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Pricing of Participating Forward Contract

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Abstract: The purpose of this work is to model a participating forward contract permitting to avoid unlimited risk and unknown loss using a formula of risk sharing that includes the payment of an additional amount under specific price variations. This contract offers a new tool that Islamic finance can use since this finance is suspicious of classical forward contracts. The modeling is based on the classical forward equation, which incorporates the profit and loss sharing principle derived from Islamic finance. The participating forward is tested on oil data prices to compare the participating forward contract to the classical one. The participating forward offers a better possibility of profit to the seller and the buyer because of the PLS mechanism which reduces the risk for both parties. The main implication of this modeling is that the participating forward can provide some investors and Islamic banks with an alternative to conventional forward contracts.

Keywords: *Islamic Finance, Price Risk Hedging, Forward Contract, and Profit and Loss Sharing.*

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Introduction

Islamic banks are relatively recent actors on the economic stage with assets close to $2.19 trillion in 2018 (IFSB, 2019). Theoretically, Islamic banks adopt an operating system that is different from conventional ones. Indeed, the proscription of usurious interest compelled them to financial engineering to mobilize and use the funds. The traditional view of banking intermediation is not correct because the assets of Islamic banks are made of profit-sharing in projects (*Mucharaka* and *Mudaraba*) or loans in economic projects with profit (*Murabaha*, *Ijara*, etc.). This specific structuring of the financial transaction implies the structuring of risks different from that of conventional banks. It may also involve the birth of new risks or boosting risks already existing in conventional finance like the price volatility leading Islamic Banks to use risk management techniques like hedging mechanisms.

These mechanisms can be defined as risk trading carried out in financial markets (Saxena & Villar, 2008; Al-Tamimi & Al-Mazrooei, 2007). This paper is interested in market risk especially price risk since the impact of price volatility on the real economy is very important. Since the 70s among the methods used for hedging was to derive prices in the absence of arbitrage (Shafique et al., 2013). This method has led to the creation of derivatives (Baxter, 1997).

Financial derivatives are financial instruments that are linked to a specific financial instrument or indicator or commodity, and through which specific financial risks can be traded in financial markets (International Monetary Fund, 2006). Derivatives include options, swaps, futures, and forwards which is the subject of this study. This choice is motivated by the fact that forward contacts are the simplest type of derivatives Bacha (1999) making its modeling an example for other derivatives. We chose forward also because they are traded over the counter and are therefore more sensitive to risk (Rappaport, 2000).

From the Quranic Perspective, Thijs (2010), hedging is a part of the risk management process. Based on the above understanding, hedging does not violate the principles of Shariah, since Islam prohibits exposure to any form of catastrophe, even if the catastrophe is uncertain and undetermined (Razif et al, 2012).

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The question is whether conventional derivatives are a lawful tool for price risk hedging in Islamic finance. The question arises particularly for the forward contracts where only one party is exposed to assume all losses or to gain all the possible profit violating thus the principle of profit and losses sharing.

According to Schaik (2001), the fiqh's opinions on the question of the legal validity of derivatives are few, even though the current general trend of different schools of thought is to consider these contracts as not Sharia Compliant due to their speculative nature and because they contain excessive uncertainty (*Gharar*) prohibited in Islamic finance (Jobst & Sole, 2012). According to Bacha (1999), conventional derivative contracts can be accepted with a financial engineering effort to make them adapted to Sharia since it already accepts Islamic derivatives (*Salam, Istijrar, Urbun*, etc.).

Therefore, the objective of this paper is to find a way to hedge price risk by modeling a participating forward contract based on the principle of profits and loss sharing. To do this, we use a formula whereby both sides of the contract can exchange an additional amount of money with an equitable distribution of profits and losses.

The remainder of the paper is structured as follows. In the next section, we present the literature review incorporating a discussion about theological objections on derivatives like forwards, section 3 deals with the methodology which includes the theoretical concepts of profit and loss sharing, section 4 presents the results, and section 5 concludes.

Literature Review

Derivatives and Islamic Finance

There are many ways to hedge price risks, such as upstream risk transfer to suppliers, downstream risk, risk transfer to outside entities, and internal risk mitigation. A good strategy of hedging does not eliminate risk but helps to transform the risk into a profit. Because of the varying levels of success of risk management techniques, there are several reasons why it is necessary to manage risks using hedging contacts such as derivatives (Bilal et al., 2013).

About that, the literature has discussed the place of conventional derivatives contracts in Islamic finance. Many authors believe that derivatives in their classical form are not sharia-compliant (Al-Amine, 2008; Rizvi et al., 2014; Salehabadi & Aram, 2002; Kunhibava & Shanmugam, 2010), but there is a lack of consensus (Bacha, 1999).

Several studies invest in the permissibility of options from the Islamic perspective and show that such a contract can be accepted under certain conditions (Smolarski, et al., 2006; Kamali, 2007; Abumustafa & Al-Abduljader, 2011; Kok et al., 2014; Alamad, 2017a; Hassan & Mollah, 2018). On the other hand, several other studies focused on contracts in Islamic finance that can be seen as derivatives, such as Salam contract which can be assimilated to futures and forward contracts (Siddiqui, 2008; Lahsasna et al., 2018; Jobst, 2013; Mohamad, et al., 2014; Rizvi, et al., 2016).

However, we have not identified studies that validate the forward permissibility. This contract is defined as an agreement where two parties undertake to complete a transaction at a future date but a price determined today. According to Rizvi et al. (2014), in forward contracts, the seller does not possess the underlying asset while in Islamic law a seller cannot sell an asset which he does not possess at the time of sale what makes this contract invalid for Islamic banks (Maurer, 2001; Alamad, 2017b).

The forward contradicts also primarily the principle of profits and losses sharing (PLS) since only one party is exposed to assume all losses. The absence of derivatives as hedging mechanisms would make Islamic banks less competitive (Jobst & Sole, 2012). Therefore, some authors have tried to adapt conventional derivatives to Islamic finance for example Dusuki (2009) described a structuring of currency swap as a hedging mechanism that respects the principles of Sharia by basing it on *Tawarruq*, and Aboulaich and Dchieche (2015), Omrana et al. (2015), and Siham and Rajae (2013) model an Islamic call option using a modified Black and Scholes model.

This is also the aim of this research which focuses on forward, a contract whose attempts to Islamic adaptation are few. To model it in the next section, we will go beyond the juridical nature of previous studies by proposing a forward model that respects the PLS principle in order to eliminate unknown risks and losses.

Methods and Theoretical Framework

Variables Presentation

The variables used in the modeling are presented as follow:

F : Forward contract price
t : Period
R : Rate of actualization
r : Reduction rate
Q : Total quantity of good
T : The deadline/maturity/delivery
P_0 : The price of the underlying asset at t = 0
P_t : The commodity price at time t (spot price)
$P(P\&L)$: Share participating forward price checking the principle of profits and losses
P' : The sharing operator
δ : The change in the price of good
ρ : The percentage of the variation of good
tol : The tolerance percentage of the price change
$[IEC]$: The contract execution interval
P_{LB} : The lower bound price
P_{UB} : The upper limit price
χ : A function that can take the values 0 and 1

Pricing Classical Forward Contracts

A forward contract is defined as an agreement where two parties undertake to complete a transaction at a future date (the delivery date) but at a price determined today (the forward price). When the contract is initiated, the forward price makes the value of the contract zero, but the evolution in the price of the underlying indicate the direction of the contract's value (negative or positive). The forward price is determined by (Hull, 2003):

$$F = P_0 e^{RT} \quad (1)$$

Pricing Participating Forward Contracts

The Salam contract is seen as an analogous contract to derivatives like sales, it is defined as prepaid forward sale (El-Gamal, 2006). In the scientific literature, the Salam contract can be defined in many ways. Literally, the word "*Salam*" is synonymous with the word "*Salaf*" which's means lending. To make *Salam* is to lend something to somebody.

