Assessing Moral Hazard Problem in Murabahah Financing[1]

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Abstract

Murabahah is a dominant financing instrument in most Islamic banks all over the world. However, price volatility of the good being financed opens a chance for entrepreneurs to gain profit by pretending to be default (moral hazard). Assessment on condition triggering such moral hazard and probability of entrepreneurs to take risk of pretending to be default are being analyzed. Finally, Islamic bank can mitigate it through appropriate bank's investigation and charging some cost as well as penalty.

Keywords: Murabahah, Moral Hazard, Price Risk, Penalty

1. Introduction

Islamic banking theory recognizes financing allocation into three types which are: (a) Equity based financing; (b) Debt based financing and; (c) Benevolent loan and services[3]. Islamic equity-based financing is an Islamic investment engaging at least two parties to do business together under sharia principles[3]. Examples of this are Mudarabah (trustee partnership), Musharakah (joint venture), Muzara'ah (Harvest Yield Profit Sharing) and Musaqot (Plantation Management Fee Based on Certain Portion of Yield) (Antonio, 1999:143-155).

Meanwhile, debt based financing is a trade based financing engaging related parties with buying and selling of good under sharia principles. This financing consists of Murabahah (cost-plus sale), Ijarah (leasing), Bay Salam (deferred delivery sale), and Bay Istishna (manufacture-sale). Lastly like its counterpart, Islamic banks also provide a range of banking services such as Wakalah, (opening of letter of credit), Kafalah (letter of guarantee) and Hiwala (debt transfer) (Obaidullah, 2005:113-115).

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[3] Fee based and fund based services

Amongst all kinds of financing, debt based financing is the most favorite one in particular Murabahah financing. Islamic banks use it is because (a) Murabahah rate of return is predetermined, fixed and continues (b) Trade financing does not require much efforts to monitor, cooperate or evaluate like investment based financing and (c) Risk of default is relatively low. Whilst for the entrepreneurs, Murabahah is preferable due to its (i) Fixed rate of return along payment period (ii) No charge for late payment/default (iii) Treating an asset being purchased as collateral, etc (Roosly, 2005).

Nevertheless, Murabahah financing in sharia point of view contains several risk to be anticipated by the banks. Such risks are price risk, default risk, commodity risk and market risk. Focus of this paper is to price risk, which is the volatility of a commodity price along its financing period (Iqbal and Mirakhor, 2007:233). Bank's clients in this case might potentially earn monetary benefit when the price of a good being financed through Murabahah is going up more than its beginning price when Murabahah contract was signed. Hence, there comes up three options for him to do. First is to continue Murabahah contract until end of the period and realize the gain from the price margin assuming future price of the good is still high. Or, second option is to immediately terminate Murabahah contract by pretending to be default and earn monetary benefit when price of the good has reached its highest level. Lastly is to fully pay the total Murabahah contract on the spot with/without a hope for price rebate as some scholar prohibits it.

Focus of this paper is to that second option because it can be classified as a moral hazard problem in Murabahah contract. In sharia point of view, if the entrepreneur is really in a default situation, there are only limited actions that can be pursued by bank; (a) Extending Murabahah payment period until entrepreneur has financial ability to continue it (Holy Qur'an 2:280) (b) Ending the contract with an obligation to the entrepreneur to fulfill all of his payments (c) Selling the asset in the market as it functions as a collateral in the contract and using the income to settle the rest of the payment. Nonetheless, those actions only apply to an honest default. If the entrepreneur pretends to be default it is intolerable and Islamic bank might suffer some problems because of it, such as:

- Interrupting bank's predetermined cash flow in asset side, which has been planned and adjusted with its liability side.

- Disrupting bank's predetermined profit calculated along Murabahah contract (from the beginning until ending of the contract period).

- Selling an asset in the market causes extra cost.

- It requires sudden investigation (I) by bank to check the real condition of the Entrepreneur with the cost borne by bank itself if entrepreneur is in honestly default.

Considering those problems, it is important to prevent entrepreneur to do such a moral hazard by finding what condition that can trigger it to happen, how big the probability is and how Islamic bank can discourage it. Inspired by Dr. Habib Ahmed's paper (2000), this paper explores moral hazard in Murabahah financing contract by modifying and extending Dr. Ahmed's works combined with applied finance/mathematical theory to model such moral hazard and find out appropriate ways to mitigate it.

