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Profit sharing and loss bearing in financial intermediation theory

Abstract

The purpose of this paper is to include the profit sharing and loss bearing (*mudharabah*) contract in Islamic financial intermediation theory. The aim is to identify under which situations the *mudharabah* contract can reach the optimal point. Theoretically, the *mudharabah* contract can be used to overcome two major problems in financial intermediation theory i.e., asymmetric information and transaction costs. The findings show that the optimal contract can be achieved in three situations. First, if $\pi^{*b} = \pi^b$ Islamic bank cannot provide an incentive because the probability of profit and value of h equal to zero. Second, this situation also shows that Islamic bank cannot achieve the optimal contract because the probability of profit and value of h is less than zero. Meanings that $\pi^{*b} \leq \pi^b$. Third, Islamic bank is capable to maximize profit and provide incentive to the entrepreneur if $\pi^{*b} \geq \pi^b$. That means probability of profit and value of h is more than zero. Hence, only the third situation can produce the optimal contract in financial intermediation theory.

Keywords: financial intermediation, profit-sharing, optimal contract, economic development, financing.

JEL Classification: G21, G32, B52, B11, N25.

Introduction

Economists like Schumpeter (1911), Gurley and Shaw (1955) and Tobin (1963), believed that financial intermediaries are important factors in supporting economic development (Ismail and Ahmad, 2006). Schumpeter (1911) shows that the services¹ provided by financial intermediaries are essential for technological innovation and economic development. While, Gurley and Shaw (1955) highlight the fundamental role of intermediary which transmits fund by issuing of indirect financial asset to surplus units (lenders) and purchases of primary securities in deficit units (borrowers). Tobin (1963) says that the essential function of bank and other financial intermediaries is to satisfy simultaneously the portfolio preferences of two types of individuals and firm. It implies that the services and funds need to have features which can be bundled in the contracts.

However, in channeling services and funds via debt contract, the borrowers might hide information and hence, financial intermediaries need to monitor the borrower. It shows the problem of asymmetry information and transaction costs could appear because the hidden information. In addition, this situation incurs search and monitoring costs to make sure that borrowers could be monitored by financial intermediaries to gain the correct information. Hence, the presence of financial intermediation is important to reduce imperfect information and transaction costs. That is why financial intermediation is very important in creating the efficient allocation of financial services in economy.

Studies done by Allen and Santomero (1996) found out that the well-functioning of financial interme-

diaries could reduce the transaction cost and asymmetric information. These findings motivate a lot of studies in financial intermediation theory (as example, see from Hasman, Samartin and Bommel (2009) on the role of intermediaries in reducing the transaction cost and asymmetric information. However, both problems only occur if financial intermediaries offer debt contract. Therefore, the earlier theory of financial intermediation, as proposed by Diamond (1984) has proven that debt contract as an optimal contract to reduce the transaction cost and asymmetry information.

Several features were introduced to overcome the transaction cost, for example, Flannery (1986) and Diamond (1991). Their studies focus on debt maturities. They found out that the transaction cost could be reduced in short-term borrowing. Short-term borrowing provides the advantage of lower interest rates. And to the extent that such short-term borrowing is used to finance short-term working capital needs such as trade financing, and hence the associated risks are low. Meanings that, short-term borrowing also implies that transaction cost might be lower. While for asymmetry information, delegated monitoring could reduce the imperfection through observation by bank on behalf of depositors.

However, in Islamic finance, profit sharing contract is one of the many contracts in designing the Islamic financial intermediaries. For example, studies done by Kahf and Khan (1992), Aggarwal and Yousef (1996), Ahmed (2002), Hawary, Grais & Iqbal (2006), Ismail and Tohirin (2010), Tohirin and Ismail (2011) and Hassan (2002, 2008) clearly mentioned those contract. Furthermore, according to El-Hawary Grais & Iqbal (2007), an Islamic financial intermediation can perform the role as financial intermediaries by monitoring the projects and also the financial performance on behalf of depositors and entrepreneurs. However, in discussing the financial intermediation theory, we cannot run