A Salam transaction is so-called because the price is to be paid when the concerned parties sit together to conclude the contract (Umar, 1995). Salam is also a contract where two parties enter into a contract of sale of goods which would be delivered in the future for which the price for the goods would be paid in cash on the spot at the time of the signing of the contract (Kurniawansyah & Agustia, 2017). To price the classical Salam contract, we introduce the future and the reduced price of the good. Using the classical formula of actualization (Bachelet, 2014), the formula of the future price of the good PF is given by:

$$PF = P_0(1 + R)^t \quad (2)$$

It represents the expected value of the good at maturity. The price of the Salam must include a reduction since the whole amount is paid spot at the beginning (Ahmed, 2007; Shehata, 2007; Ghait, 2005; Khan, 1985). To apply this condition, we use the rate of reduction r and Equation 1 to give the formula of the reduced price of the good:

$$P_r = PF(1 - r) \quad (3)$$

P_r is the price of Salam paid by the buyer at the time of signing the contract to receive the good at maturity. Despite the usefulness of the Salam contract, especially in the field of agriculture, it has

experienced the stress of the price variation, if prices change much, farmers can feel injustice about the obtained pay off.

In order to avoid these problems, many solutions have been proposed such as negotiating the difference of price, the return of the goods, or the latter possibility can be considered as *Khiyar Shart* which is an option that constitutes a condition stipulated in the contract, this option confers on the parties to the contract the right to proceed with the contract by confirming it or to cancel it all within a pre-agreed period of time. The use of *Khiyar Shart* is controversial by Shariah in the Salam contract. (Ahmed, 2006; Civil Transactions Law, 1984). In the next part, we present a new way to resolve the issue of price variation using the principle of profit and loss sharing.

Pricing Participating Forwards

To model participating forward we rely on classical modeling of Salam contract, in addition to some other assumptions (Dchieche & Aboulaich, 2016). At the time of signing, the agreement must be reached regarding:

1) The contract execution interval
2) The total quantity of the goods to be delivered
3) The exact day of delivery

The payment will be made at the moment of the signature of the agreement and the goods will be delivered at maturity.

To resolve the price variation issue, we suggest adding an additional amount that will be exchanged between the buyer and the seller. The additional amount to be exchanged is set according to the variation of the prices on the market and based on the interval of execution of the contract, and by using the concept of sharing of profits and losses. We also suppose the perpetual availability of the goods and the perpetual availability of cash. To model forward contracts based on profit and loss sharing, we use the previous work of Dchieche and Aboulaich (2016) and we develop the extension of the model to avoid the cancellation of the contract.

According to Rajae and Amina (2017), in the modeling of a contingent participating option (*PCPO*), the expression of the equation $P'_{(PCPO)}$ which represents the sharing operator under the principle of sharing profits and losses:

$$P' = \delta_{\{PCPO\}} * \rho_{\{PCPO\}} \tag{4}$$

With $\delta_{\{PCPO\}}$ is the price change between the market price and the actual price of the underlying asset, given by:

$$\delta_{\{PCPO\}} = |P_t - P_{\{PCPO\}}| \tag{5}$$

$\rho\{PCPO\}$ is the percentage of this variation:

$$\rho_{\{PCPO\}} = \frac{|P_t - P_{\{PCPO\}}|}{P_{\{PCPO\}}} \tag{6}$$

We notice the use of positive values only, whereas the operator $P'_{\{PCPO\}}$ can be positive or negative. To account for this possibility, we cancel the use of the absolute value of Equation 4 and substitute the purchase price $P_{\{PCPO\}}$ with the price of the underlying asset at $t = 0$ "P_0". Equations 4 and 5 become:

$$P'_{\{Participative\ Forward\}} = \delta_{\{Participative\ Forward\}} * \rho_{\{Participative\ Forward\}} \tag{7}$$

$$\delta_{\{Participative\ Forward\}} = P_t - P_0 \tag{8}$$

For Equation 6, we choose to keep the absolute value to represent the percentage change:

$$\rho_{\{\text{Participative Forward}\}} = \frac{|P_t - P_0|}{P_0} \tag{9}$$

$P'_{\{Participative\ Forward\}}$ is the additional amount to be exchanged between the buyer and the seller according to the principle of sharing profits and loss. This is an additional amount that the buyer will have to add to the purchase price, called the reduced price modeled in Equation 3. This sum can be

positive, negative, or zero. Before presenting the price of the participative forward contract, we introduce the contract execution interval. Based on the article Rajae and Amina (2017), the interval for contract performance is determined by maximizing the buyer's profit and minimizing its loss. The tolerance percentage *"tol"* of the price variation will be determined according to an agreement between the two parties at the time of signing the contract. The formula for this interval is given by:

$$[IEC] = [P_0 * (1 - tol1)\ ;\ P_0 * (1 + tol2)] \quad (10)$$

With $tol1$ is the tolerance rate of the lower limit, and $tol2$ is the tolerance rate of the upper limit. The interval of execution of the contract pushes us to define three price possibilities, the first will be the one applied when the market price at maturity belongs to [*IEC*], denoted $P_{P\&L}$, the second is where the market price at maturity is less than [*IEC*], denoted P_{LB}, and the third is where the market price at maturity is greater than [*IEC*], denoted P_{UB}. Using Equation 7, 8, 9, and 10, we present the price equations $P_{P\&L}$, P_{LB}, and P_{UB}.

$$\mathrm{P_{P\&L}} = \mathrm{P_r} + P'\ ;\ P_{LB} = P_0 * (1 - tol1);\ P_{UB} = P_0 * (1 + tol2) \quad (11)$$

Before presenting the general model of participating forwards we introduce χ_1, χ_2, and χ_3 which can take different values according to the following situations:

$$\chi_1 = \begin{cases} 0\ elsewhere \\ 1\ if\ P_t < P_{LB} \end{cases} \quad (12)$$

χ_1 will take the value 1 if the price of the commodity on the market at the delivery time is strictly lower than the lower limit of the contract execution interval, and 0 elsewhere.

$$\chi_2 = \begin{cases} 0\ elsewhere \\ 1\ if\ P_t \in [IEC] \end{cases} \quad (13)$$

χ_2 takes the value 1 if the price of the commodity on the market at the time the delivery is within the contract execution interval, and 0 if it is outside the range of the contract execution of the contract.

$$\chi_3 = \begin{cases} 0\ elsewhere \\ 1\ if\ P_t > P_{UB} \end{cases} \quad (14)$$

χ_3 takes the value 1 if the price of the commodity on the market at the time of the delivery is greater than the upper limit of the contract execution interval, and 0 elsewhere. The general model of participating forward can be presented by:

$$P_{Participative\ Forward} = Q[(\chi_1 P_{LB}) + (\chi_2 P_{P\&L}) + (\chi_3 P_{UB})] \quad (15)$$

If the price of the good at the delivery time changes outside the contract execution interval [*IEC*], the price paid for the participative forward will be either the price of the upper limit or the price of the lower limit. Otherwise, if the price of the good is inside [*IEC*] $P_{P\&L}$ is paid.

Model Testing and Results

To test the model, we use the spot price of oil, for the last 3 years between 22/01/2016 and 11/01/2019, this choice is due to the important volatility of this commodity on the market (Mezghani & Boujelbène, 2018; Alhassan et al., 2019).

The moment of the signature of the contract is $T = 0$ on 22/01/2016 where the price of one barrel of oil is P_0 = \$27.76. The delivery date is at $t = T$ on 11/01/2019 where the price of one barrel of oil at maturity is P_T = \$58.64. To calculate the actualized price of good, several rates can be considered, in our study we use the rate of return based on USD LIBOR - 12 months, R = 3.03013% (Čihák & Hesse, 2010; El-Gamal, 2010; Usmani, n.d.).