2. Murabahah Financing

2. 1. Model Selection Criteria

This part elaborates Islamic banking selection criteria in advancing Murabahah financing to its business partners. It is going to be a starting point to know what kind of condition that can trigger moral hazard to appear. But before that, several assumptions below are used as the basis of the analysis.

- Entrepreneur proposes Murabahah financing to Islamic bank for an asset valued as V in time period $t = 0$. It also functions as collateral in Murabahah contract.

- To acquire such asset, entrepreneur proposes the bank to finance major part of asset value or L at time $t = 0$. L is the residual value of the asset after down payment (Dp) made by entrepreneur to the vendor. Down payment is counted as $Dp = DpV$. Hence $L = (V - DpV)$ and $L<V$.

- Bank is risk neutral.

- Mark up (r_m) is set by bank after purchasing an asset and signed bilateral Murabahah contract with the entrepreneur. r_m is assumed to be composed of (i) rate of profit (π_m) and (ii) administrative cost (Ca). Thus, $r_m = \pi_m + Ca$. Therefore, $L(1 + r_m)$ is the total Murabahah contract to be paid from t_1 until t_n (end of Murabahah contract).

- Bank conducts Murabahah investigation regularly or upon demanded. During Murabahah contract, investigation is done to monitor the entrepreneur's financial ability while in case of default; investigation is placed to ensure the real condition of the entrepreneur. Cost of such investigation is borne by bank but if the entrepreneur is proven to do moral hazard, he has to cover this cost alone.

Following all assumptions, regular Murabahah payment from entrepreneur to Islamic bank is formulized as

$$\sum_{t=1}^{n} L(1+r_m)^t = \sum_{t=1}^{n} (V - D_p V)(1+r_m)^t$$

and roled as a regular cash inflow for the bank. Finally, Islamic bank for the sake of this research judges three variables as criteria to select Murabahah financing proposal. Firstly is information about entrepreneur (λ), normalized to unity ($0 < \lambda < 1$), leading to adverse selection (AS) or AS = $f(1/\lambda)$. If bank only knows less information about the entrepreneur, $\lambda \approx 0$ meaning there will be adverse selection, whilst if bank has a lot of positive information about entrepreneur, $\lambda \approx 1$ meaning there will be no adverse selection.

Second variable to be evaluated is whether entrepreneur has saving account (T) in the bank. Assuming the same normalized unity as information variable above ($0 < T < 1$), Murabahah financing will be given if entrepreneur is the bank's own depositor (T $\approx$ 1) meaning he has account in the bank and no financing will be given if entrepreneur is not bank's depositor or T $\approx$ 0. Finally is price and expected price [$E(P_v)$] of the good planned to be purchased in the market. According to the standard economic theory, price of the good in the market is determined by market demand (D) and Supply (S) or $E(P_v) = f(D,S)$. Thus, if $E(P_v) > V_0$ Murabahah financing will be extended but if $E(P_v) < V_0$ it will not be realized thereof. This third variable is notably the source of moral hazard in Murabahah. Particularly, when the existing price of a good is in higher position than the first price (when firstly bought).

Based on those three set of variables, Islamic bank evaluates various Murabahah proposals with parameter $\theta = f(\lambda, T, P_v)$. Note that the higher the risk, the closer θ to unity ($0 < \theta < 1$) and Islamic bank will tend to release funding for Murabahah proposal. Later on, this indicator underlies a condition that opens a chance to the entrepreneur to do moral hazard upon receiving Murabahah financing.

2. 2. Financial Decision in Murabahah Financing

As Murabahah is remarkably a trade-based contract with a deferred payment, total payment of Murabahah contract will be treated as opportunity cost concept related to the present and future value of the total payment (Benninga, 2000:1-10). However, unlike conventional way of using interest rate to calculate present and future value, sharia adopts rate of return (r_m) as a controllable tool to direct the present of future value of payments being made. With respected to Murabahah financing, Islamic bank will decide to release financing if the present value of the total Murabahah payment is

higher than (or at least the same as) total proposed Murabahah financing (L_0), or simply said $PV \geq L_0$.

