Menemui Matematik (Discovering Mathematics)
Vol. 45, No. 1: 1-11 (2023)

Modeling and Assessing Moral Hazard Problem in Ijarah Financing

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ABSTRACT

In the event when the price of goods being financed is higher than its initial price, it opens a chance for the bank's client to pretend to be default (moral hazard) in order to gain monetary benefit. On that account, this problem has become serious. Hence, considering this problem, this study explores the moral hazard in Ijarah financing and models the total profit for both bank and customer by using finance and mathematical theories. Pertaining to this, mathematical model to calculate the amount of money that the customer owns the bank, the investigation cost, and the total revenue for customer are developed. Using a case study, the developed model is proven to be useful in identifying the total profit gained by both bank and borrower when such moral hazard appears and henceforth mitigate such cases.

Keywords: Moral Hazard, Ijarah, Default, Islamic Finance, Rent

INTRODUCTION

The term "moral hazard" is broadly used in debate about how to improve the financial sector performance. According to Abasimel (2022), moral hazard is defined as the possibility of someone who will take less care to prevent an accident even though he or she is insured against it. Even though one is made responsible for the interest of another, he or she has an incentive to put own interest first (Sabrina and Abd Majid, 2020). Moral hazard in financial sector has been out of control to the extent that it has a significant impact on distortion of the international capital markets (Syawaluddin and Ponelo, 2020).

Moral hazard can happen any time between two parties, when customer and bank come into an agreement with one another. Each party in a financing contract may have the opportunity to gain profit from acting against the principles laid out by the agreement. Under syariah principle, moral hazard usually arises in debt-based financing (Wasiuzzaman and Nurdin, 2019). Debt based financing is a type of trade financing engaging related parties with buying and selling of goods under syariah principle (Wasiuzzaman and Nurdin, 2019; Billah and Billah, 2019a).

Ijarah is one of the Islamic financing contracts that fall under this type of financing allocation. It is a type of contract in Islamic finance that involves transferring the usufruct of a certain property from a person to another person in exchange for a rent claimed for him (Al Fasiri, 2021). Ijarah financing usually refers to a financing arrangement where the lessor's assets are rented to the lessee and the asset ownership is transferred to the lessee at the end of the rental period (Maulana, 2021).

There are two categories of defaulting debtors in Islamic Banking and Insurance (Wasiuzzaman and Nurdin, 2019). The first type is about an individual who defaults by necessity such that the individual does not have a good financial position. This situation requires that the defaulter to be given an opportunity until he is able to pay back. The second type of defaulting debtors in Islam is the debtor who refuses to pay even though he is well off. The debtor can be referred as a perpetrator of injustice and exposes himself to possible punishment. Focus of this study is the second type of debtors as it can be classified as a moral hazard problem in Ijarah financing.

Considering this moral hazard problem, it is important to prevent the customer to do such moral hazard by finding what condition that can cause moral hazard to happen and find out the appropriate ways to minimise the problems (Dalimunthe et al., 2019). Currently, there is still no mathematical model for Ijarah financing with the existence of moral hazard. Therefore, it is important to model the total profit for both bank and customer with the occurrence of moral hazard in Ijarah financing.

MATHEMATICAL MODELS

Assumptions about Ijarah Financing between Bank and Customer

Several assumptions about Ijarah financing between bank and customer need to be considered and the existence of moral hazard needs to be identified as the basis of the analysis. The assumptions are as below:

- customer proposes Ijarah financing to Islamic bank for an asset valued as V_0 at time $t=0$.
- to acquire such asset, customer proposes the bank to finance major part of asset value or L at time $t=0$. The quantity L is the residual value of the asset after the down payment, D made by customer to the vendor or can also be defined as total proposed financing. Down payment, D is an initial amount paid at the time of purchase. Hence $L=V_0 - D$ and $L<V_0$.
- bank is risk neutral.
- profit rate, r is set by bank after purchasing an asset and signed bilateral Ijarah contract with the customer.
- period of lease must be determined in clear terms at the time of contract signed.
- the customer makes monthly payments at each time, t with $t=0,1,...,n$ where n is the number of months at the end of a contract.
- bank conducts Ijarah investigation regularly or upon demand. During Ijarah contract, investigation is done to monitor the customer's financial ability while in case of default and it ensures the real condition of the customer.
- investigation cost is borne by bank but if the customer is proven to do moral hazard, he or she has to cover this cost alone.