Using Equation 2 the actualized price of the good is PF = \$30.36073. To calculate the reduced price of the good we use the American inflation rate r = 2.54%, we consider that this rate is constant between $T = 0$ and $T = t$.

Using Equation 3 the reduced price of the good is P_r = \$29.5895672. Assuming that the percentage of the tolerance $tol1 = tol2$ = 30%, we use Equation 11 the calculate P_{LB} the lower bound price, and P_{UB} the upper limit price.

P_{LB} = \$19.432
P_{UB} = \$36.088

The interval of the execution of the contract [*IEC*] = [19.432; 36.088]. Using the general model of participating forwards, three possibilities of price payment of one barrel of oil can exist. If the price of the good at maturity is inside [*IEC*] $P_{P\&L}$ will be paid, based on the variations. If the price is outside, P_{LB} or P_{UB} will be paid. All price payments according to the variations are presented in Appendix 1.

To present the payoff of the contract, we use the following additional equations:

The payoff of the buyer of Participating forward is:

$$Payoff\ (Buyer) = P\{Participating\ Forward\} - P_T \quad (16)$$

The payoff of the seller of participating forward is:

$$Payoff\ (\text{Seller}) = P_T - P\{Participating\ Forward\} \quad (17)$$

Using Equations 16 and 17, the payoff of the buyer and the seller of participating forward contract are presented in Figure 1 and Figure 2 (see complete results in Appendix 2).

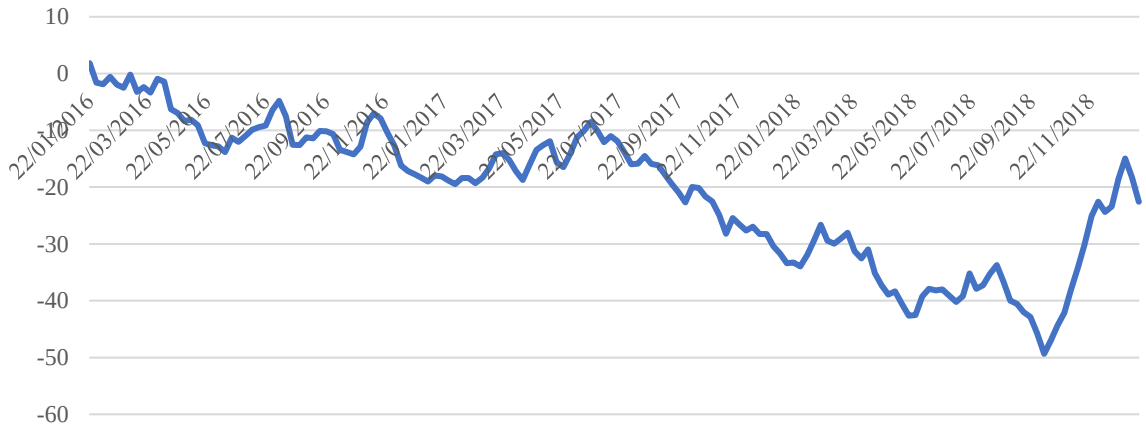

Figure 1. Participating Forward Buyer's Profit

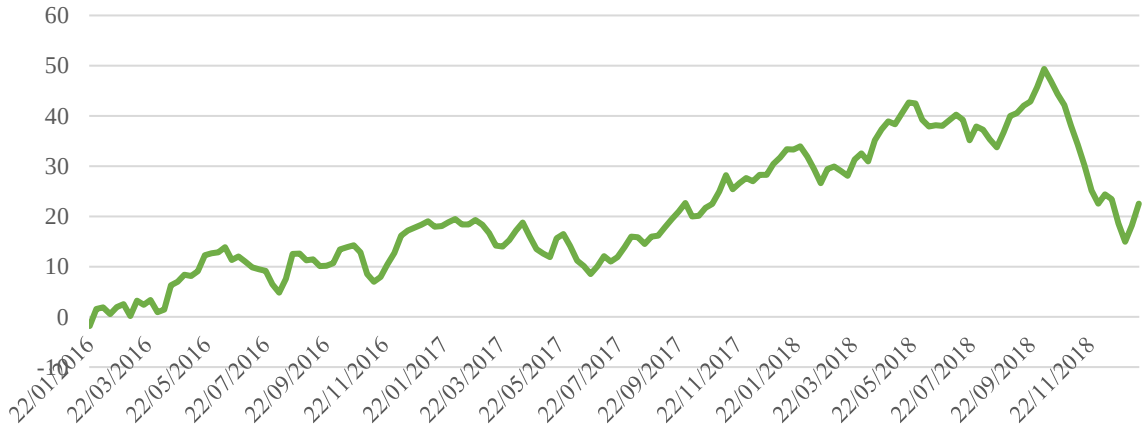

Figure 2. Participating Forward Seller's Profit

Buyer's and seller's profits, presented in Figure 1 and Figure 2 respectively, show that the more the price of oil in the market is far from the interval of execution of the contract [*IEC*], the more the profit/loss is important. To compare participating forward to the classical one, we use the following formula of forward's payoff:

The payoff of the buyer of classical forward is:

$$Payoff\ (Buyer) = F - P_T \quad (18)$$

The payoff of the seller of classical forward is:

$$Payoff\ (Seller) = P_T - F \quad (19)$$

To calculate the price of classical forward (Appendix 3), we use the same conditions of participating forward, so we substitute the price of the underlying asset at $t = 0$ (P_0) by the reduced price P_r, using Equation 1 the price of classical forward becomes:

$$F = P_r e^{RT} \quad (20)$$

To present the results, we assume that the rate of actualization R is the same used in the pricing of participating forwards $R = 3.03013\%$, the maturity is $T = 3$ years, and the reduced price of the good is P_r = \$29.5895672, and using Equation 20 the price of classical forward is F = \$31.9324214. The comparison between participating and classical forwards payoff is presented in Figure 3 and Figure 4.