By adjusting conventional present value formula to Islamic perspective, total present value of Murabahah financing is derived as follows:

$$PV = \sum_{t=1}^{n} \frac{L}{(1+r_m)^t}$$ and because $L = (V - D_p V)$ so PV of Murabahah financing is

formulated as $PV = \sum_{t=1}^{n} \frac{(V - D_p V)}{(1+r_m)^t}$. Recalling Murabahah financing decision

prerequisite of $PV \geq L_0$, Murabahah proposal from an entrepreneur will be approved

if $\sum_{t=1}^{n} \frac{(V - D_p V)}{(1+r_m)^t} \geq L_0$ while $PV = L_0$ represents internal rate of return (IRR) which

is a breakeven point between financing being given and payments received alongside period of Murabahah contract. In order to gain profit, Murabahah's mark up rate r_m should be determined in a higher rate than IRR or $r^*_m \geq r_m$. Then, the final Murabahah

financing decision will be $\sum_{t=1}^{n} \frac{(V - D_p V)}{(1+r_m^*)^t} \geq L_0$ noting that r^*_m is the profitable

Murabahah mark up rate for the bank.

3. Moral Hazard in Murabahah Financing

3. 1. Conditions Triggering Moral Hazard

As briefly explained above, entrepreneur, who occupied Murabahah financing contract, can be tempted to do moral hazard whenever there is a possibility for that. Logic behind it is monetary benefit possibly gained by pretending to be default to terminate the contract rather than continuing it until end of Murabahah contract. Continuing the indication of moral hazard appeared inherently with fluctuation of the price, there are three scenarios of price risk with respected to the probability of doing moral hazard as explained in the following:

Higher Current Market Price than the First Price Agreed in Murabahah Contract

Current market price of a Murabahah good is higher than the first price when it was agreed to finance or $V_k > V_0$. Intuitively, entrepreneur might think of possibility to gain some benefit by squaring the contract, releasing the good but receiving some money from it especially if he also has enough saving (T) in the bank to cover the cost upon needed. He pretends to be default although "pretending" itself is a kind of

dishonesty and not allowable in Islamic financing principle. For entrepreneurs, settling Murabahah contract of working capital good (machinery, operational car, etc) when they have a better alternative is not impossible, especially if they can benefit by doing it. Specially, it is possible when a higher current market price facilitates them to do such execution.

What are benefits of pretending to be default to end the contract unilaterally? Following some unwanted output faced by Islamic bank as an impact of this unplanned termination of Murabahah contract, entrepreneur will get:

- Profit margin from a higher current market price of the good than the starting price in the contract (assuming cost of selling, etc is not significant).

- A release from an obligation to continue Murabahah contract and can utilize his money (allocated previously for payment) for other purposes.

- Another alternative to replace the good especially if the Murabahah good is not needed again or there is a better alternative other than acquiring the good at the end of Murabahah contract.

Nevertheless, as the entrepreneur declares himself default, Islamic bank will instantaneously arranges an investigation to find out the real situation. For this entrepreneur's declaration, probability of arranging investigation (I) is almost 1 (assuming unity index $0< T <1$) and the consequences of this sudden investigation are definitely two (i) If bank finds and believes that entrepreneur's default is real then the cost of investigation will be under their responsibility as it should be, but (ii) if bank finds that it is fraud (pretended to be default), the entrepreneur should bear investigation cost and other penalties explained later.

No Changes in Market Price of the Good

If the price of a good is relatively the same as the first price agreed in the contract ($V_t = V_0$), entrepreneur will less consider of pretending to be default unless he is really default consciously. The probability of doing investigation for this case would only be $0< I <1$ as Islamic bank also realizes that entrepreneur will not try to deceit due to zero benefit of doing it. Even, if the entrepreneur is really in default and investigation finds it true, cost of investigation and penalties will not charge him (still responsibility of the bank). The result of ending the Murabahah contract in this case is under bilateral decision and consciousness meaning that any benefit or loss appears to entrepreneur at the end contains no dishonesty.

Lower Current Price than the First Price Agreed in Murabahah Contract

Undoubtedly, this condition ($V_t < V_0$) brings no incentive for entrepreneur to conduct moral hazard like in the first scenario and probability of bank's investigation is nearly

zero ($I \approx 0$). Entrepreneur has to pay for investigation cost and penalties as well if he pretends to be default and proven as cheating (moral hazard) according to bank's investigation. Even if, bank's investigation fails to prove it as less probability of doing it, ending Murabahah contract by selling the good to the market might cause him to add more money to cover the rest of the total $L(1 + r_m)$ as the current market price of the good is lower than the first price agreed in the contract. However, as entrepreneurs often engage in Murabahah contract for a real and marketable capital good, so this scenario of lower current market price than firstly agreed price rarely happens. Whilst like the same case in the unchanged price above, if the entrepreneur really goes bankrupt and cannot fulfill his payment obligation, any benefit or loss appears to entrepreneur at the end of Murabahah contract contains no dishonesty.