The Scenario in the Event of Default in Ijarah Financing

Moral hazard problem in Ijarah financing arises when the customer pretends to be default in the event of default. In this predefined circumstance of event of default, the lender is allowed to demand full repayment from the borrower for the outstanding balance before it is due (Abasimel, 2022). If the lessee disobeys any term of the Ijarah agreement, the lessor has the right to terminate the lease contract unilaterally. However, if there is no default on the part of the lessee, the lease cannot be terminated without mutual consent.

In some agreements of the Ijarah financing it has been noticed that the lessor has been given an unrestricted power to terminate the lease unilaterally whenever the bank wishes, according to his sole judgment. In this research, the time contract termination is at time $t=k+g$, where k is referring to the last instalment payment made by the customer and g as the number of months from the last payment made. Moreover, to check the existence of the moral hazard, the customer needs to be default first. Hence, firstly, we need to consider the event of default in Ijarah contract. In order to make a clear vision about the procedure of default in the Ijarah

contract, the time line in Figure 1 is illustrated. The time line in this Figure 1 is based on information that had been obtained from Billah and Billah (2019b).

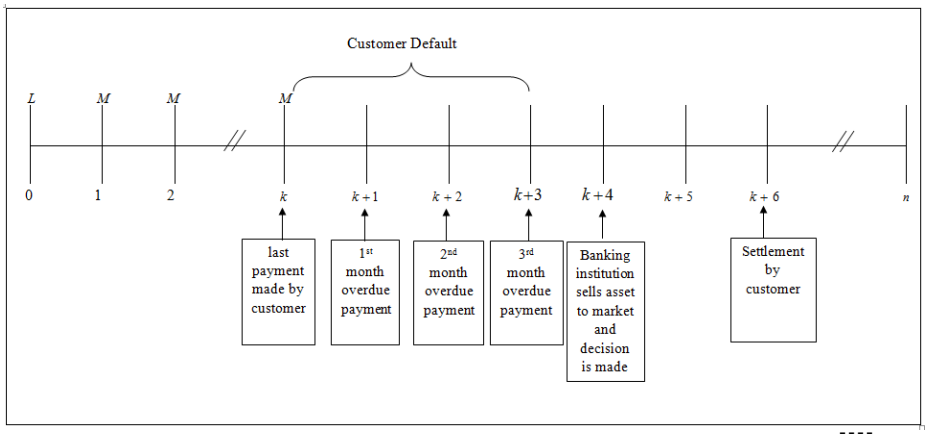

Figure 1: The time line for event of default in Ijarah contract

Based on the time line in Figure 1, the customer fails to pay the monthly instalment for the three consecutive payments after $t = k$ that is the monthly instalment at time $t = k+1$, $t = k+2$ and $t = k+3$.

At time $t = k+1$ the customer fails to pay the monthly instalment and the bank assumes that the customer forgets to pay the monthly instalment and the customer will receive standard reminder via text messages or phone calls to inform the customer to pay the one month overdue payment.

At time $t = k+2$ the customer fails to pay the monthly instalment and it becomes two months overdue payment. The first notice will be given to the customer to inform the customer to update the arrears in instalment and bank's investigation starts. After 14 days of the first notice, the second notice will be printed to inform the bank's intention to repossess the asset.

At time $t = k+3$ the customer fails to pay the monthly instalment and it becomes three months overdue payment. Upon the expiry of the second notice, the bank will repossess the asset. Upon repossession of the asset, the bank will send a notice to inform the customer that the bank had retaken the asset. The third notice is to inform the customer to exercise the rights whether to terminate the Ijarah contract or continue the Ijarah contract until the end of the period without any willingness to take moral hazard consequences.

At time $t = k+4$, if the customer decides to terminate the contract then the bank will sell the asset to public market. The banking institution can sell the asset through public auction. As auction prices are based on forced sale value, it will be lower than the prevailing market value. Forced sale value is priced at which an asset can be sold at an auction. The auction price may also be reduced during auction is carried out. If proceeds from the sale of the asset are inadequate to pay the outstanding amount due, the bank will recover the shortfall from the customer. Bank's investigation will stop as the asset had been sold.

Next, the bank will give two months to the customer that is at time $t = k+6$ to settle all the expenses including the cost that is involved during Ijarah contract. Hence, by this time, the bank will calculate their profit as the contract is terminated already. The profit for the customer will also be known.

Developing Total Profit Model for Bank and Customer with Existence of Moral Hazard

The model is developed based on the concept and idea of the total profit of Murabahah model with existence of moral hazard proposed by Ismal (2009).