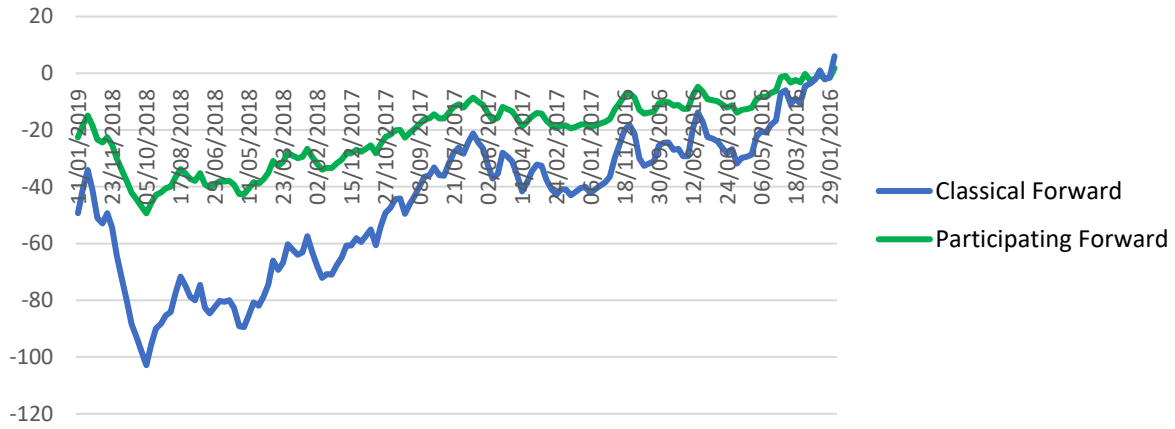

Figure 3. Intersection of Buyer's Profit in Classical and Participating Forward

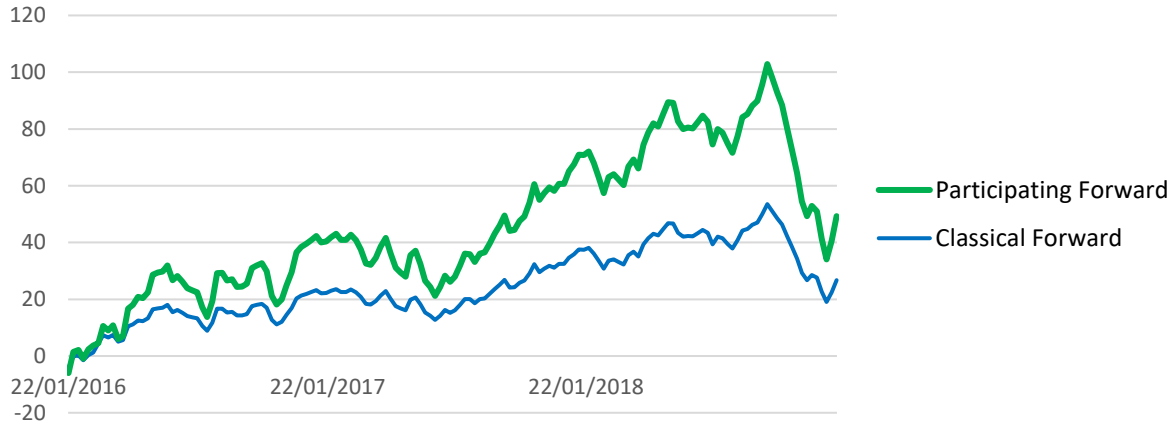

Figure 4. Intersection of Seller's Profit in Classical and Participating Forward

According to Figure 3 and Figure 4, the profit of participating forward is globally greater than the classical forward uniformly for the buyer and seller. We notice in Figure 4 between 22/01/2016 and 22/03/2016 that the profit of classical forward can be sometimes greater than the participating one, this is due to the profit and loss sharing operator.

Conclusion

In order to respond to the objections to the forward contract in Islamic jurisprudence, we proposed to model a forward contract based on the principle of profits and losses sharing. This model has been tested on oil prices to assess its robustness. This application shows that the participative forward offers a better possibility of profit to the seller and the buyer because of the PLS mechanism which reduces the risk for both parties. The main policy implication of this modeling is that the participating forward

can provide some investors with an alternative to conventional forward contracts. Nevertheless, this model remains to be validated with other commodities in order to verify its relevance.

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Appendix 1. Participating Forward Calculation Details

Dates	Barell Oil Price	δ	ρ	P'	$P_{P\&L}$	Decision Payment	Participating Forward Price
11/01/2019	58.64	30.88	1.11239193	34.3506628	63.9402300	PUB	36.08800000
04/01/2019	54.31	26.55	0.95641210	25.3927414	54.9823085	PUB	36.08800000
28/12/2018	51.03	23.27	0.83825648	19.5062284	49.0957955	PUB	36.08800000
21/12/2018	54.64	26.88	0.96829971	26.0278963	55.6174634	PUB	36.08800000
14/12/2018	59.51	31.75	1.14373199	36.3134906	65.9030578	PUB	36.08800000
07/12/2018	60.47	32.71	1.17831412	38.5426549	68.1322221	PUB	36.08800000
30/11/2018	58.65	30.89	1.11275216	34.3729143	63.9624814	PUB	36.08800000
23/11/2018	61.22	33.46	1.20533141	40.3303890	69.9199562	PUB	36.08800000
16/11/2018	66.21	38.45	1.38508646	53.2565742	82.8461414	PUB	36.08800000
09/11/2018	70.34	42.58	1.53386167	65.3118300	94.9013971	PUB	36.08800000
02/11/2018	74.09	46.33	1.66894813	77.3223667	106.9119340	PUB	36.08800000
26/10/2018	78.23	50.47	1.81808357	91.7586780	121.3482450	PUB	36.08800000
19/10/2018	80.41	52.65	1.89661383	99.8567183	129.4462850	PUB	36.08800000
12/10/2018	83.05	55.29	1.99171470	110.1219060	139.7114730	PUB	36.08800000
05/10/2018	85.44	57.68	2.07780980	119.8480690	149.4376360	PUB	36.08800000
28/09/2018	81.85	54.09	1.94848703	105.3936640	134.9832310	PUB	36.08800000
21/09/2018	78.97	51.21	1.84474063	94.4691679	124.0587350	PUB	36.08800000
14/09/2018	78.11	50.35	1.81376081	91.3228566	120.9124240	PUB	36.08800000
07/09/2018	76.64	48.88	1.76080692	86.0682421	115.6578090	PUB	36.08800000
31/08/2018	76.08	48.32	1.74063401	84.1074352	113.6970020	PUB	36.08800000
24/08/2018	72.77	45.01	1.62139769	72.9791102	102.5686770	PUB	36.08800000
17/08/2018	69.82	42.06	1.51512968	63.7263545	93.3159216	PUB	36.08800000
10/08/2018	71.42	43.66	1.57276657	68.6669885	98.2565556	PUB	36.08800000
03/08/2018	73.37	45.61	1.64301153	74.9377558	104.5273230	PUB	36.08800000
27/07/2018	74.00	46.24	1.66570605	77.0222478	106.6118150	PUB	36.08800000
20/07/2018	71.27	43.51	1.56736311	68.1959690	97.7855362	PUB	36.08800000
13/07/2018	75.29	47.53	1.71217579	81.3797154	110.9692830	PUB	36.08800000
06/07/2018	76.33	48.57	1.74963977	84.9800036	114.5695710	PUB	36.08800000
29/06/2018	75.24	47.48	1.71037464	81.2085879	110.7981550	PUB	36.08800000
22/06/2018	74.12	46.36	1.67002882	77.4225360	107.0121030	PUB	36.08800000
15/06/2018	74.26	46.50	1.67507205	77.8908501	107.4804170	PUB	36.08800000
08/06/2018	73.98	46.22	1.66498559	76.9556340	106.5452010	PUB	36.08800000
01/06/2018	75.35	47.59	1.71433718	81.5853062	111.1748730	PUB	36.08800000
25/05/2018	78.59	50.83	1.83105187	93.0723667	122.6619340	PUB	36.08800000
18/05/2018	78.75	50.99	1.83681556	93.6592255	123.2487930	PUB	36.08800000
11/05/2018	76.68	48.92	1.76224784	86.2091643	115.7987310	PUB	36.08800000
04/05/2018	74.42	46.66	1.68083573	78.4277954	108.0173630	PUB	36.08800000
27/04/2018	74.98	47.22	1.70100865	80.3216282	109.9111950	PUB	36.08800000
20/04/2018	73.39	45.63	1.64373199	75.0034906	104.5930580	PUB	36.08800000
13/04/2018	71.24	43.48	1.56628242	68.1019597	97.6915268	PUB	36.08800000
06/04/2018	67.03	39.27	1.41462536	55.5523379	85.1419051	PUB	36.08800000
30/03/2018	68.65	40.89	1.47298271	60.2302630	89.8198301	PUB	36.08800000
23/03/2018	67.40	39.64	1.42795389	56.6040922	86.1936594	PUB	36.08800000