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¹ Services like mobilizing saving, evaluating project, managing risk, monitoring manager and facilitating transaction.

away from the two major problems either transaction costs or asymmetry information. So, how could Islamic financial intermediaries come out with tools to reduce the information and transaction costs within the economy through the profit sharing contracts? Recent studies done by Ben Jedidia Khoutem and Ben Ayed Nedra (2012) show the extent to which Islamic participative financial intermediation can enhance economic growth. It underlines its role in resolving ex ante and ex post asymmetric information problems. Based on profits and losses principle, this intermediation reduces costs of information as well as transaction and permits risk sharing. They also highlight the fact that participative intermediation leads to an equitable, stable and sustained economic development. It can help to resolve a variety of problems: poverty and unemployment.

Although the Islamic contracts are many, but in this study we will highlight that *mudharabah* (or profit sharing and loss bearing) contract can be the optimal contract in Islamic financial intermediation theory. The role of this contract is to facilitate an efficient and transparent execution of financial transactions. Furthermore, in *mudharabah* contract, a party with available capital (*rabu al-maal*) develops a profit-sharing partnership with an agent (*mudarib*) who has investment expertise. Losses are borne only by the capital provider. Although, under a *mudharabah* contract, the capital provider does not participate in the management of the funds, but it is exclusively left to the agent (*mudarib*).

Therefore, the objective of this paper is to incorporate profit sharing contract into the Islamic financial intermediation theory. Specifically, the objective is to identify under which conditions the *mudharabah* contract is optimal. This paper is expected to contribute in various aspects. First, this study will show how the Islamic financial intermediation can reduce the transaction cost and asymmetry information problems with the application of *mudharabah* contract. Second, this paper will also discuss the introduction of *mudharabah* contract in financial intermediation theory.

The remainder of this paper is organized as follows. In introduction section we discuss prior studies on financial intermediation theory. The theoretical model for Islamic financial intermediation is presented in section 1. Then section 2 proposes the discussion on the proposed model under *mudharabah* contract. The final section will conclude and discuss policy implications.

1. The model

Several researchers, among others such as Aggarwal and Yousef (1996), how that alternative interest-free

financing contracts were developed by Islamic banks to replace the interest-based debt contract. The contracts are designed base on two principles: the profit-and-loss sharing (PLS) (i.e. *mudharabah* and *musharakah* principle) and the mark-up (i.e., *murabahah* principle). As argued by Ahmed (2002), Mahmoud (2005), Alomar (2005) PLS also creates the asymmetric information and transaction cost. Khadidja Kahaldi and Amina Hamdouni (2011) they proposed four models that govern the activities of the Islamic banks. The first model is based on the *mudharabah* (deposit, investment funds); the second concerns the *Mudharabah* for the deposit only while for the investment we need the *musharakah*; The third model is based on the *mudharabah* for deposits but introduces the debt and quasi-debt instruments (*Murabahah*, *Istisna*, *Salam*, *Ijara*). The fourth model is based on *mudharabah* for deposits and *mutajarah* on the assets side. Finally, the results show that the first model is more efficient than the others, particularly the third which is paradoxically largely adopted. The fourth is not recommended for its negative impact on trade.

However, so far, the existing studies do not raise under which condition that the contract of PLS will achieve the optimal. In this section, this paper will show how the optimally can achieve and what situation will happen. First, we present a model that show the relationship between Islamic bank and entrepreneur where the Islamic bank acts as a capital provider. The second model, we will show the relationship between Islamic bank and depositor, where depositor acts as a capital provider.

1.1. First model: bank as capital provider. The model has the following characteristics: first, we follow the model of financial intermediation proposed by Harris and Raviv (1979), Holmstrom (1979) and Shavell (1979) which has the following basic elements: (1) single agents and single principle; (2) the present of asymmetry information and (3) depositor delegated the power to bank. These characteristics lead us to establish the relationship between bank and entrepreneur using debt-contract. Ramakrishnan (1984) argues that if informational asymmetries are present in debt contract financial intermediation can improve the welfare implication of intermediary size that related to delegated monitoring issue. Diamond (1984) shows debt contract in which customers delegated power to bank to monitor financial activities by entrepreneurs.

