. They have to encourage the immigration to try to reduce the increases in the national wage level and the re-allocation in the stricken sectors.

3- Petrodollar recycling and its effects.

How do oil exporters recycle their revenues? This question arises after the long analysis of crude oil market and macroeconomic impacts we have illustrated in the past chapters. This critical claim is really important given the large amounts of proceeds that the oil exporting countries have at their disposal. Furthermore, it is fundamental to consider the balance of payments roles in the advanced economies and the correlation of oil imports to their surplus or deficit. Therefore, the way oil exporters reserve their revenues has important implications for the oil importing countries balance sheet.

Definition and brief history.

The terms petrodollar was introduced by the professor of economics at the Georgetown University, Ibrahim Oweiss in the 1973. Today, the petrodollar recycling refers to the reflows to the rest of the world that result from the use that oil exporting countries make of their oil receipts. However these phenomena were born in the 1970's. As we described in the previous chapter, in that period the oil price rose dramatically and the money earned from the sale of oil to advanced economies increased, especially in the Middle Eastern countries, where, also at the present day, the petrodollars are the primary sources of governments revenues, and the OPEC nations members. Today, the definition and the phenomenon have been extended in the recent years to all major oil exporting players. In fact, these funds represent a massive amount of investment capital and they are often exploited on the financial markets all over the world. However they could be used also for national development purposes, like improving the industrial capacity, removing or reducing the citizens' taxations and creating a better welfare state or national healthcare. A typical example is the Asian nation of Brunei Darussalam where, given the enormous wealth derived from oil and gas productions and exports, the government can provide for all medical and scholastic services.

In the past years the oil shock and the lack of equilibrium in the global balance led to large inequality in the oil importing and exporting countries. Two major developments in the international economic landscape happened over the past years, from the 1970's to nowadays.

The first one is the large global external imbalance created by the oil trade; the most important example is the large account deficit in the United States together to the contrary surplus situation in the other advanced economies, in the emerging Asian' nations and the fuel exporting countries. Indeed, from the mid of 1990's a large current account deficit started to dominate the USA check. This situation has been matched by surpluses in the other advanced economies and emerging Asian countries, thus it corresponded a shift in the net foreign assets positions[24].

Another important events was the large oil price rose from the end of 1970's to 2014. After this great change a group of oil exporting countries has become the major player on the global current account imbalances scene. Over the past ten years different countries passed the 40 % share of fuel exports in the total country's exports; this percentage represents a full dependence to the oil gains. Small or remarkable, these countries derived a large quantities of their exports revenues from the sale of fuel. Their locations are different, but spread in specific geographical territories like Africa (Algeria, Angola, Republic of Congo, Equatorial Guinea, Gabon, Libya, Nigeria and Sudan), the Ex-URSS countries (Azerbaijan, Kazakhstan, Russia and Turkmenistan), the Middle East (Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen) and three exceptions the Brunei Darussalam in Asia, the European Norway and the last two South American countries: Venezuela and Trinidad and Tobago.

[24] City Group Global Markets, David Lubin (2007), *Petrodollars, emerging markets and vulnerability*, Economic & Market Analysis.