3. 2. Consequence of Price Risk

Now, focus of the analysis is to scenario of the higher current market price of the good as it opens the opportunity of moral hazard. When entrepreneur dares to pretend default, what is the bank's total receipt if Murabahah contract has to be ended unscheduled? Assuming that bank's investigation fails to detect entrepreneur's moral hazard, Islamic bank will get total accumulated payment of:

$$TR_b = \sum_{t=1}^{k} L(1 + r_m^*)^t + sV_k \tag{1}$$

with k = termination of Murabahah contract and s = portion of asset value (after being sold) located for bank. To see the present value of TR_b, it has to be adjusted with rate of return as explained earlier. Total cost occurs in termination date is:

$$TC_b = I + Cs \tag{2}$$

with Cs = cost of selling such asset to the market. Thus, total profit (π_b) for bank of this moral hazard practice is:

$$\pi_b = \left[\sum_{t=1}^{k} L_0 + \frac{V(1 - D_p)}{(1 + r_m^*)^t} \right] + sV_k - I - C_s \tag{3}$$

As the equation 3 above has been in form of net present value, the value of L_0 is negative representing initial financing value followed by positive revenue received from payment of Murabahah from $t = 1$ into $t = k$.

Meanwhile, if bank's investigation successfully detects this entrepreneur's moral hazard practice, total cost will be zero assuming no other related cost except investigation cost (I) and cost of selling the good to market (C_s). Total profit of Islamic bank becomes:

$$\pi_b = \left[\sum_{t=1}^{k} L_0 + \frac{V(1-D_p)}{(1+r_m^*)^t} \right] + sV_k \tag{4}$$

For the entrepreneur, this scenario produces total revenue of:

$$TR_c = (1-s)V_k \tag{5}$$

because he does not have any asset left but he potentially gains income from price margin of selling asset in the higher current market price. TR_c has already counted total entrepreneur's payment of Murabahah from $t = 1$ until $t = k$. Then, if bank's investigation <u>fails</u> to detect his practice, total cost (TC_c) is zero ending up with total profit (π_c) = TR_c (equation 5).

But, if his practice is <u>caught</u> by bank, unfortunately he has to bear I and C_s so that his total profit is:

$$\pi_c = (1-s)V_k - I - C_s \tag{6}$$

For a comparison, let's examine a normal condition when entrepreneur continues Murabahah constract until end of the period without any willingness to take moral hazard consequences. In this situation, total revenue for the bank is:

$$TR_b = \sum_{t=1}^{n} L(1+r_m^*)^t = \sum_{t=1}^{n} V(1-D_p)(1+r_m^*)^t \tag{7}$$

Total cost (TC) is only investigation cost (I), so total profit counts to be:

$$\pi_b = \left[\sum_{t=1}^{n} L_0 + \frac{V(1-D_p)}{(1+r_m^*)} \right] - I \tag{8}$$

On the other hand, entrepreneur receives TR as the last market price of the asset (V_n), but his total cost is:

$$TC_c = \sum_{t=1}^{n} L(1+r_m^*)^t = \sum_{t=1}^{n} V(1-D_p)(1+r_m^*)^t \tag{9}$$

without any obligation to pay both investigation cost and selling cost. Then, his total profit in this case becomes:

$$\pi_c = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right] \tag{10}$$

3. 3. Chance of Doing Moral Hazard

Using set of formula calculated above, entrepreneur will happily do moral hazard if profit of doing it is bigger than not doing or ($\pi_{mh} > \pi_{co}$). Under two consequences of

being found or not found by bank's investigation, every scenario is shown in the following:

Moral hazard is not found by bank's investigation:

Profit resulting from moral hazard is $\pi_{mh} = (1-s)V_k$, whilst normal profit of continuing the contract is $\pi_{co} = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right]$ so moral hazard happens if:

$$(1-s)V_k \geq \left[V_n - \left(\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right) \right] \qquad (11)$$

Moral hazard is found by bank's investigation:

Profit resulting from moral hazard is $\pi_{mh} = (1-s)V_k - I - C_s$, whilst normal profit of continuing the contract is $\pi_{co} = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right]$ so moral hazard happens if:

$$(1-s)V_k - I - C_s \geq \left[V_n - \left(\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right) \right] \qquad (12)$$

4. Minimizing Moral Hazard in Murabahah Financing

4. 1. Charging Penalty

Because of some negative impacts of this moral hazard practice mentioned previously and to create trusted relationship between bank and entrepreneur, Islamic banks may impose penalties besides assigning entrepreneur to pay for investigation cost and cost of selling. However, such penalty should fulfill at least two prerequisites (a) It is charged during Murabahah period and not at the end of the contract period (b) It is charged because entrepreneur deceives the bank while in fact he is in a good financial capability to continue Murabahah contract until the end of the period. In principle, this penalty is set to minimize entrepreneur's total profit resulted from price margin into the level that causes him to just continue the contract until end of the period.