The assumption is that the customer pretends to be default for he has not paid number of consecutive monthly instalments even though the customer has good financial position, then the customer has the options whether to terminate or continue the contract at $t = k + g$, where k is referring to the last instalment payment made by the customer and g as the number of months from the last payment made.

If the customer wants to continue the Ijarah contract until the end of the period without any willingness to take moral hazard consequences, then the normal condition applied. The normal condition here is when the customer pays the monthly instalment until the end of the contract without any willingness to take moral hazard consequences. Hence, all investigation cost, I are borne by the bank and there is no cost of selling asset back to the market, A involved as the asset will not be reverted back to the market in this case.

However, if the customer chooses to terminate, there are two conditions that the bank needs to consider. If the bank's investigation successfully detects the moral hazard, then the customer needs to pay for the investigation cost, I and also the cost of selling asset back to the market A. Meanwhile, if the bank fails to detect the customer's moral hazard, then the bank will have to pay the investigation cost I and the cost of selling back asset to the market A.

Now, after one month of the third notice, at time $t = k + g + 1$ with g months overdue payment, the bank will sell the asset to the public market. As the asset had been sold, cost of selling asset A, investigation cost I, and price of asset after being sold V_{k+g+1} will be known. This will be followed by the event of default that will take two months to settle which is at $t = k + g + 3$ including the amount the customer owes the bank. The investigation cost is depending on the commission rate, h on the amount of the overdue payment, Y and placement fee, f. In the event of asset selling, the variables involved are the asset selling price V_{k+g+1}, the portion s of asset that belongs to bank and the total amount of customer owes the bank s. The event of default is illustrated as in Figure 2.

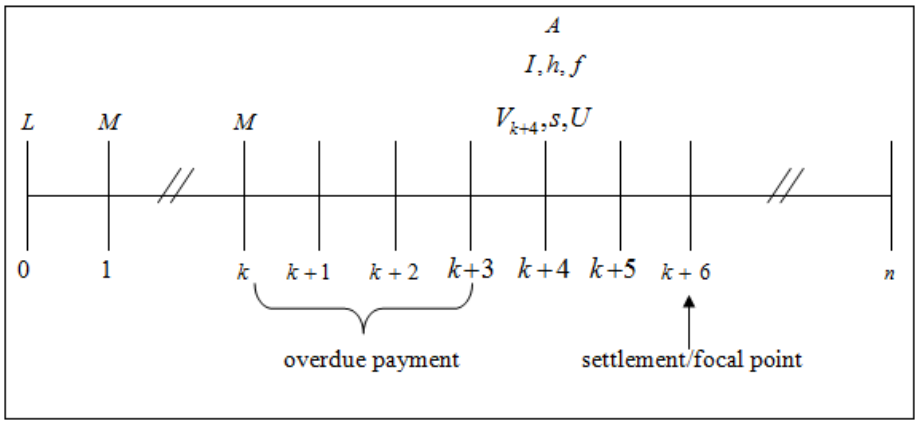

Figure 2: The event of default by customer ending with termination of contract

Firstly, the total interest paid for bank P is obtained before developing the total profit for bank B with the existence of moral hazard. The total interest paid formula is obtained based on amortization schedule in Table 1.

Table 1: Amortization Schedule

Time, t (months)	Monthly Instalment (RM)	Interest Paid, P (RM)	Principal Paid (RM)	Outstanding Loan Balance (RM)
0	M			L
1	M	Lr	$M - Lr$	$L - (M - Lr)$
2	M	$Lr(1+r) - Mr$	$M - (Lr(1+r) - M)$	$(L - (M - Lr)) - M - (Lr(1+r) - M)$
3	M	$Lr(1+r)^2 - M((1+r)^2 - 1)$	$M - (Lr(1+r)^2 - M((1+r)^2 - 1))$	$(L - (M - Lr)) - M - (Lr(1+r) - M) - (M - (Lr(1+r)^2 - M((1+r)^2 - 1)))$
4	M	$Lr(1+r)^3 - M((1+r)^3 - 1)$	.	.
.	.	.	.	.
k	M	$Lr(1+r)^{k-1} - M((1+r)^{k-1} - 1)$	.	.
.	.	.	.	.
.	.	.	.	.
n	M	$Lr(1+r)^{n-1} - M((1+r)^{n-1} - 1)$		

From Table 1 at $t = 1$, the interest paid, P is $P = Lr$.