Dates	Barell Oil Price	δ	ρ	P'	$P_{P\&L}$	Decision Payment	Participating Forward Price
16/03/2018	64.14	36.38	1.31051873	47.6766715	77.2662386	PUB	36.08800000
09/03/2018	65.12	37.36	1.34582133	50.2798847	79.8694519	PUB	36.08800000
02/03/2018	66.02	38.26	1.37824207	52.7315418	82.3211089	PUB	36.08800000
23/02/2018	65.52	37.76	1.36023055	51.3623055	80.9518726	PUB	36.08800000
16/02/2018	62.72	34.96	1.25936599	44.0274352	73.6170023	PUB	36.08800000
09/02/2018	65.50	37.74	1.35951009	51.3079107	80.8974778	PUB	36.08800000
02/02/2018	68.00	40.24	1.44956772	58.3306052	87.9201723	PUB	36.08800000
26/01/2018	70.04	42.28	1.52305476	64.3947550	93.9843222	PUB	36.08800000
19/01/2018	69.39	41.63	1.49963977	62.4300036	92.0195708	PUB	36.08800000
12/01/2018	69.47	41.71	1.50252161	62.6701765	92.2597437	PUB	36.08800000
05/01/2018	67.81	40.05	1.44272334	57.7810699	87.3706370	PUB	36.08800000
29/12/2017	66.52	38.76	1.39625360	54.1187896	83.7083568	PUB	36.08800000
22/12/2017	64.36	36.60	1.31844380	48.2550432	77.8446104	PUB	36.08800000
15/12/2017	64.35	36.59	1.31808357	48.2286780	77.8182451	PUB	36.08800000
08/12/2017	63.08	35.32	1.27233429	44.9388473	74.5284144	PUB	36.08800000
01/12/2017	63.73	35.97	1.29574928	46.6081016	76.1976687	PUB	36.08800000
24/11/2017	62.68	34.92	1.25792507	43.9267435	73.5163107	PUB	36.08800000
17/11/2017	61.52	33.76	1.21613833	41.0568300	70.6463971	PUB	36.08800000
10/11/2017	64.29	36.53	1.31592219	48.0706376	77.6602048	PUB	36.08800000
03/11/2017	61.04	33.28	1.19884726	39.8976369	69.4872040	PUB	36.08800000
27/10/2017	58.58	30.82	1.11023055	34.2173055	63.8068726	PUB	36.08800000
20/10/2017	57.78	30.02	1.08141210	32.4639914	62.0535585	PUB	36.08800000
13/10/2017	56.21	28.45	1.02485591	29.1571506	58.7467177	PUB	36.08800000
06/10/2017	56.08	28.32	1.02017291	28.8912968	58.4808640	PUB	36.08800000
29/09/2017	58.75	30.99	1.11635447	34.5958249	64.1853921	PUB	36.08800000
22/09/2017	57.03	29.27	1.05439481	30.8621362	60.4517033	PUB	36.08800000
15/09/2017	55.54	27.78	1.00072046	27.8000144	57.3895816	PUB	36.08800000
08/09/2017	53.88	26.12	0.94092219	24.5768876	54.1664548	PUB	36.08800000
01/09/2017	52.25	24.49	0.88220461	21.6051909	51.1947581	PUB	36.08800000
25/08/2017	52.03	24.27	0.87427954	21.2187644	50.8083316	PUB	36.08800000
18/08/2017	50.58	22.82	0.82204611	18.7590922	48.3486594	PUB	36.08800000
11/08/2017	51.96	24.20	0.87175793	21.0965418	50.6861089	PUB	36.08800000
04/08/2017	52.04	24.28	0.87463977	21.2362536	50.8258208	PUB	36.08800000
28/07/2017	49.95	22.19	0.79935159	17.7376117	47.3271788	PUB	36.08800000
21/07/2017	47.99	20.23	0.72874640	14.7425396	44.3321068	PUB	36.08800000
14/07/2017	47.10	19.34	0.69668588	13.4739049	43.0634721	PUB	36.08800000
07/07/2017	48.17	20.41	0.73523055	15.0060555	44.5956226	PUB	36.08800000
30/06/2017	46.16	18.40	0.66282421	12.1959654	41.7855326	PUB	36.08800000
23/06/2017	44.63	16.87	0.60770893	10.2520497	39.8416169	PUB	36.08800000
16/06/2017	46.18	18.42	0.66354467	12.2224928	41.8120600	PUB	36.08800000
09/06/2017	47.28	19.52	0.70317003	13.7258790	43.3154461	PUB	36.08800000
02/06/2017	50.23	22.47	0.80943804	18.1880728	47.7776399	PUB	36.08800000
26/05/2017	52.58	24.82	0.89409222	22.1913689	51.7809360	PUB	36.08800000
19/05/2017	51.75	23.99	0.86419308	20.7319921	50.3215592	PUB	36.08800000

Dates	Barell Oil Price	δ	ρ	P'	$P_{P\&L}$	Decision Payment	Participating Forward Price
12/05/2017	48.00	20.24	0.72910663	14.7571182	44.3466853	PUB	36.08800000
05/05/2017	48.70	20.94	0.75432277	15.7955187	45.3850859	PUB	36.08800000
28/04/2017	49.55	21.79	0.78494236	17.1038941	46.6934612	PUB	36.08800000
21/04/2017	52.08	24.32	0.87608069	21.3062824	50.8958496	PUB	36.08800000
14/04/2017	54.83	27.07	0.97514409	26.3971506	55.9867177	PUB	36.08800000
07/04/2017	53.28	25.52	0.91930836	23.4607493	53.0503164	PUB	36.08800000
31/03/2017	51.33	23.57	0.84906340	20.0124244	49.6019915	PUB	36.08800000
24/03/2017	50.10	22.34	0.80475504	17.9782277	47.5677948	PUB	36.08800000
17/03/2017	50.29	22.53	0.81159942	18.2853350	47.8749022	PUB	36.08800000
10/03/2017	52.78	25.02	0.90129683	22.5504467	52.1400138	PUB	36.08800000
03/03/2017	54.40	26.64	0.95965418	25.5651873	55.1547545	PUB	36.08800000
24/02/2017	55.40	27.64	0.99567723	27.5205187	57.1100859	PUB	36.08800000
17/02/2017	54.46	26.70	0.96181556	25.6804755	55.2700427	PUB	36.08800000
10/02/2017	54.48	26.72	0.96253602	25.7189625	55.3085297	PUB	36.08800000
03/02/2017	55.53	27.77	1.00036023	27.7800036	57.3695708	PUB	36.08800000
27/01/2017	54.91	27.15	0.97802594	26.5534042	56.1429713	PUB	36.08800000
20/01/2017	54.19	26.43	0.95208934	25.1637212	54.7532883	PUB	36.08800000
13/01/2017	54.02	26.26	0.94596542	24.8410519	54.4306190	PUB	36.08800000
06/01/2017	55.13	27.37	0.98595101	26.9854791	56.5750463	PUB	36.08800000
30/12/2016	54.44	26.68	0.96109510	25.6420173	55.2315844	PUB	36.08800000
23/12/2016	53.81	26.05	0.93840058	24.4453350	54.0349022	PUB	36.08800000
16/12/2016	53.26	25.50	0.91858790	23.4239914	53.0135585	PUB	36.08800000
09/12/2016	52.26	24.50	0.88256484	21.6228386	51.2124058	PUB	36.08800000
02/12/2016	48.78	21.02	0.75720461	15.9164409	45.5060081	PUB	36.08800000
25/11/2016	46.49	18.73	0.67471182	12.6373523	42.2269195	PUB	36.08800000
18/11/2016	44.01	16.25	0.58537464	9.5123379	39.1019051	PUB	36.08800000
11/11/2016	43.09	15.33	0.55223343	8.4657385	38.0553056	PUB	36.08800000
04/11/2016	44.63	16.87	0.60770893	10.2520497	39.8416169	PUB	36.08800000
28/10/2016	48.95	21.19	0.76332853	16.1749316	45.7644987	PUB	36.08800000
21/10/2016	50.33	22.57	0.81304035	18.3503206	47.9398878	PUB	36.08800000
14/10/2016	49.94	22.18	0.79899135	17.7216282	47.3111954	PUB	36.08800000
07/10/2016	49.52	21.76	0.78386167	17.0568300	46.6463971	PUB	36.08800000
30/09/2016	46.74	18.98	0.68371758	12.9769597	42.5665268	PUB	36.08800000
23/09/2016	46.24	18.48	0.66570605	12.3022478	41.8918150	PUB	36.08800000
16/09/2016	46.21	18.45	0.66462536	12.2623379	41.8519051	PUB	36.08800000
09/09/2016	47.51	19.75	0.71145533	14.0512428	43.6408100	PUB	36.08800000
02/09/2016	47.31	19.55	0.70425072	13.7681016	43.3576687	PUB	36.08800000
26/08/2016	48.65	20.89	0.75252161	15.7201765	45.3097437	PUB	36.08800000
19/08/2016	48.60	20.84	0.75072046	15.6450144	45.2345816	PUB	36.08800000
12/08/2016	43.63	15.87	0.57168588	9.0726549	38.6622221	PUB	36.08800000
05/08/2016	40.88	13.12	0.47262248	6.2008069	35.7903741	PUB	36.08800000
29/07/2016	42.55	14.79	0.53278098	7.8798307	37.4693978	PUB	36.08800000
22/07/2016	45.22	17.46	0.62896254	10.9816859	40.5712530	PUB	36.08800000
15/07/2016	45.54	17.78	0.64048991	11.3879107	40.9774778	PUB	36.08800000

