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Conceptual methods of supply and delivery of crude oil by using of financial derivatives

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Abstract
Since many years, the most important part of Iran's exchange and budget revenues came from the income of export of oil and its products. in order to realize a country's economic growth and development, the National Iranian Oil Company started to use financial derivatives for supplying and presenting oil and its products within the frame of the Islamic Republic of Iran's policies. Using these tools with a risk management approach can consolidate the incomes of currency revenues caused by the sale of oil in country's budget figures. This paper examines the different types of oil trade. As follow up it introduces the strategies of using financial derivatives to reduce the price fluctuation risk and limit the need of cash in oil transactions.

Keywords: financial derivatives, oil market, economic growth

1. Introduction
The constant fluctuation of prices and lack of price security caused by the domination of the cash market in the oil world, met the need of some factors, but had some negative impacts on market players. For example, producers and consumers had problems like future forecasting, budgeting, and economic decision making. The emergence of financial derivative markets was a result of this problem. Thus, a fluid system rises from buying and selling which reduces the cost and time of the transaction, so that millions of transactions on volumes of more than a million barrels of crude oil and its products can be done in a particular stock market. Countries in the Asia Pacific region now account for 35% of global oil consumption (BP 2016) [14]. Thus, huge amounts of crude oil and liquidity are drawn into the oil market and is activated in a way that has the two sides of supply and demand interacting with each other. The advantages of this market are that by increasing the risk-price and the risk of oil access, the market allows the buyer to receive oil in future with a given present price and insures itself against the risk of a sudden increase in oil prices. In addition, oil buyers can store it in the form of oil paper (remittance of upcoming sales contract) without storing the physical oil. Thus, if there is a risk of oil decrease, oil producers can insure themselves against sudden decrease of oil. A new chapter has begun in the oil market with the appearance of electronic oil shares which is active all over the world, as this is a place for attracting risk capital and utilizing its returns. The correlation of this market with other financial markets and its simultaneous digitization and globalization increases the distribution of information and capital turnover, the basis of comparing returns in this market with other financial markets is like the stock and capital markets. What is important for financial economists is the determination of purchase power of financial assets, because the nominal value of the financial assets does not always reflect the purchasing power and is lost due to inflation or devaluation. Unpredictable changes in the price of crude oil is required to make appropriate facilities and tools in the market, so that buyers and sellers can cover their transactions against risks caused by unpredictable and unexpected price changes.

2. Different types of oil trading markets
Transactions in oil markets are carried out physically. Where in, the oil producers or consumers exchange directly with each other. Another type of transaction is the use of financial derivatives, through which these oil tools and oil products are organized in stock exchanges or off-exchange trades.

2.1 physical oil markets
A significant percentage of produced crude oil is sold directly by producers to refineries or other applicants at official prices. Such contracts are usually made for a month to a year with provision for extension. However, oil companies usually do not have an accurate estimate of market demand for crude oil, therefor long-term contracts cannot fully meet their needs. In some cases use of long-term contracts makes oil companies, face oil shortage for sale and in other cases face with excess oil. The cash market which is also called "free market" can balance the surplus or shortage supply of oil companies, which means that oil companies can sell their surplus to cash markets and make up their shortages from those markets. Pricing in cash markets is based on the price of the main oil source. These days the crude oil markets are the largest commodity market in terms of transaction value in the world. In many of the producer countries, it is the national oil company's responsibility to sell the crude oil. The price in these transactions is determined by a specific formula: whereby the basis is the price of crude oil, such as Brent or an average of the price of crude oil and we add or reduce the differences. The crude oil price is taken from news organizations such as Pilates or Reuters. Buyers make a contract with national oil companies where a certain amount

of crude oil can be traded over a specified period of time. The timing of determining the price of the cargo according to the price of main oil price has great importance. This timing is according to one of the following three models: "Loading date" a few days after the loading and "Discharge day", since oil price changes may be very significant even during the few days. It is in the interest of the buyer or seller to accurately adjust the date of pricing the consignment. Like other outsourced trades, transactions on the cash market have numerous countermeasures, for example: these markets prices are not so clear, even of official prices are published as main prices as estimated by reporters. The pricing basis is placed on transactions, but these prices are just indicators and do not show definite market prices. Due to lack of information for both parties of the transaction, the cost of conducting transactions in cash markets are high, there should be experienced brokers in the market, who adapt to the needs of buyers and sellers. Third, the reputation of parties of the contract is one of the most important factor in the performance of cash markets. The parties must ensure that payment and delivery time will be enforced in a specified date. Fourth, there is always the possibility of "default" and price risk in cash markets.