Then at $t = 2$, the interest paid, P is

$$\begin{aligned} P &= \left(L - \left(M - Lr\right)\right)r \\ &= Lr\left(1+r\right) - Mr \end{aligned}$$

Then at $t = 3$, the interest paid, P is

$$\begin{aligned} P &= \left(L\left(1+r\right) + Lr\left(1+r\right) - M - M\left(1+r\right)\right)r \\ &= Lr\left(1+r\right) + Lr^2\left(1+r\right) - Mr - Mr\left(1+r\right) \\ &= Lr\left(1+r\right)^2 - Mr - Mr\left(1+r\right) \\ &= Lr\left(1+r\right)^2 - M\left(\left(1+r\right)^2 - 1\right) \end{aligned}$$

The interest paid, P at $t = 4$ is

$$
\begin{aligned}
P &= \Big(L(1+r) + Lr(1+r) - M - M(1+r) - M - Lr(1+r) + Lr^2(1+r) - Mr - Mr(1+r)\Big)r \\
&= Lr(1+r) + Lr^2(1+r) - Mr - Mr(1+r) - Mr + Lr^2(1+r) + Lr^3(1+r) - Mr^2 - Mr^2(1+r) \\
&= Lr(1+r) + Lr^2(1+r) + Lr^3(1+r) - Mr - Mr - Mr(1+r) - Mr^2 - Mr^2(1+r) \\
&= Lr(1+r)(1+r) + Lr^2(1+r)(1+r) - Mr - Mr(1+r) - Mr(1+r)^2 \\
&= Lr(1+r)^2 + Lr^2(1+r)^2 - Mr - Mr(1+r) - Mr(1+r)^2 \\
&= Lr(1+r)^2(1+r) - Mr - Mr(1+r) - Mr(1+r)^2 \\
&= Lr(1+r)^3 - Mr - Mr(1+r) - Mr(1+r)^2 \\
&= Lr(1+r)^3 - M\Big((1+r)^3 - 1\Big)
\end{aligned}
$$

Then at $t=3$, the interest paid, P is

$$P = Lr(1+r)^{k-1} - Mr\Big(1+(1+r)+(1+r)^2+\ldots+(1+r)^{k-1}\Big)$$

Then, by using a geometric series, the equation becomes

$$
\begin{aligned}
P &= Lr(1+r)^{k-1} - Mr\left(\frac{1\Big((1+r)^{k-1}-1\Big)}{(1+r)-1}\right) \\
&= Lr(1+r)^{k-1} - M\Big((1+r)^{k-1} - 1\Big)
\end{aligned}
$$

Note that the unit for the quantity r in the above equation is in years. Hence, based on Table Table 1, at $t=k$, the total interest paid, P is

$$\sum_{t=1}^{k}\left(L\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{t-1} - M\left(\left(1+\frac{r}{12}\right)^{t-1} - 1\right)\right) \tag{1}$$

The quantity k is the time when customer makes the last payment before default. If the contract is settled at time $t=k+g+3$ then the total interest paid, P at $t=k+g+3$ is

$$P = \left(1+\frac{r}{12}\right)^{g+3}\sum_{t=1}^{k}\left(L\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{t-1} - M\left(\left(1+\frac{r}{12}\right)^{t-1} - 1\right)\right) \tag{2}$$

The total three consecutive overdue payments Y at time $t=k+g$ is

$$Y = M\left(1+\frac{r}{12}\right)^{g} + M\left(1+\frac{r}{12}\right)^{g-1} + \ldots + M\left(1+\frac{r}{12}\right)^{2} + M\left(1+\frac{r}{12}\right) + M \tag{3}$$

The percentage portion of asset value for bank s is the remaining asset that has not been paid due to the termination of contract. As the contract terminates at $t = k + g$, then the portion of asset value for bank, s is calculated after $t = k$ until the end of the contract $t = n$. The asset portion owned by bank, s is the amount the customer owes the bank, U divided by the price of asset sold at $t = k + g + 1$, V_{k+g+1}. The formula formula for asset portion owned by bank s is formulated as follows :

$$S = \frac{U}{V_{k+g+1}} \tag{4}$$

where

U : the amount the customer owes the bank
V_{k+g+1} : price of asset sold at $t = k + g + 1$

The quantity U at $t = k + g + 1$ is obtained by using the future annuity formula from Kellison (2009). The formula is

$$U - \left(L\left(1+r\right)^{k} - M\left(\frac{\left(1+r\right)^{k} - 1}{r} \right) \right) \left(1+r\right)^{g+1} \tag{5}$$