Dates	Barell Oil Price	δ	ρ	P'	$P_{P\&L}$	Decision Payment	Participating Forward Price
08/07/2016	45.96	18.20	0.65561960	11.9322767	41.5218438	PUB	36.08800000
01/07/2016	47.09	19.33	0.69632565	13.4599748	43.0495419	PUB	36.08800000
24/06/2016	48.12	20.36	0.73342939	14.9326225	44.5221896	PUB	36.08800000
17/06/2016	47.39	19.63	0.70713256	13.8810122	43.4705794	PUB	36.08800000
10/06/2016	49.94	22.18	0.79899135	17.7216282	47.3111954	PUB	36.08800000
03/06/2016	48.91	21.15	0.76188761	16.1139229	45.7034901	PUB	36.08800000
27/05/2016	48.73	20.97	0.75540346	15.8408105	45.4303777	PUB	36.08800000
20/05/2016	48.34	20.58	0.74135447	15.2570749	44.8466421	PUB	36.08800000
13/05/2016	45.20	17.44	0.62824207	10.9565418	40.5461089	PUB	36.08800000
06/05/2016	44.20	16.44	0.59221902	9.7360807	39.3256478	PUB	36.08800000
29/04/2016	44.46	16.70	0.60158501	10.0464697	39.6360369	PUB	36.08800000
22/04/2016	43.04	15.28	0.55043228	8.4106052	38.0001723	PUB	36.08800000
15/04/2016	42.35	14.59	0.52557637	7.6681592	37.2577264	PUB	36.08800000
08/04/2016	37.51	9.75	0.35122478	3.4244416	33.0140088	PUB	36.08800000
01/04/2016	37.00	9.24	0.33285303	3.0755620	32.6651291	PUB	36.08800000
25/03/2016	39.41	11.65	0.41966859	4.8891391	34.4787062	PUB	36.08800000
18/03/2016	38.50	10.74	0.38688761	4.1551729	33.7447401	PUB	36.08800000
11/03/2016	39.30	11.54	0.41570605	4.7972478	34.3868150	PUB	36.08800000
04/03/2016	36.28	8.52	0.30691643	2.6149280	32.2044951	PUB	36.08800000
26/02/2016	33.12	5.36	0.19308357	1.0349280	30.6244951	P(P&L)	30.62449511
19/02/2016	32.29	4.53	0.16318444	0.7392255	30.3287927	P(P&L)	30.32879266
12/02/2016	30.41	2.65	0.09546110	0.2529719	29.8425391	P(P&L)	29.84253906
05/02/2016	32.18	4.42	0.15922190	0.7037608	30.2933280	P(P&L)	30.29332796
29/01/2016	31.75	3.99	0.14373199	0.5734906	30.1630578	P(P&L)	30.16305779
22/01/2016	27.76	0.00	0.00000000	0.0000000	29.5895672	P(P&L)	29.58956716

Appendix 2. Participating Forward Profit

Date	Barell Oil Price	Buyer's Profit	Seller's Profit
11/01/2019	58.64	-22.55200000	22.5520000
04/01/2019	54.31	-18.22200000	18.2220000
28/12/2018	51.03	-14.94200000	14.9420000
21/12/2018	54.64	-18.55200000	18.5520000
14/12/2018	59.51	-23.42200000	23.4220000
07/12/2018	60.47	-24.38200000	24.3820000
30/11/2018	58.65	-22.56200000	22.5620000
23/11/2018	61.22	-25.13200000	25.1320000
16/11/2018	66.21	-30.12200000	30.1220000
09/11/2018	70.34	-34.25200000	34.2520000
02/11/2018	74.09	-38.00200000	38.0020000
26/10/2018	78.23	-42.14200000	42.1420000
19/10/2018	80.41	-44.32200000	44.3220000
12/10/2018	83.05	-46.96200000	46.9620000
05/10/2018	85.44	-49.35200000	49.3520000
28/09/2018	81.85	-45.76200000	45.7620000

Date	Barell Oil Price	Buyer's Profit	Seller's Profit
21/09/2018	78.97	-42.88200000	42.8820000
14/09/2018	78.11	-42.02200000	42.0220000
07/09/2018	76.64	-40.55200000	40.5520000
31/08/2018	76.08	-39.99200000	39.9920000
24/08/2018	72.77	-36.68200000	36.6820000
17/08/2018	69.82	-33.73200000	33.7320000
10/08/2018	71.42	-35.33200000	35.3320000
03/08/2018	73.37	-37.28200000	37.2820000
27/07/2018	74.00	-37.91200000	37.9120000
20/07/2018	71.27	-35.18200000	35.1820000
13/07/2018	75.29	-39.20200000	39.2020000
06/07/2018	76.33	-40.24200000	40.2420000
29/06/2018	75.24	-39.15200000	39.1520000
22/06/2018	74.12	-38.03200000	38.0320000
15/06/2018	74.26	-38.17200000	38.1720000
08/06/2018	73.98	-37.89200000	37.8920000
01/06/2018	75.35	-39.26200000	39.2620000
25/05/2018	78.59	-42.50200000	42.5020000
18/05/2018	78.75	-42.66200000	42.6620000
11/05/2018	76.68	-40.59200000	40.5920000
04/05/2018	74.42	-38.33200000	38.3320000
27/04/2018	74.98	-38.89200000	38.8920000
20/04/2018	73.39	-37.30200000	37.3020000
13/04/2018	71.24	-35.15200000	35.1520000
06/04/2018	67.03	-30.94200000	30.9420000
30/03/2018	68.65	-32.56200000	32.5620000
23/03/2018	67.40	-31.31200000	31.3120000
16/03/2018	64.14	-28.05200000	28.0520000
09/03/2018	65.12	-29.03200000	29.0320000
02/03/2018	66.02	-29.93200000	29.9320000
23/02/2018	65.52	-29.43200000	29.4320000
16/02/2018	62.72	-26.63200000	26.6320000
09/02/2018	65.50	-29.41200000	29.4120000
02/02/2018	68.00	-31.91200000	31.9120000
26/01/2018	70.04	-33.95200000	33.9520000
19/01/2018	69.39	-33.30200000	33.3020000
12/01/2018	69.47	-33.38200000	33.3820000
05/01/2018	67.81	-31.72200000	31.7220000
29/12/2017	66.52	-30.43200000	30.4320000
22/12/2017	64.36	-28.27200000	28.2720000
15/12/2017	64.35	-28.26200000	28.2620000
08/12/2017	63.08	-26.99200000	26.9920000
01/12/2017	63.73	-27.64200000	27.6420000
24/11/2017	62.68	-26.59200000	26.5920000
17/11/2017	61.52	-25.43200000	25.4320000