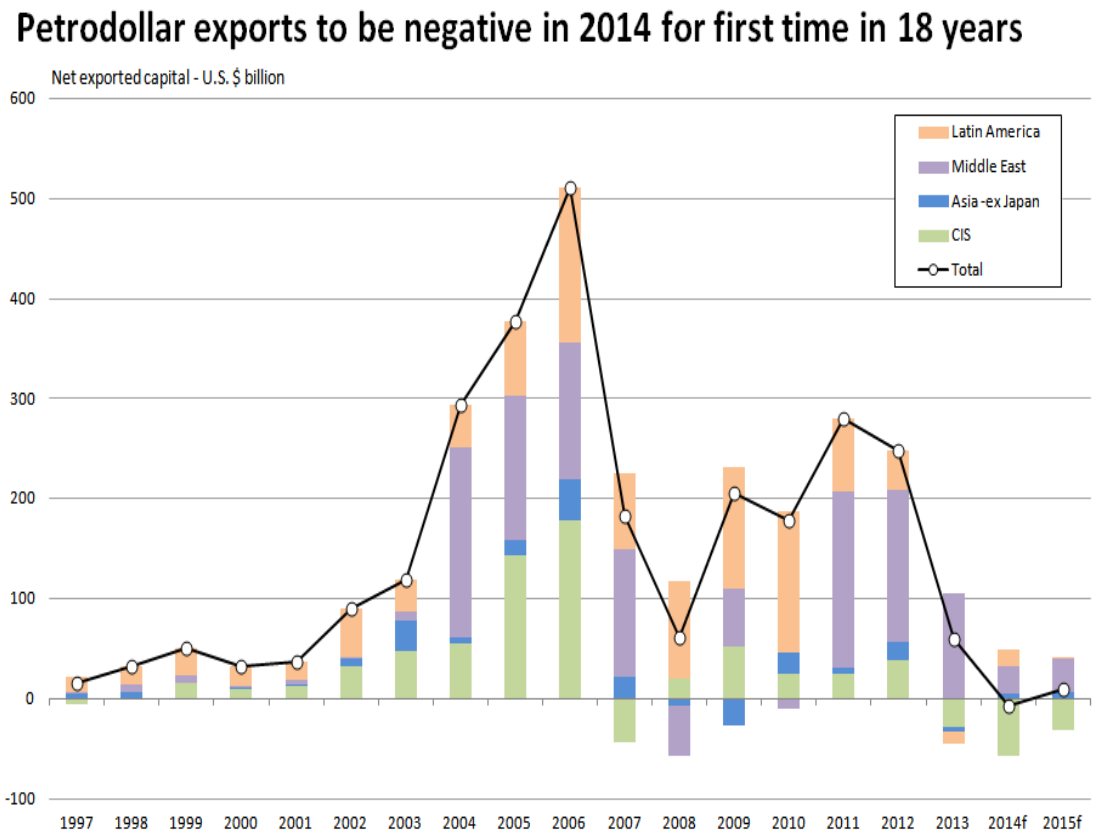
However, from the beginning of 2015 this situation is really changing according to the new political decisions in different exporting countries. The price decrease, given by the high production respect to the demand decline during the crisis, is the most important consequence. Furthermore, an extraordinary growth in oil and natural gas output in the USA will change the global energy scenario. The real objectives of this USA's political decision is to became a net exporters of gas and oil by 2020 and be almost self sufficient in energy terms in the 2035. If this plan reaches the North America, USA and Canada, will emerge as net oil exporters accelerating in this way the switch in other direction of the international oil trade, with the growing of Middle East exports to Asia. In according to this changes the regional dynamics will replace in dramatic ways and, also, the pronounced shift towards gas and renewable could lead to different situations[25].

Different empirical studies confront with the recycling petrodollar. All the economists highlight that, over the past years, the oil producing countries have experienced a huge unexpected gains associated with the majestic oil price increase.

This graph represents the petrodollar recycling effects. The net exported capital, in US dollar billion, is indicated; and also the original areas of countries outflows of capital.

Source: Tyler Durden (2014), *How The Petrodollar Quietly Died, And Nobody Noticed*, http://www.zerohedge.com/news/2014-11-03/how-petrodollar-quietly-died-and-nobody-noticed

[25] Matthew Higgins, Thomas Klitgaard, and Robert Lerman (2006), *Current Issues In economics and finance, Recycling Petrodollars*, Federal Reserve Bank of New York, www.newyorkfed.org/research/current_issues , Volume 12, Number 9 December 2006.



These two pronounced increases (price and gains) raised up the question about how the oil exporters' nations have used their windfall. However a big issue distresses the researcher. Indeed, the non oil exports from oil exporting countries have risen in the recent years and, practically, it isn't possible to understand or distinguish the different flows from oil and other exports which have been reserved.

The macroeconomic studies and analysis.

Brief literature review.