Total amount of penalty borne by entrepreneur of his moral hazard is counted as $\beta\{(1-s)V_k\}$ which is percentage of entrepreneur net profit after selling Murabahah's asset. As a result the chance of doing moral hazard become more difficult as the profit from moral hazard is now $\pi_{mh} = (1-s)V_k - I - C_s - \beta\left[(1-s)V_k\right]$ or simply,

$$\pi_{mh} = (1-s)V_k[1-\beta] - I - C_s \qquad (13)$$

whilst normal profit of continuing the contract is still $\pi_{co} = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right]$ so

the chance of conducting hazard happens might appear if:

$$(1-s)V_k[1-\beta] - I - C_s \geq \left[V_n - \left(\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right) \right] \tag{14}$$

4. 2. Effective Investigation

After charging penalty, effective investigation plays important role to detect and minimize the probability of doing moral hazard. The entrepreneur on the other hand considers the probability of bank's investigation (to avoid sanction), as crucial factor to calculate cost and benefit of doing moral hazard. Thus, if probability of bank's investigation can be written as P_I, the probability of moral hazard and the policy of bank to stop it can be determined. Summarizing all profit alternatives of entrepreneur above into table below:

Table: Profit to Continue and Do Moral Hazard

Entrepreneur	Profit to continue (π_c)	Profit to moral hazard (π_{mh})
Found in Investigation	$\pi_{co} = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right]$	$\pi_{mh} = (1-s)V_k[1-\beta] - I - C_s$
Unfound in Investigation	$\pi_{co} = V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right]$	$\pi_{mh} = (1-s)V_k$

The probability of continuing Murabahah contract until the end of the period[4] is found as:

$$\pi_{co} = P_I \left[V_n - \left(\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right) \right] \tag{15}$$

and the probability of terminating it (pretending to be default) is counted as:

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[4] Sharia principles prohibit business dealing with non halal item (pork, alcohol, etc), speculative activities, gambling, etc.
[5] Totaling profit gained if investigation occurs and if investigation does not occur

$$\pi_{mh} = P_I \left\{ (1-s)V_k [1-\beta] - I - C_s \right\} + (1-P_I)\left[(1-s)V_k\right]$$
(16)

As entrepreneur will try to do moral hazard if $\pi_{mh} > \pi_{co}$ therefore cut-off probability of bank's investigation (P_I*) that will lead to moral hazard practice is:

$$P_I^* = \frac{(1-s)V_k}{\left\{ \beta\left[(1-s)V_k\right] + I + C_s + V_n - \left[\sum_{t=1}^{n} \frac{V(1-D_p)}{(1+r_m^*)^t} \right] \right\}}$$
(17)

Several important points revealed by equation 17 above regarding bank's policy to mitigate moral hazard are:

- If probability of bank's investigation (P_I) is less than (P_I*) or ($P_I<P_I*$), entrepreneur will most likely pretend to be default (moral hazard) knowing that the profit of doing it is higher than just continuing the contract.

- Moral hazard problem will likely to take place not only when probability of bank's investigation is low but also due to a very high current market price of the Murabahah good leading to a promising profit to square the contract prior to its end period.

- Hence, to mitigate such moral hazard, Islamic bank has to (a) Determine probability of bank's investigation (P_I) so that $P_I = P_I*$ and (b) Set an appropriate percentage of entrepreneur's net profit after selling Murabahah's asset (β) to reduce entrepreneur's profit of terminating the contract prior to its end period $(1-s)V_k$ besides charging entrepreneur to pay investigation cost (I) and cost of selling the good (C_s).

5. Conclusion

Islamic banking financing recognizes three forms, equity based financing, debt based financing and benevolent loan. In practice, debt based financing particularly Murabahah is dominantly occupied by Islamic banks around the globe. However, price risk of the good being financed opens a chance for entrepreneurs to gain profit by pretending to be default. To mitigate such problem, Islamic bank conducts bank's investigation and charging some cost as well as penalty. Hence, entrepreneur will hopefully keep continuing the Murabahah contract until the end of the agreed period.

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