2.2 Financial derivatives markets

Risk is caused by uncertainty about the nature and the quality of occurrences in the future. Risk is one of the concerns of investors and in this case, investors consider it as successful of one who can afford acceptable levels of risk. Generally, risk can be divided into two categories, the financial risk and non-financial risk. Risk management is a process that enables an enterprise to control different types of risk and deal with it. Accordingly, first all types of risks will be identified and then the appropriate control method is specified. Of course, it is important to note that some risks like political risk can't be deleted or controlled. therefore, scientific attitude towards risk is nothing but its management. Risk management needs a tool to implement effective control on risk and minimize it which is designed and delivered by financial engineering. Financial engineering designs or develops a new financial instrument and eventually makes it possible to provide solvent solutions to financial problems. One of the financial engineering tools which are used to control and manage the risk is financial derivatives. Derivative instruments which were mainly raised after the 1990s, are a kind of national instrument whose value is derived from other financials asset's value and the price change of each of them are a function of price changes of the main asset. The Derived Financial Instruments and the price changes of each of them are a function of changes in the price of the main asset. Forward contract, future contract, optional contract, SWAP contract are among the financial derivatives which are used in supplying oil products.

2.2.1 Forward markets

Usually, for various types of crude oil, it is created indicators like Brent, Texas oil and Dubai crude oil and traders can trade forward contracts daily. The profits and losses of traders are determined through "check out the differences". Experiences have shown that the forward market for crude oil continues to play a key role in the oil market. In fact, the forward market for crude oil plays an important role for oil markets. The close relationship between the forward paper contracts with the physical market will make the companies, which are involved in supplying physical oil pay particular attention to forwarded markets, and that is because with trade in these markets they can save themselves from the risk of adverse price changes in the short-lived. This will make large traders and banks which are willing to take, short term risk, enter these markets to have minor profit and speculations.

The forward contract has several deficiencies. For example, in industries like the oil industry, any increase in oil price can encourage the seller and any price reduction will make the buyer cancel the contract. Since the dealers are not obligated to publish details of the contract in the forward contract, this one will have less transparency than future contract.

Nevertheless, forward paper markets continue to play a key role in oil markets. One of the main reasons is that in the forward contract, oil traders can choose their dealership and the transaction can be done without any time limit and in any time agreed by the parties. Also, it is possible for oil companies to trade a huge amount of crude oil in one transaction and it is also possible that the forward contract leads to the physical delivery of crude oil. Today, despite the rapid growth of future contract markets, the importance of the forward contract is reduced, but Brent and WT1 paper crude oil and are still the most important forward crude oil markets.

2.2.2 Future contracts:

It is the standard type of forward contracts. Standard means that the volume, quality, technical characteristics, time and place of delivery should be in accordance with the rules of the stock exchanges. For example, the standard amount of crude oil trades in stock exchange is a multiple of 1000 barrels of crude oil and every barrel of 1000 crude oil is called a contract. The future market has been devised to overcome the shortcomings and deficiencies of the forward markets. The future contract will be executed through Intermediary institutions which names clearing houses and this room will guarantee the obligations of the transaction parties.

2.2.3 Swap market

In swap contract, the first party pays some money to the second party on the basis of the fixed price of each unit in return for some goods, according to the contract. The second side also pays some money on the basis of the units on settlement dates. The contract goods can be similar or dissimilar. If it is similar, the exchange of the hypothetical sum is not necessary, but if the commodity is dissimilar, the hypothetical sum should be exchanged. Yet in all transactions, the exchange of hypothetical sum is not a general rule. The largest amount of its usage is related to the contracts between oil companies and refineries and petrochemical companies. In this transaction, the oil price is related to the floating price which is determined by the base price. Swap contracts are traded like forward contracts in an outsourced market that includes commercial banks and investment banks. Due to the existence of swap traders, the parties of the transaction are not faced with any kind of risk related to the other party.

The most commonly used swap transaction which is very simple and easy to understand, is the oil swap scheme. In this

type of buy and sale which is based on geographical, geopolitical and complex political – geographical – geo-cultural economic issues, the producer country tends to deliver its oil at a place to the buyer and delivers the quantities equivalent in another place (he or his lawyer or his counterpart will deliver) and for that change in the geographical location of delivery, the country receives the right of transit. For example, Iran receives oil from oil-rich countries of central Asia and Caucasus receives the oil from the Caspian Sea. On the one hand, those countries do not have access to the open sea or have other problems, or it is not affordable to transport oil through pipelines and technical and engineering conditions. On the other hand, Iran should supply oil to the refineries in Tehran and Tabriz from southern Iran, which certainly requires the construction of pipeline-installing, maintaining and strengthening the pressure, the various stations of cathodic protection, and all of these things have various cost issues.