Hence, the portion of asset value for customer, $1-s$ is from initial time $t = 0$ until the of contract termination, $t = k$. The asset portion owned by customer, $1-s$ is the remaining asset that the bank do not owned that is $1-s$. The quantity s is obtained from equation (5). The formula for asset portion owned by customer $1-s$ is formulated as follows :

$$1 - s = 1 - \frac{U}{V_{k+g+1}} \tag{6}$$

Total cost, T in the simplest term is defined as all the costs incurred in producing something or engaging in an activity. Due to the contract termination, there exists the cost in selling of asset A and the cost of investigation I at $t = k + g + 1$. Hence, the total cost, T at $t = k + g + 3$ is

$$T = \left(A + I\right)\left(1 + \frac{r}{12}\right)^{2} \tag{7}$$

The investigation cost, I at $t = k + g + 1$ is the commission rate, h times overdue payment, Y at from equation (3) plus placement fee, f and is formulated as follows :

$$I = h\left(M\left(1+\frac{r}{12}\right)^{g} + M\left(1+\frac{r}{12}\right)^{g-1} + \ldots + M\left(1+\frac{r}{12}\right)^{2} + M\left(1+\frac{r}{12}\right) + f \right) \tag{8}$$

Using the definition from Ismal (2009), the total revenue for customer, E involves the portion of asset owned by customer after being sold that is $1-s$ and the asset value that is sold at time

$t = k + 4$ is V_k. The procedure of event of default in Ijarah contract can be referred to Figure 1. The total revenue model for customer, in Ijarah contract at $t = k + g + 3$ is

$$E = (1 - s) V_{k+g+1} \left(1 + \frac{r}{12}\right)^2 \tag{9}$$

Now consider the bank's investigation successfully detects customer's moral hazard. Hence, the bank does not need to pay for all the total cost that is $A = 0$ and $I = 0$. Hence, the total cost, T for bank from equation (7) is zero. Therefore, the total profit for bank, B is $B = P$.

By substituting total interest paid for bank P from equation (2), the equation for total profit for bank, B becomes

$$B = \left(1 + \frac{r}{12}\right)^6 \sum_{t=1}^{k} \left(L \frac{r}{12} \left(1 + \frac{r}{12}\right)^{(t-1)} - M \left(\left(1 + \frac{r}{12}\right)^{(t-1)} - 1 \right) \right). \tag{10}$$

The total revenue for customer E is obtained from equation (9) and the equation for total cost, T for customer is obtained from equation (7). As the customer has to pay for all investigation cost and cost of selling asset, the total profit for customer, C becomes

$$\begin{aligned} C &= E - T - X_k \left(1 + \frac{r}{12}\right)^{g+3} \\ &= (1 - s) V_{k+g+1} \left(1 + \frac{r}{12}\right)^2 - (A - I) \left(1 + \frac{r}{12}\right)^2 - M \left[\frac{\left(1 + \frac{r}{12}\right)^k - 1}{\frac{r}{12}} \right] \left(1 + \frac{r}{12}\right)^{g+3} \\ &= \left((1 - s) V_{k+g+1} - A - I \right) \left(1 + \frac{r}{12}\right)^2 - M \left[\frac{\left(1 + \frac{r}{12}\right)^k - 1}{\frac{r}{12}} \right] \left(1 + \frac{r}{12}\right)^{g+3} \end{aligned}$$

RESULTS AND DISCUSSION

In order to check the feasibility of implementing Ijarah with the existence of moral hazard, empirical data were used. The values were obtained from various sources. The values for monthly instalment, M, amount financing, L, profit rate, r, and the number of months of Ijarah contract n were obtained from product disclosure sheets from Bank A. The value for the cost of selling asset back to market, A or the repossession cost are obtained from webpage Ammar (2014). From Kellison (2009), the value of repossession cost is RM 500. The investigation cost, I are obtained from a debt collector company located in Kuala Lumpur. The investigation cost, I is as in Table 2.

Table 2: Investigation Cost Table

LOCATION	PLACEMENT FEES	AGING OF DEBTS	
	RM	UNDER 24 MONTHS	OVER 24 MONTHS BUT UNDER 6 YEARS
Kuala Lumpur / Selangor / Perak / Pulau Pinang	300	25%	30%
Rest of Malaysia	500	30%	35%
Singapore	500	30%	35%
International	500	Negotiable (depending on country)	

Source: A debt collector company

Data of the total profit was obtained from EXCEL spreadsheet. For each total profit model, the necessary values are calculated and amortization schedule is provided using total profit model with the existence of moral hazard that is by using different type of variables. Below is the list of variables and data used in the amortization schedule.