In this paper, we differ from the above: (1) we include the element of profit sharing contract. We try to propose a model of financial transaction based on equity contract. An equity contract in this context is based on profit-sharing agreement, where the profit shared depends on the profits reported by the

entrepreneur. The basic model is constructed based on the ex-post asymmetric information between Islamic bank and entrepreneur who need to raise capital to operate a large project under *mudharabah* contract and (2) this model specifies a simple situation and characterize optimal direct contract with *mudharabah* between Islamic bank and entrepreneurs. We stress that we have more than one agent and principles. That is why, the probability and distribution of profit between Islamic bank and entrepreneur exists as shown in Table 1.

Let say the assumption for this model is as follows. First, there are N entrepreneurs indexed by i, \dots, N in the economy. The entrepreneur is endowed with the skill and technology for investment project with stochastic return. For modeling *mudharabah*, entrepreneur as a *mudharib*, so the entrepreneur's wealth is zero.

Second, for the scale of input, assume a one good economy with all consumption at the end of the period. The project requires inputs of the good today, and will produce output in one period. Normalize required initial amount of inputs to one.

Third, for the case of *mudharabah*, the expected return from the output that will be produced at the end of the period is (α/π) for bank and $(1-\alpha/\pi)$ for entrepreneur that shows by ps^m as an expected income. A *mudharabah* contract based to profit sharing principal (PSP) in which the bank provides capital that we call *rabu al-maal* and the entrepreneur acts an agent i.e., *mudharib* to implement the project.

Fourth, refers to Islamic banks are also risk neutral. To start the project, the entrepreneur must acquire sufficient resources from Islamic banks to operate it. Since ps^m is the expected income of the Islamic bank in the case of *mudharabah* contract, Islamic banks have access to a technology which will give returns, ps^m per unit. To make sure the project that undertake by entrepreneur can give profit, banks must convince potential entrepreneur that the rate which Islamic banks receive from entrepreneur has an expected value at least ps^m as described above.

Fifth, each Islamic bank has available wealth of $1/m$, thus the entrepreneur must obtain from $m > 1$ Islamic banks. Assume that capital market is competitive; if convinced that their expected return equals or exceed ps^m , Islamic banks will make the investment. Let the total expected net income of the project be the random variable π and h is the smallest face value. Assume that $\pi < \infty$. The entrepreneur and all Islamic banks as a capital provider agree on the probability distribution on π . So, we can build the modeling *mudharabah* contract as

below and probability distribution on π as shown in column 1 of Table 1.

Table 1. Probability distribution of profit of the project, bank and entrepreneur in *mudharabah* contract (PSP)

Probability (p_i)	Project profit/loss (π)	Bank	Entrepreneur
p_1	$\pi_1 < 0$	$\pi_1 < 0$	0
p_2	$\pi_2 < 0$	$\pi_2 < 0$	0
.	.	.	.
.	.	.	.
p_n	$\pi_n = 0$	$\pi_n = 0$	0
p_{n+1}	$\pi_{n+1} > 0$	$\alpha\pi_{n+1} > 0$	$(1-\alpha)\pi_{n+1} > 0$
.	.	.	.
.	.	.	.
p	π_k	$\alpha\pi_k$	$(1-\alpha)\pi_k$

The model works as follows:

Let say in this case, actual profit/income $\pi = 1$, means that $h = 0$ and expected return equals to $(1 - \alpha)$ for entrepreneur and (α) for Islamic bank. If actual profit $\pi < 0$, Islamic bank will bear the losses of project and entrepreneur is fully reflected in the opportunity cost of his services only.