2.2.4 Option

Using the flexibility of optional in comparison with future contracts, we can cover the risk of fluctuations in oil prices. Hence, some of the financial institutions introduced "optional" in the oil market. Brent crude optional was first introduced and welcomed by traders in IPE stock exchange on May 11, 1989. Traders, who trade Brent crude optional, are required to open "a daily deposit account" and settle it on a daily basis just like the future contract. The transaction optional is an agreement between the assignor and the acquirer, by which the holder has the right to purchase or sell the certain assets at a specified price and at a certain date in the future. The transaction option includes two options for purchase and sale option.

3. Trading Strategies

The importance of using financial derivative instruments to cover possible losses caused by reduction in oil prices in the market, and the consolidation of foreign exchange earnings caused by oil sales in the country's budget figures, and desirability of utilizing international funds in order to realize the growth and economic development of the country was determined by using the changes of international markets and increased efficiency in risk management to supply the oil and its products.

In order to realize this, there are some of the trading strategies of derivative instruments which are used in the oil market.

3.1 Future market trading strategies

The trading strategies in future market can be noted as follow.

3.1.1 Defective situation strategy

This strategy is usually used by crude oil and oil products and traders who have crude oil store and oil products. The reason for using this method is to alleviate the concern about price reduction in the future. Therefore, by adopting the strategy, the losses caused by the price reduction are guaranteed.

3.1.2 Additional situation strategy

This strategy is usually used by crude oil consumers and the reason for using it is to lifting their concern about rising prices in the future.

3.1.3 Crackspread strategy

Refiners are worried about rising crude oil prices or decreasing extracted oil product prices in the future. In the other word, the refiners' profit is always exposed to two above-mentioned risks, so they have to buy and sell crude oil and its product in cash and future markets simultaneously to guaranteeing the profitability. Now with regard to the refining system of each refiner and according to the specific cut-offs which exist for any oil, the strategies are adjusted in proportion to the purchase of oil and oil products. Variety kinds of CRACK SPREAD strategies are as follows.

3.1.3.1 One-to-one Crack Spread strategy

This strategy is a simultaneous purchase of a crude oil future contract against the sale of a future gas or gasoline contract, and its value is the price of a barrel of gas or gasoline minus the price of one barrel of crude oil.

3.1.3.2 Two-to-one Crack Spread strategy

This strategy is simultaneous purchasing of two crude oil future contracts against selling one gasoline future contract and one gas future contract. The value of this transaction is calculated as follow.

3.1.3.3 Three-to-one Crack Spread strategy

This strategy is simultaneous purchasing three crude oil future contracts against selling two gas future contracts and one gasoline future contract. The value of this transaction is calculated as follow.

3.1.4 Hybrid strategies

Hybrid strategies in the stock market come from combining future and options contracts.

3.2 Option market trading strategies

Among different kind of trading strategies in the option market, the following can be noted. These strategies are used to manage risk on the London Stock Exchange.

3.2.1 Vertical range

Vertical ranges strategies involved in buying and selling multiple options at the same time which has the same asset and Date of Maturity. For example, purchasing and selling multiple call and put options which have the same asset and expiry date, but their negotiated prices are different, these are so-called public ranges because in financial reports usually insert the agreed prices vertically.

3.2.2 Horizontal range or calendar range

Calendar range involves buying and selling multiple options at the same time which has the same base asset and agreed price but their date of maturity is different. In the financial report, the maturities are usually inserted horizontally, so calendar ranges are called "horizontal ranges". In this strategy, usually, when one Maturity's option is near to its expiration date, the other option will be sold with a maturity which has a extended

time to expire or vice versa, they buy an option with closer maturity and at the same time sell an option with the second maturity.

3.2.3 Diagonal ranges
Diagonal range strategies involve in call and put options with different agreed prices and different maturities. Traders' assumption in adopting this strategy is "market's failing ".

3.2.4 Two base strategy
Two bases are a combination of call and put options. This strategy has two bases and its structure is that if the price of a base asset has a significant increase or decrease, the profit of one base is more than the paid price for the purchase of another option. This strategy is divided into two orders:

3.2.4.1 Purchasing two bases
Purchasing two bases is involved in simultaneously buying call option and one put option, which has the same asset and the agreed price and maturity.

3.2.4.2 Selling two bases
In order to make a two-base sale strategy, we must simultaneously sell the call and put options at an agreed price and maturity. When the base asset price has a "less variability", the strategy of selling two bases is profitable.

3.2.5 Strings strategy
This strategy is based on the purchasing of one call option and two put options which have the same agreed prices and maturities: Its assumption is market falling.