Our macro economical analysis will concentrate on the results of different models and practical researches. They belong to a very developed studies' field, in both parts, theoretical and empirical. Arise from the large fluctuations in the relative price of oil in the 1970's, a prosperous literature has examined the macroeconomic effects of oil shocks and the channels through which these operate. Two main currents exist in regard to this analysis; they are useful in the petrodollar analysis and the study of its effects on the

advanced economies. The first one considers the effects of oil price shocks on the economy. It is founded on the theoretical work of Bruno and Sachs in 1985. They were the first ones to examine the effects of oil prices of the 1970's crisis on output and inflation in the major industrialized countries considering also the different roles of other shocks, monetary policy and wage setting. After them, on the same route, a number of economists has estimated the ability of standard models to explain the size and the nature of the observed effects of oil price shocks. An example is the study of Bodenstein, Guerrieri, and Gust (2010), where the analysis talks about the relation between oil shocks and the zero bound on nominal interest rates. They found that the oil shocks effects on economic activity are restricted when monetary policy is constrained. A successive paper related to this study is the Bodenstein, Guerrieri, Kilian (2012) that wants to examine how monetary policy makers should respond to oil price fluctuations. The main result of this analysis is that the best central bank policy response depends on the reason why the price of crude oil has changed. Moreover, we find the Bodenstein, Erceg, Guerrieri (2010) paper that studies the oil shocks and subsequent external adjustments, given a DSGE model and an external shock, a lot of wealth exchanges will be generated by the different balance movements in the oil importing and exporting countries. Instead, the empirical side of this first current is based on the work of Hamilton (1983,1996) that studied the past U.S. recessions[26]. He found that, typically, they were preceded by increases in the price of oil, suggesting, in this manner, an important role for this price in the principal causes of recessions; however the stability of this relation has been discussed by a great list of authors.

The second area of research is based on the possible changes over time in the effects of oil shocks. Different researches refer to this area and develop different explanations to changes of oil shock effects. For example, we can

[26] Olivier J. Blanchard, Jordi Galí (2010), *The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s so different from the 1970s?*, International Dimensions of Monetary Policy, University of Chicago Press.

find the decline in shocks intensity, the monetary policy errors in the previous crisis (Barsky and Kilian (2002); Bernanke, Gertler, and Watson (1997)), the change in economic structure and the decline of oil share in the economies (Hooker (2002)). Other important examples of these researches are the work of Blanchard and Galì (2008-2010) where they examine the differences in the macroeconomic performances in a selected number of advanced economies after an oil price shocks of the 1970's and of the last decade, but focusing on the differences between the two episodes. The main variables found to demonstrate the difference was four: a more comfortable and stable economic situation, smaller share of oil production, more flexible labor markets and better developments in the countries monetary policies. Successive to this paper, we find a research of Blanchard and Riggi (2010) where they develop a new Keynesian model used to estimate the difference in the empirical research in the two sample, pre and post 1980's, and the model estimation. The results showed that two relevant changes in the structure of the economies, the elimination of the wage indexation and an important improvement in the credibility of monetary policy, have modified the transmission mechanism of these shocks.

Petrodollar recycling and other channels.

The global imbalances' effects of higher oil prices aren't so obvious and, clearly, depend on the geographical movements of petrodollar recycling and the real cause of the prices increases. At the beginning all the oil shock have a direct negative consequence on the external account of oil importing countries, given the worsening of their international trade conditions. However, these nations have two indirect channels that can help to recover the other negative situations. The first one is the petrodollar recycling and the second one is the source of the oil demand that sometimes can reflect the higher global demand.

Now we can consider a supply oil shock to describe the creation of the global imbalances. A direct effect in terms of trades movements is reached in

the oil importing countries where the terms of trade deteriorate and, thus, the country obtains a higher current account deficit. Instead, the oil exporting country will take advantage from the terms of trade and will have an higher trade surplus. This direct effect on the trade movements could be significantly compensated by two different and distinct channels.

The first one is the petrodollar recycling that consists to the reflows to the rest of the world resulted from the oil exporting countries use of their receipts. The revenues that the oil exporting countries gains from the higher oil prices, in this specific situation, can be used to various objectives. Sometimes the nation is small or in the first stage of the industrialization phase thus the government can decide to collect the wealth outside the country or to postpone the total gain inside the national economy, with the aim to avoid the Dutch Disease effects. The uses of wealth collected can be different. It can be used to purchase goods, assets, firms, brands or participations from oil importing countries, reducing their current account deficit accumulated. Moreover, the increased numbers of purchases of foreign assets by the oil importing countries can help to sustain the growth of national economy, because it can see these ones as a form of lending to the indebted countries. The first channel is the petrodollar recycling, but these huge quantities of revenues can be used for two main different options. The first is the imports of goods and services outside the country, the absorption part. Instead the second option is the purchase of foreign assets in the international capital markets, the capital account part. This formula can indicate the national saving division in the oil exporting country composed as:

$$national\ saving = \\ domestic\ investment\ spending + current\ account\ balance$$