In *mudharabah*, the entrepreneur as a *mudharib* will have an incentive to increase those costs that accumulate to him as benefits. The incentive to entrepreneur in modeling *mudharabah* above is $\phi(\pi)$. Unlike debt contract in conventional concept, no monitoring cost would be allowed under *mudharabah* contract. So, in this case, incentive is the good alternative for Islamic bank and entrepreneur to undertake the investment project. The monitoring activities by both parties can be done with negotiation under "*shura system*";

$$\max E \pi^b \tag{1a}$$

subject to

$$E + D = F + OA \tag{1b}$$

and

$$E \text{Max}_{\pi^b} [\pi - (r^e + \phi(\pi) - OC)] (\alpha) = r^b, \tag{1c}$$

where π^b is the return to Islamic bank; r^b is the expected income to Islamic bank; r^e is the expected income to entrepreneur; ps^m is $[(\alpha)$ for bank and $(1-\alpha)$ for entrepreneur]; $\phi(\pi)$ is incentive to entrepreneur; π is aggregate amount for actual return between bank and entrepreneur ($r^b + r^e$); OC is other cost (processing cost and *zakah*).

If Islamic bank also got return from their equity investment, the return on equity investment is, let say equal to $p_i \pi_i = \pi^s$. Thus, the return to bank equal to $\pi^b + \pi^s$.

Seventh, in this model, a contract with incentive is allowed. The incentive should be the utility for the entrepreneur without making the Islamic bank better off, the incentive represents as a higher return for the profit ratio in contract agreement. The optimal contract maximizes the expected return Islamic banks as a capital provider and minimizes expected return to entrepreneurs. Let $\phi(\pi)$ be the incentive to the entrepreneur as function of the reward from Islamic banks. The optimal contract that Islamic bank maximizes π^b , when $\pi^b = [\pi - (r^e + \phi(\pi)) - OC](\alpha)$.

Eight, in the case of monitoring, the entrepreneur's outcomes are delegated to the bank. The depositor acts as capital provider which deposit money into Islamic bank acts as an entrepreneur. The depositor can only observe the payment they receive from the Islamic bank. Due to *mudharabah*, the Islamic banks monitor an entrepreneurs receiving $r^b = \sum_j p_j \pi_j + \alpha \sum_i p_i \pi_i$. In these cases, there must be imposed penalties on the Islamic bank such processing cost for information. To ensure that the Islamic bank well monitors, the return of Islamic bank will be then $E[\pi^b = (\pi - (r^e + \phi(\pi)) - OC)(\alpha)]$. So, the Islamic bank has no incentive to lie.

Based on the above assumption, we want to propose an optimal contract where it can maximize the expected return and provide an incentive to entrepreneur. Hence, we produce the following proposition.

Proposition 1. The optimal contract which solves (1) and given that $\phi^*(\pi) = \max [z - OC]$; where z equals to $(h + \pi)$. h shows amount of asset that Islamic bank invested and π equal to actual profit from the investment project. If this model could achieve h^+ means that Islamic banks capable to maximize profit and provide incentive to entrepreneur. This *mudharabah* contract is able to be an optimal contract as shown as below.

Where h is the smallest solution to

$$(p(z < h) E_\pi[\pi^* | \pi < h]) + (p(\pi \geq h) h) = r^b. \quad (2)$$

That is, it is the PS contract under *mudharabah* with incentive and other non-pecuniary cost equal to shortfall from actual capital (face value) h , where his the expected return that provides Islamic banks with an expected of r^b , and $z = h + \pi$

Proof given $\phi^*(\pi)$,

$$\max_{\pi^b} [\pi - (r^e + \phi(\pi)) - OC](\alpha) = \begin{cases} \pi & \text{if } < h \\ h & \text{if } \geq \pi \end{cases}$$

Using (2), this satisfies with equality the constraint (1c) of providing competitive return to Islamic banks. By construction, h is the smallest number such that if the constraint $\pi^* \geq \pi$ and $\pi \geq h$ are

satisfied, the expectation of $\phi(\pi)$ is at least r^b . Hence to satisfy (1c), there must exist some payment $\phi(\pi)$ which is incentive compatible. If $\pi^b = h^+$ is incentive compatible (fulfills $(\phi^*(\pi) = \max [z - OC])$ given contract $\phi(\pi)$), it must be true that;