3.2.6 Bands strategy
This strategy is based on purchasing two call options and one put option at an agreed price and the same maturity. Its assumption is "market rising".

3.2.7 Strangles
Their structure is the same as "two bases". And the difference is that options of put and call have different agreed prices and the same maturity. Strangles' strategy is divided into two categories:

3.2.7.1 Buying Strangles
This strategy is based on purchasing call and put options. Traders assumed that asset price variability is high.

3.2.7.2 Selling Strangles
In selling Strangles, the call and put options will be sold. Traders assumed that the price variability is low.

3.3 Trading strategies of Swap market
Some of the trading strategies are made through Swap transactions for supplying crude oil and oil products. Below, there are some strategies that can be done by Iran.

3.3.1 Volume contracts
It is a combination of Swap and loan. Unlike the usual Swap, the VPP buyer (usually is the producer) will receive the current value of future payments at the beginning of the contract, and instead, the seller will receive the agreed amount of crude oil during the time.

3.3.2 Swaption transactions
Swaption transactions are trades that guarantee the right of entering or exiting of the swap transaction for the buyer, but it is not obligated to him. In fact, SWAPTION can be considered as an option transaction on SWAP transaction, because these contracts are based on call and put option. Buyers of call and put options secure their buy and sale right at higher or lower prices than the price that has been agreed with premium payments. These contracts are offered in different forms in offshore markets depending on the various needs of oil and gas producers and oil and oil product consumers.

3.3.2.1 Range Forward Swap or Collar strategy
This strategy can be used for oil producers and consumers. Their difference is that their mechanism for each of them is exactly opposite.
A. COLLAR strategy for crude oil producers: this strategy is the result of the sale of put option (Asian) and the purchase of call option (Asian) in the off-exchange market. In this strategy, the income of sale of call option covers the cost of purchase of put option. In other words, this is a kind of free-cost SWAP, by which the price of crude oil sales in the future will be stabilized at the base and maximum price.
B. COLLAR strategy for crude oil consumers: this strategy is the result of selling call options (Asian) and purchasing put option (Asian) in the off-exchange market. In this strategy, the income of sale of put option covers the cost of purchase of call option. In other words, this strategy is a free-cost SWAP, by which the price of crude oil sales in the future will be stabilized at the base and maximum price.

3.3.2.2 Participating Forward SWAP strategy
This strategy like the collar strategy is used by oil producers and consumers; the difference is that the mechanism for each one is exactly the opposite.

A. Participating Forward Swap strategy for crude oil producers: the crude oil producer can stabilize future crude oil selling prices and prices of mentioned options which is called base price, by purchasing put options (Asian). Meanwhile, in order to cover a part of rising prices risk in future that may occur in contrary to the producer's expectations in the market, it can proceed to sell call options (Asian) at X% and in base price, that the level of oil producer's participation in increasing prices is more than agreed base price, and is a fraction of X% of 100%.
B. Participating Forward Swap strategy for crude oil consumers: crude oil consumers can stabilize future crude oil buying prices and mentioned option contract's prices which are called the maximum price by purchasing call options (Asian). Meanwhile in order to cover a part of failing prices risk at a level of below the maximum price, they can sell put options (Asian) at a rate of X% below than the maximum price, that consumer's participation in decreasing market prices is less than agreed maximum prices and is a fraction of 6% of 100%.

If the goods have not delivered at the arranged time by the

mediator or the terms have not been observed, it is possible to obtain a fine for the damage caused to the consumer by the mediator.

4. Conclusion

The use of financial derivatives can reduce the fluctuation risk of oil price, which has a paramount importance for Iran whose economy is based on oil revenues. Using derivative instruments in stock exchanges or off-exchange have some limitations. Due to some religious and jurisprudential dilemmas of financial derivatives, they can be used to supply oil and its product. Therefore, it is suggested that the Ministry of Oil of the Islamic Republic establish a specialized company in the field of activities in financial derivative markets of oil, and beside that uses experts who are familiar with Islamic finance in order to make optimal use of financial derivative instruments and to adjust it to the religious rules. Creating this company in addition to scientific usage of risk management in selling and supply Iran's oil can generate revenue for the country through purchase and sale of oil derivatives. This can be true by setting up oil, gas and petrochemicals exchange in the country and price issue can be upgraded by applying appropriate risk management tools. It can also provide a safe environment for domestic and foreign investment.

The lack of laws and regulations based on legal rules and lack of economic infrastructure are one of the most important challenges of financial derivatives in Iran. Therefore, it is suggested that researchers under take work to solve these challenges.

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