Date	Barell Oil Price	Buyer's Profit	Seller's Profit
10/11/2017	64.29	-28.20200000	28.2020000
03/11/2017	61.04	-24.95200000	24.9520000
27/10/2017	58.58	-22.49200000	22.4920000
20/10/2017	57.78	-21.69200000	21.6920000
13/10/2017	56.21	-20.12200000	20.1220000
06/10/2017	56.08	-19.99200000	19.9920000
29/09/2017	58.75	-22.66200000	22.6620000
22/09/2017	57.03	-20.94200000	20.9420000
15/09/2017	55.54	-19.45200000	19.4520000
08/09/2017	53.88	-17.79200000	17.7920000
01/09/2017	52.25	-16.16200000	16.1620000
25/08/2017	52.03	-15.94200000	15.9420000
18/08/2017	50.58	-14.49200000	14.4920000
11/08/2017	51.96	-15.87200000	15.8720000
04/08/2017	52.04	-15.95200000	15.9520000
28/07/2017	49.95	-13.86200000	13.8620000
21/07/2017	47.99	-11.90200000	11.9020000
14/07/2017	47.10	-11.01200000	11.0120000
07/07/2017	48.17	-12.08200000	12.0820000
30/06/2017	46.16	-10.07200000	10.0720000
23/06/2017	44.63	-8.54200000	8.5420000
16/06/2017	46.18	-10.09200000	10.0920000
09/06/2017	47.28	-11.19200000	11.1920000
02/06/2017	50.23	-14.14200000	14.1420000
26/05/2017	52.58	-16.49200000	16.4920000
19/05/2017	51.75	-15.66200000	15.6620000
12/05/2017	48.00	-11.91200000	11.9120000
05/05/2017	48.70	-12.61200000	12.6120000
28/04/2017	49.55	-13.46200000	13.4620000
21/04/2017	52.08	-15.99200000	15.9920000
14/04/2017	54.83	-18.74200000	18.7420000
07/04/2017	53.28	-17.19200000	17.1920000
31/03/2017	51.33	-15.24200000	15.2420000
24/03/2017	50.10	-14.01200000	14.0120000
17/03/2017	50.29	-14.20200000	14.2020000
10/03/2017	52.78	-16.69200000	16.6920000
03/03/2017	54.40	-18.31200000	18.3120000
24/02/2017	55.40	-19.31200000	19.3120000
17/02/2017	54.46	-18.37200000	18.3720000
10/02/2017	54.48	-18.39200000	18.3920000
03/02/2017	55.53	-19.44200000	19.4420000
27/01/2017	54.91	-18.82200000	18.8220000
20/01/2017	54.19	-18.10200000	18.1020000
13/01/2017	54.02	-17.93200000	17.9320000
06/01/2017	55.13	-19.04200000	19.0420000

Date	Barell Oil Price	Buyer's Profit	Seller's Profit
30/12/2016	54.44	-18.35200000	18.3520000
23/12/2016	53.81	-17.72200000	17.7220000
16/12/2016	53.26	-17.17200000	17.1720000
09/12/2016	52.26	-16.17200000	16.1720000
02/12/2016	48.78	-12.69200000	12.6920000
25/11/2016	46.49	-10.40200000	10.4020000
18/11/2016	44.01	-7.92200000	7.9220000
11/11/2016	43.09	-7.00200000	7.0020000
04/11/2016	44.63	-8.54200000	8.5420000
28/10/2016	48.95	-12.86200000	12.8620000
21/10/2016	50.33	-14.24200000	14.2420000
14/10/2016	49.94	-13.85200000	13.8520000
07/10/2016	49.52	-13.43200000	13.4320000
30/09/2016	46.74	-10.65200000	10.6520000
23/09/2016	46.24	-10.15200000	10.1520000
16/09/2016	46.21	-10.12200000	10.1220000
09/09/2016	47.51	-11.42200000	11.4220000
02/09/2016	47.31	-11.22200000	11.2220000
26/08/2016	48.65	-12.56200000	12.5620000
19/08/2016	48.60	-12.51200000	12.5120000
12/08/2016	43.63	-7.54200000	7.5420000
05/08/2016	40.88	-4.79200000	4.7920000
29/07/2016	42.55	-6.46200000	6.4620000
22/07/2016	45.22	-9.13200000	9.1320000
15/07/2016	45.54	-9.45200000	9.4520000
08/07/2016	45.96	-9.87200000	9.8720000
01/07/2016	47.09	-11.00200000	11.0020000
24/06/2016	48.12	-12.03200000	12.0320000
17/06/2016	47.39	-11.30200000	11.3020000
10/06/2016	49.94	-13.85200000	13.8520000
03/06/2016	48.91	-12.82200000	12.8220000
27/05/2016	48.73	-12.64200000	12.6420000
20/05/2016	48.34	-12.25200000	12.2520000
13/05/2016	45.20	-9.11200000	9.1120000
06/05/2016	44.20	-8.11200000	8.1120000
29/04/2016	44.46	-8.37200000	8.3720000
22/04/2016	43.04	-6.95200000	6.9520000
15/04/2016	42.35	-6.26200000	6.2620000
08/04/2016	37.51	-1.42200000	1.4220000
01/04/2016	37.00	-0.91200000	0.9120000
25/03/2016	39.41	-3.32200000	3.3220000
18/03/2016	38.50	-2.41200000	2.4120000
11/03/2016	39.30	-3.21200000	3.2120000
04/03/2016	36.28	-0.19200000	0.1920000
26/02/2016	33.12	-2.49550489	2.4955049

Date	Barell Oil Price	Buyer's Profit	Seller's Profit
19/02/2016	32.29	-1.96120734	1.9612073
12/02/2016	30.41	-0.56746094	0.5674609
05/02/2016	32.18	-1.88667204	1.8866720
29/01/2016	31.75	-1.58694221	1.5869422
22/01/2016	27.76	1.82956716	-1.8295672

Appendix 3. Classical Forward Profit

Date	Barell	Profit of the Buyer	Profit of the Seller
11/01/2019	58.64	-26.70757861	26.70757861
04/01/2019	54.31	-22.37757861	22.37757861
28/12/2018	51.03	-19.09757861	19.09757861
21/12/2018	54.64	-22.70757861	22.70757861
14/12/2018	59.51	-27.57757861	27.57757861
07/12/2018	60.47	-28.53757861	28.53757861
30/11/2018	58.65	-26.71757861	26.71757861
23/11/2018	61.22	-29.28757861	29.28757861
16/11/2018	66.21	-34.27757861	34.27757861
09/11/2018	70.34	-38.40757861	38.40757861
02/11/2018	74.09	-42.15757861	42.15757861
26/10/2018	78.23	-46.29757861	46.29757861
19/10/2018	80.41	-48.47757861	48.47757861
12/10/2018	83.05	-51.11757861	51.11757861
05/10/2018	85.44	-53.50757861	53.50757861
28/09/2018	81.85	-49.91757861	49.91757861
21/09/2018	78.97	-47.03757861	47.03757861
14/09/2018	78.11	-46.17757861	46.17757861
07/09/2018	76.64	-44.70757861	44.70757861
31/08/2018	76.08	-44.14757861	44.14757861
24/08/2018	72.77	-40.83757861	40.83757861
17/08/2018	69.82	-37.88757861	37.88757861
10/08/2018	71.42	-39.48757861	39.48757861
03/08/2018	73.37	-41.43757861	41.43757861
27/07/2018	74.00	-42.06757861	42.06757861
20/07/2018	71.27	-39.33757861	39.33757861
13/07/2018	75.29	-43.35757861	43.35757861
06/07/2018	76.33	-44.39757861	44.39757861
29/06/2018	75.24	-43.30757861	43.30757861
22/06/2018	74.12	-42.18757861	42.18757861
15/06/2018	74.26	-42.32757861	42.32757861
08/06/2018	73.98	-42.04757861	42.04757861
01/06/2018	75.35	-43.41757861	43.41757861
25/05/2018	78.59	-46.65757861	46.65757861
18/05/2018	78.75	-46.81757861	46.81757861
11/05/2018	76.68	-44.74757861	44.74757861