This formula can be applied in the oil exports countries; their savings have increased in recent years and during the same periods the investment spending in domestic, as a part of the gross domestic product (GDP), has been unchanging. Instead the other part in saving composition, the current account

balance related to the net foreign assets purchases, has grown because of the greater associated parts. The first option, the absorption channel, related to the imports of goods and services, is typically linked to the question: “is it better to save or spend?” Different empirical studies have noted a smaller share of their additional revenues spent after the first oil price shock in the 70’s. In effect, the increase in the imports accounts happened only for a little part, typically one half of the additional revenues. Moreover, a significant difference can be viewed across the countries: in the Arabian States of the Gulf the spending rates are relatively lower than the higher ones in the Iran. Furthermore, a significant element is identified by the economic theory. Indeed, they suggest that the perception of oil rising prices as temporary or permanent have crucial effects. The behavior of oil exporters is affected by a temporary huge income or a permanent one. In the first case, the revenues will be largely saved. In the second one, they will spend a large parts of them.

In the past years a FED documents identified how the geography of petrodollar recycling has changed. The oil exporters are importing fewer quantities of goods, measured as a share of their total import in the 70’s, from the USA. The document stated that: only 20 cents of 1$ increase in the purchased from oil exporters came back directly in USA in form of higher purchase of US’ goods. Instead, in Europe the amount is higher, 41 cents; also in China where it is 60 cents and Korea where it is 24 cents; and lower quantities can be founded in the Japanese smaller economy as 18 cents. These data underlined the different situations and capacities to attract the petrodollars recycling to back home as purchase of locally produced goods. The European and Chinese situations are much better than US. Thus it draws attention to the important role in reducing the current account deficit of US. On the contrary, particular shock events could be more sustained by the European nations and China, thanks to the exports to oil exporting countries.

This graph represents the trade difference between these specific countries (USA, EU, China, Japan, Korea) with the oil exporters in terms of imports, exports and ratio of these two data.

Table 3

Trade with Oil Exporters

Change from 2002 to 2006, Billions of U.S. Dollars

	Imports	Exports	Ratio
United States	116.1	22.9	19.8
Euro area	191.5	77.5	40.5
China	56.1	33.5	59.7
Japan	70.4	12.9	18.3
Korea	42.0	10.1	24.0

Sources: U.S. Census Bureau; Eurostat; CEIC Data Company.

Note: The 2006 data are based on the most recently available twelve months, generally through August or September 2006.

Source: Matthew Higgins, Thomas Klitgaard, and Robert Lerman (2006), *Current Issues In economics and finance, Recycling Petrodollars*, Federal Reserve Bank of New York, www.newyorkfed.org/research/current_issues , Volume 12, Number 9 December 2006.

The second option to the petrodollar recycling ways is the purchase of foreign assets in the international capital markets. This is the second channel, the capital account one. Typically, the petrodollars not spent on the directly imports are saved in foreign assets. These are held abroad and resulting in a capital account outflow. The structure considers that this outside wealth is managed by the national central banks, as a part of their international reserves, or by institutional funds belonging to the oil exporting countries. This formula is really useful because the funds can be invested in a various foreign financial instruments, including a variety of currency or other assets advantageous to protect the value in time.

The empirical analysis shows how the oil exporters' net financial investment in the rest of the world is the same as the exporters' combined current account surplus. The data showed how the main and most important all

over the world counterpart to the higher surplus of oil exporters in the last years has been the great current account deficit of the USA. As a consequence, it was natural to presume that a large quantities of oil exporters' net investment outside the country had to go into the United States economy. Some typical methodological difficulties are the poor data available, so tracking the vast petrodollar investments becomes difficult. Indeed, the US data don't found the original sources of funds that entered in the country, thus is possible that a global bank can invest in a specific financial or physical or firms assets across a different location from the original oil exporters supplier country. Moreover, tracking petrodollar is difficult because a lot of major nations don't report the details of financial transactions related to oil exporting countries to the public knowledge. A typical example of the difficult to trace the petrodollar recycling is given by the two different forms of financing: directly and indirectly. The indirect petrodollar recycling has kept the US financial current account level upward. Indeed, outside the official and direct movements in the recycling, typically, an amount invested in a different country outside the oil exporters must found a net borrowers to be received[27]. The financial markets global participation creates a financial outflows from the country that received the petrodollar to a specific nation that wishes to undertake an additional quantity of net borrowing. In the past years and also nowadays, the country that would receive a large parts of the new flows of money is the USA.