$$z - h - \phi(h^+) \geq \max_{\pi^b \in [h^+, z]} z + [r^b - \phi(\pi)]$$

or for all $\pi^* \in [0, h^+]$

$$\phi(\pi) \geq h + \phi(h^+) + r^b \geq h + r^b = \phi^*(\pi).$$

The final inequality follows from the requirement $\phi(\pi) \geq 0$ for all. Combined with the result that $\phi^*(\pi) \geq 0$ for all $\pi^b \geq h$ this implies that $\phi^*(\pi)$ give the largest value to entrepreneur such that it is incentive compatible to fulfill (1c), implying that $\phi^*(\pi)$ maximize (1), where $h + r^b = z^*$ shows an Islamic bank portion and π^b is an expected profit to Islamic banks.

The necessity of a positive probability of incurring the non-pecuniary cost or incentive means that even the optimal contract is costly. Entrepreneur could be made better off without making Islamic banks worse off if π was observable.

From this model, we can see the existence of incentive which Islamic bank can pay as a reward to entrepreneur if they make higher profit from their investment project as $\phi^*(\pi)$. In contrast, if occur any losses Islamic bank will bear all the cost whereas the entrepreneur lost the opportunities cost from their services only.

For more agents and principles setting, in *mudharabah*, where π could be observed by Islamic bank and entrepreneurs have a right to know their profit. Means that $E[\phi^*(\pi)] = E[\phi^*(h^+)]$. Because no monitoring cost were charge. This can happen if both of Islamic bank and entrepreneur are agree to do that. Means that, *mudharabah* can be the optimal contract between Islamic bank and entrepreneurs.

1.2. Second model: depositor as capital provider.

The assumptions of the model are as follows. First, Islamic bank as owner provide (shown as question 1(b)) equity (E), and offers saving deposit (D). The balance sheet of the Islamic bank indicates that total assets (A) must equal deposits and equity (i.e. $F + OA = D + E$).

Second, thus depositors all will be invested in investment project (F). The balance will be put in asset side or make an investment with difference risk return profiles and they will accept more risk with higher returns through other assets.

Third, the model assumes that people savings account mainly to protect the real value deposit from inflation and zakat dues. Let say the expected

rate of return for depositor is r^d . As depositors of Islamic banks get a share of profit, the return and risk of deposit will be closely linked to that of the Islamic banks assets.

Forth, for the case of delegated monitoring, we assume that Islamic banks as and entrepreneur or *wakeel* because that has an implication on item eight. Let say, depositor deposit money in *mudharabah* contract, so Islamic bank can observe the outcomes but the customer only know about pre-determine ratio that they will receive. Means that, entrepreneur delegated power to Islamic bank but not observable to the depositor because entrepreneur give “*amanah*” to Islamic bank to monitor.

$$\max \pi^{*b} [\pi - \phi(\eta)] \tag{2a}$$

subject to

$$D + E = F + OA \tag{2b}$$

and

$$E \max \pi^{*b} [\pi - \phi(\eta)] \geq r^b, \tag{2c}$$

where D is the deposit from depositor; E is the equity shareholders; F is the financing; OA is the other asset (Reserve); $\phi(\eta)$ is the cost of processing information; η is the number of depositors

Proposition 2. Now, look into optimal contract between Islamic bank and depositor which solves (2) given by $\max \pi^{*b} = \max (h_d - D - \phi(\eta))$, where h as face value for depositor that provided to the Islamic bank as capital.

$$(p(\pi^{*b} < h_d)E[\pi^{*b} | \pi < h_d]) \div (p(\pi \geq h_d)h_d) = r^b. \tag{3}$$

That is, it is the PS contract under *mudharabah* with processing cost equal to shortfall from actual capital (face value) h , where her the expected return that provides Islamic banks with an expected of r^b .