Date	Barell	Profit of the Buyer	Profit of the Seller
04/05/2018	74.42	-42.48757861	42.48757861
27/04/2018	74.98	-43.04757861	43.04757861
20/04/2018	73.39	-41.45757861	41.45757861
13/04/2018	71.24	-39.30757861	39.30757861
06/04/2018	67.03	-35.09757861	35.09757861
30/03/2018	68.65	-36.71757861	36.71757861
23/03/2018	67.40	-35.46757861	35.46757861
16/03/2018	64.14	-32.20757861	32.20757861
09/03/2018	65.12	-33.18757861	33.18757861
02/03/2018	66.02	-34.08757861	34.08757861
23/02/2018	65.52	-33.58757861	33.58757861
16/02/2018	62.72	-30.78757861	30.78757861
09/02/2018	65.50	-33.56757861	33.56757861
02/02/2018	68.00	-36.06757861	36.06757861
26/01/2018	70.04	-38.10757861	38.10757861
19/01/2018	69.39	-37.45757861	37.45757861
12/01/2018	69.47	-37.53757861	37.53757861
05/01/2018	67.81	-35.87757861	35.87757861
29/12/2017	66.52	-34.58757861	34.58757861
22/12/2017	64.36	-32.42757861	32.42757861
15/12/2017	64.35	-32.41757861	32.41757861
08/12/2017	63.08	-31.14757861	31.14757861
01/12/2017	63.73	-31.79757861	31.79757861
24/11/2017	62.68	-30.74757861	30.74757861
17/11/2017	61.52	-29.58757861	29.58757861
10/11/2017	64.29	-32.35757861	32.35757861
03/11/2017	61.04	-29.10757861	29.10757861
27/10/2017	58.58	-26.64757861	26.64757861
20/10/2017	57.78	-25.84757861	25.84757861
13/10/2017	56.21	-24.27757861	24.27757861
06/10/2017	56.08	-24.14757861	24.14757861
29/09/2017	58.75	-26.81757861	26.81757861
22/09/2017	57.03	-25.09757861	25.09757861
15/09/2017	55.54	-23.60757861	23.60757861
08/09/2017	53.88	-21.94757861	21.94757861
01/09/2017	52.25	-20.31757861	20.31757861
25/08/2017	52.03	-20.09757861	20.09757861
18/08/2017	50.58	-18.64757861	18.64757861
11/08/2017	51.96	-20.02757861	20.02757861
04/08/2017	52.04	-20.10757861	20.10757861
28/07/2017	49.95	-18.01757861	18.01757861
21/07/2017	47.99	-16.05757861	16.05757861
14/07/2017	47.10	-15.16757861	15.16757861
07/07/2017	48.17	-16.23757861	16.23757861
30/06/2017	46.16	-14.22757861	14.22757861

Date	Barell	Profit of the Buyer	Profit of the Seller
23/06/2017	44.63	-12.69757861	12.69757861
16/06/2017	46.18	-14.24757861	14.24757861
09/06/2017	47.28	-15.34757861	15.34757861
02/06/2017	50.23	-18.29757861	18.29757861
26/05/2017	52.58	-20.64757861	20.64757861
19/05/2017	51.75	-19.81757861	19.81757861
12/05/2017	48.00	-16.06757861	16.06757861
05/05/2017	48.70	-16.76757861	16.76757861
28/04/2017	49.55	-17.61757861	17.61757861
21/04/2017	52.08	-20.14757861	20.14757861
14/04/2017	54.83	-22.89757861	22.89757861
07/04/2017	53.28	-21.34757861	21.34757861
31/03/2017	51.33	-19.39757861	19.39757861
24/03/2017	50.10	-18.16757861	18.16757861
17/03/2017	50.29	-18.35757861	18.35757861
10/03/2017	52.78	-20.84757861	20.84757861
03/03/2017	54.40	-22.46757861	22.46757861
24/02/2017	55.40	-23.46757861	23.46757861
17/02/2017	54.46	-22.52757861	22.52757861
10/02/2017	54.48	-22.54757861	22.54757861
03/02/2017	55.53	-23.59757861	23.59757861
27/01/2017	54.91	-22.97757861	22.97757861
20/01/2017	54.19	-22.25757861	22.25757861
13/01/2017	54.02	-22.08757861	22.08757861
06/01/2017	55.13	-23.19757861	23.19757861
30/12/2016	54.44	-22.50757861	22.50757861
23/12/2016	53.81	-21.87757861	21.87757861
16/12/2016	53.26	-21.32757861	21.32757861
09/12/2016	52.26	-20.32757861	20.32757861
02/12/2016	48.78	-16.84757861	16.84757861
25/11/2016	46.49	-14.55757861	14.55757861
18/11/2016	44.01	-12.07757861	12.07757861
11/11/2016	43.09	-11.15757861	11.15757861
04/11/2016	44.63	-12.69757861	12.69757861
28/10/2016	48.95	-17.01757861	17.01757861
21/10/2016	50.33	-18.39757861	18.39757861
14/10/2016	49.94	-18.00757861	18.00757861
07/10/2016	49.52	-17.58757861	17.58757861
30/09/2016	46.74	-14.80757861	14.80757861
23/09/2016	46.24	-14.30757861	14.30757861
16/09/2016	46.21	-14.27757861	14.27757861
09/09/2016	47.51	-15.57757861	15.57757861
02/09/2016	47.31	-15.37757861	15.37757861
26/08/2016	48.65	-16.71757861	16.71757861
19/08/2016	48.60	-16.66757861	16.66757861

Date	Barell	Profit of the Buyer	Profit of the Seller
12/08/2016	43.63	-11.69757861	11.69757861
05/08/2016	40.88	-8.94757861	8.94757861
29/07/2016	42.55	-10.61757861	10.61757861
22/07/2016	45.22	-13.28757861	13.28757861
15/07/2016	45.54	-13.60757861	13.60757861
08/07/2016	45.96	-14.02757861	14.02757861
01/07/2016	47.09	-15.15757861	15.15757861
24/06/2016	48.12	-16.18757861	16.18757861
17/06/2016	47.39	-15.45757861	15.45757861
10/06/2016	49.94	-18.00757861	18.00757861
03/06/2016	48.91	-16.97757861	16.97757861
27/05/2016	48.73	-16.79757861	16.79757861
20/05/2016	48.34	-16.40757861	16.40757861
13/05/2016	45.20	-13.26757861	13.26757861
06/05/2016	44.20	-12.26757861	12.26757861
29/04/2016	44.46	-12.52757861	12.52757861
22/04/2016	43.04	-11.10757861	11.10757861
15/04/2016	42.35	-10.41757861	10.41757861
08/04/2016	37.51	-5.57757861	5.57757861
01/04/2016	37.00	-5.06757861	5.06757861
25/03/2016	39.41	-7.47757861	7.47757861
18/03/2016	38.50	-6.56757861	6.56757861
11/03/2016	39.30	-7.36757861	7.36757861
04/03/2016	36.28	-4.34757861	4.34757861
26/02/2016	33.12	-1.18757861	1.18757861
19/02/2016	32.29	-0.35757861	0.35757861
12/02/2016	30.41	1.52242139	-1.52242139
05/02/2016	32.18	-0.24757861	0.24757861
29/01/2016	31.75	0.18242139	-0.18242139
22/01/2016	27.76	4.17242139	-4.17242139