The second channel, independent from the petrodollar recycling, is the source of the hike in oil prices. Indeed, an oil price increase may reflect a global demand shock rather than a supply one. Thus potential overflow can interest the foreign demand from the oil importing country. This second channel can be founded after an oil price increase, like the 70's when the global demand led to the shock. In these events there are potential spills over

[27] www.economist.com (2005), *Oil producers' surpluses. Recycling the petrodollars*, Print and web edition "The economist".

for the foreign demand to oil importing countries. A great part of oil price increases moved a remarkable quantities of wealth from the fast growing nations to the emerging economies. These situations can lead to an indirect advantage those countries that have a privileged trade relationship with the emerging economies, coinciding with an increase in their exports. A real case of these situations are: Germany and Japan. The data show that during the 2000's Asia, in particular China, became a large sales market for German exporting goods. The oil shocks driven by increased demand from Asian continent demonstrated that an increase in the oil prices came together with an improvements in the German exports, because they had a strong trade relationship with this countries. Typically, this situation has two main effects. The first one consider the growing emerging countries, that are driving the oil price raise, will slow down their importing oil and thus their growth will slow down or stop. On the impact, they will lead to a deterioration of the terms of trade and to higher deficit in oil importing countries. However, a strong trade relationship with those countries oil importing emerging economies, is demonstrated that it could provide a large countercyclical balance in the advanced economies, like Germany and Japan that could benefit from this mechanism. Indeed, their national current account balance could tend to improve rather than decrease when the oil price jumps.

Conclusions.

This paper analyses a set of economic consequences on advanced economies after oil shock has created important negative scenarios in these countries. At the beginning I introduce the oil market from three different points of view. An historical analysis helps to describe the main evolutionary and fundamental steps in the oil market. The second part describes the present sector structure, where I divide this search by reserves, consumptions and productions main players. At least, I illustrate the market real operating mode and commodity exchanges all over the world. According to the literature the second part of this work analyses the main and important consequences of an oil shock on the advanced economies. The New Keynesian Phillips Curve model allows to study a great point of interest: the mechanism of propagation of oil shock to the inflation rate in these countries; in all the possible cases, supply or demand. I highlight the two rounds effects that characterize the oil shock in the 70's the advanced economies and also I find the main reason that justifies the smaller effects of recent oil shock. The study continues with the analysis of the Dutch Disease effects on the advanced economies. This part employs the Corden and Neary model to describe a small open economy, composed by three economic sectors and two markets, the labor and commodity, and their movements in the case of a large oil's field, or other commodities, discoveries. The two main effects are the resource and spending movements that characterize the behavior of all the country components. However this model analysis can also be used to find different possible country's policies instruments: fiscal, monetary and exchange rates and, finally, the spending and structural. I know that all these different instruments can be used to fix the problems created by the Dutch Disease. The last part observes another point of view of this work. It examines the petrodollar recycling, because the way oil exporters reserve their revenues, given the large amounts of proceeds, has important implications for the oil importing countries balance sheet. The different literature find that the global imbalances, given typically by oil shock, can lead to two effects to compensate

the large amount of proceeds received by the exporting countries. The first one is the direct effect of high deficit and surplus generation; however it is compensated by the indirect channel where the petrodollar recycling can have two really different forms. The absorption part is an increase in the imports of goods and services outside the country and the other part is the capital account one that has a totally different effect and importance in the global economical dynamics.

Thanks to this paper I have been able to convey a useful analysis of the past and current oil crisis. The different points of view expressed in this work can help to better understand the variety of the effects on the advanced economies but, also, they want to underline how the world evolutions in the last decade have changed the attitude to consider and engage to these important and different crisis scenarios.

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