Proof given $\phi^*(\eta)$,

$$\text{Max } \pi^{*b} [\pi - \phi^*(\eta)] = \begin{cases} \pi^{*b} & \text{if } \geq h_d \\ h_d & \text{if } \leq \pi \end{cases}$$

Using (3), this satisfies with equality the constraint (2c) of providing competitive return to Islamic bank. By construction, h_d is the smallest number such that if the constraint $D \leq \pi$ and $D \geq h_d$ are satisfied, the expectation of $\phi(\eta)$ is at least r^b . Hence to satisfy (2c), there must exist some payment $\phi(\eta)$ which is incentive compatible. If $D = h_d^+$ is incentive compatible (fulfills $(\pi^{*b} = \max (h_d - D - \phi(\eta))$ given contract $\phi(\eta)$), it must be true that;

$$\pi - h_d - \phi(h_d^+) \geq \max_{\pi^{*b}} [h_d^+] \pi - \phi(\eta)$$

or for all $\pi^* \in [0, h_d^+]$

$$\phi(\eta) \geq h_d + \phi(h_d^+) \geq h_d = \phi^*(\eta).$$

The final inequality from the requirement combined with the result that $\phi^*(\eta) = 0$ for all $D \geq h_d$. This implies that $\phi^*(\eta)$ gives the smallest penalties such that it is monitoring cost compatible to fulfill (2c), implying that $\phi^*(\eta)$ that maximizes (2).

Unlike the first model, in this case, profit to Islamic bank that receive from the investment between depositors are different. The expected return that Islamic bank will receive at least $r^b = \max \pi^* [\pi - \phi(\eta)]$. That’s mean, the profit that Islamic bank will received between depositors less than profit between entrepreneurs (show in the first model).

Although the processing costs are existing in *mudharabah* contract like present by the propose model, the transaction cost still can reduce by the reducing asymmetric information. In *mudharabah* principal each party has a right to know about the information that related to the investment project. So, no searching and bankruptcy cost in this contracts are involve. Means that, this model can show that equity contract under *mudharabah* could be the optimal contract.

Conclusion, from the proposed model under *mudharabah* contract we found that equity contract can work and could be the optimal contract in Islamic financial intermediation. Although, processing cost emerge that’s because of asymmetric information. So, this contract can reduce the asymmetry information by observation and also can remove transaction cost like monitoring and search cost. We also can conclude from the second model as follows:

1. Deposits are accepted in investment or saving accounts.
2. The profit sharing ratio depend on pre-agree ratio between Islamic bank and depositors. Some Islamic banks apply the ratio in the first instance to gross revenue and then distribute profit among the depositors allocable to their share of gross revenue.
3. The distribution of profit among the depositors in the pool varies with category; savings receiving lower proportion than investments. Within the category, rates of profit mostly move up with the amount and duration of deposits. We could not obtain information on how individual Islamic banks arrive at these rates.
4. Islamic banks included in the study all claim that the profit sharing ratio is the result of negotiations with the depositors. One is not sure if depositors, especially the smaller ones really have negotiating power and get opportunity to exercise it; or they simply sign on the dotted lines in the Islamic bank documents.

5. The loss if any is borne by the depositors; the assumption being that Islamic banks have no moneys of their own to invest or keep it distinctly separate from that of the depositors in matters of investment.

Regarding this proposed model, it is similar to two concepts have been suggested for the structure of an IFI. The first one is commonly referred to as the “two-tier *mudharabah*” model. The second is the “two-window” model. In a “two-tier *mudharabah*” model, both funds mobilization and allocation are on the same basis of profit sharing among the depositor, the Islamic bank and the entrepreneur.

The first tier *mudharabah* contract is between the depositor and the Islamic bank (shown like second model), where the Islamic bank acts as a *mudharib* for the depositor who shares in the earnings of the Islamic bank’s investments financed with his resources. The liabilities and equity side of the Islamic bank’s balance sheet includes deposits accepted on a *mudharabah* basis. Such profit-sharing investment deposits are not liabilities as their value is not guaranteed and they may incur losses. They are rather a form of limited-term, non-voting equity. In the first tier model, Islamic banks would also offer demand deposits that yield no returns and are repayable on demand at par value and are treated as liabilities.