L : RM100,000.00
n : 120 months
r : 8.35%
g : number of months from the last payment made
V_{k+g+1} : RM300,000.00
h : 30%
f : RM500.00
A : RM500.00
M : RM1,231.85
I : RM1,624.30

Table 3: Amortization Schedule Show The Total Profit Obtained by The Bank and Customer for Their Cash Flow

t	Monthly Installment, M	Interest Paid	Total Interest Paid	Principal Repaid	Outstading Loan Balance	The amount the customer owes the bank, U	Bank portion, s	Customer portion, 1-s	Total profit for bank, B	Total profit for bank, C
0					100000.00	102812.52	0.34	0.66	0.00	197787.39
1	RM1,231.85	695.83	695.83	536.02	99463.98	102261.43	0.34	0.66	725.39	198337.30
2	RM1,231.85	692.10	1387.94	539.75	98924.24	101706.50	0.34	0.66	1446.90	198891.04
3	RM1,231.85	688.35	2076.28	543.50	98380.74	101147.72	0.34	0.66	2164.49	199448.64
4	RM1,231.85	684.57	2760.85	547.28	97833.46	100585.04	0.34	0.66	2878.14	200010.11
5	RM1,231.85	680.76	3441.61	551.09	97282.36	100018.45	0.33	0.67	3587.82	200575.49
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
113	RM1,231.85	66.47	47586.79	1165.37	8387.86	8623.77	0.03	0.97	49608.42	291774.81
114	RM1,231.85	58.37	47645.15	1173.48	7214.38	7417.28	0.02	0.98	49669.26	292978.72
115	RM1,231.85	50.20	47695.35	1181.65	6032.73	6202.40	0.02	0.98	49721.59	294191.00
116	RM1,231.85	41.98	47737.33	1189.87	4842.86	4979.06	0.02	0.98	49765.36	295411.72
117	RM1,231.85	33.70	47771.03	1198.15	3644.71	3747.22	0.01	0.99	49800.49	296640.94
118	RM1,231.85	25.36	47796.39	1206.49	2438.22	2506.79	0.01	0.99	49826.92	297878.71
119	RM1,231.85	16.97	47813.35	1214.88	1223.34	1257.74	0.00	1.00	49844.61	299125.09
120	RM1,231.85	8.51	47821.87	1223.34	0.00	0.00	0.00	1.00	49853.49	300380.14
Total	147821.87	47821.87		100000.00						

Let t = 113, the interest paid by the customer to the bank is RM 66.47. As t increases the interest paid at t month decreases. The total interest paid from monthly instalment is RM 47,586.79. This

is the total profit for bank at t = 113. The principal repaid by the customer to the bank is RM1,165.37. The remaining amount of payment is RM 8,387.86. Hence, the amount of debt owed by customer is RM 8,623.77. As the bank's portion is 3%, the customer portion $1 - s$ is 97%. If the customer's moral hazard is detected in the investigation, then the total profit for the bank and the customer are RM 49,608.42 and RM 29,1774.81 respectively.

CONCLUSION

Ijarah financing is a debt-based financing and many customers choose this type of financing rather than other debt-based financing like Murabahah from bank to purchase the needed asset. This is because it is easier to lease than borrow for short-term needs. At present, there is still no study pertaining to Ijarah financing with the existence of moral hazard. Moral hazard happens when the customer pretends to be default. In most cases, the moral hazard arises when the customer default in payment for three consecutive months. Nevertheless, different bank may impose different rules for detecting event of default. Hence, this study proposes the variable, as number of consecutive months from the last payment made of default payment replacing the usual used 3 consecutive months. The total profit model with existence of moral hazard was developed by considering the idea and concept from Ismal (2009), Ruslan and Jaffar (2012) model. For this case all the costs incurred are borne by the customer as the customer's moral hazard is detected by the bank's investigation.

From the result obtained in this study, it is hoped that it can be referred to for any future studies that are related in order to enhance the Ijarah product in Islamic financing. This model is useful to avoid the customer in Ijarah financing from pretending to be default that is intolerable in Islam. This can help the banking institution to cope with defaulting debtors.

ACKNOWLEDGEMENT

This study is partially funded by the Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education Malaysia that is managed by the Re- search Management Centre (RMC), IRMI, Universiti Teknologi MARA, 600- IRMI/FRGS 5/3 (83/2016).

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