The second tier features *mudharabah* contracts between the Islamic bank as capital provider and entrepreneurs seeking funds and sharing profits with the Islamic bank according to a ratio stipulated in the contract (similar to first model above). However, the salient feature of the “two-tier *mudharabah*” model is that it does not factor any specific reserve requirement on either investment or demand deposits. It has been argued that in contrast to investment deposits, demand deposits are liabilities which are not supposed to absorb any loss and therefore reserve requirement should be introduced for them (Hassan, 2008; Mirakhor, 1989; Khan, 1986). In the “two-tier” model, by design, the assets and liabilities sides of a bank’s balance sheet are fully integrated and thus should minimize the need for active asset/liability management.

2. Discussion

Having described and examined how the proposed *mudharabah* contract would work, we are now ready to discuss the proposition. The discussion will be done in the following ways, how does the proposed of *mudharabah* contract can maximize the expected return and at the same time can provide the incentive to entrepreneur. We present three situations that might produce optimal contract.

First, let say the expected profit of Islamic bank equals to actual profit. So, when $\pi^{*b} = \pi^b$, it means that probability distribution of profit and value of h equal to 0. It shows that Islamic bank will receive the same profit either actual or expected profit from the investment project that the entrepreneur undertake. If this situation occurs, Islamic banks do not need to provide an incentive to entrepreneur because no excess profit had been made. However, Islamic banks might sacrifice their profit and show that Islamic banks look like bear some losses from the project. This situation does not fulfill the optimal contract that we proposed above because there is no capital gain (h^+) provided.

Second, another situation could happen if the expected profit of Islamic bank less than actual profit. So, when $\pi^{*b} < \pi^b$, it means that probability distribution of profit and value of h is less than zero. Meaning that, Islamic banks receive lower profit than their expected from the project that they made. For this situation, it is too complicated to Islamic banks to provide an incentive because the amount of initial profits that they receive is negative. This situation also presents that entrepreneur failed to achieve higher return and cannot make some profit for their investment project. This also not fulfills the condition to be an optimal contract that we proposed above by using *mudharabah* contract theoretically because h^- .

Third, we show the optimal contract that can lead Islamic bank maximize profit and provide incentive to the entrepreneur if $\pi^{*b} \geq \pi^b$. From the derived model, we can proof the optimal contract happened when $\pi^{*b} \geq \pi^b$. Because the probability distribution on profit and value of h is higher than zero. This situation shows that Islamic bank is capable to maximize their profit at the same time they can provide an incentive without scarifying any profit or capital because the entrepreneur can make higher return for their investment project. This proposed model proofed that equity contract under *mudharabah* is able to give an advantage to both Islamic banks and entrepreneurs theoretically because h^+ .

We now turn to discussion of the proposed *mudharabah* contract in solving the two problems that we mentioned in section 1. To recap, the two underlying problems of current financial intermediation theory, i.e., transaction cost and asymmetric information on debt contract, we now ask whether in its proposed form, the *mudharabah* contract might be able to reduce the transaction costs and asymmetry information.

From the derived model we have proofed that there would be no more transaction cost involved either between Islamic bank and entrepreneur or depositor. By using *mudharabah* contract Islamic bank can observe their customer. Meanings that Islamic bank can get more completely information related to their potential entrepreneurs and investment project that they undertake. However, Islamic bank still charge small amount to depositor as a processing information and provides an incentive to entrepreneurs for their performance and hard work to get higher return from the investment project.

The issue of asymmetry information could be reduced by the observation from Islamic banks to their potential entrepreneurs. Islamic banks have gained the information clearly about the investment project that they invested. That means, this proposed *mudharabah* contract have proofed that it could reduce the problem of asymmetry information as well. In addition, the issue of fairness to the Islamic bank was addressed in the model i.e., when Islamic bank gains the suitable profit. This theoretical model also proves that Islamic banks could maximize profit and at the same time can provide incentive to entrepreneur.

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Conclusion

The objective of this paper is to incorporate *mudharabah* contract into the Islamic financial intermediation theory. Specifically, the objective is to identify under which conditions the *mudharabah* contract is optimal. Our findings show that the optimal contract can be achieved in three situations. First, if $\pi^{*b} = \pi^b$ Islamic bank cannot provide an incentive because the probability of profit and value of h equal to zero. Second, this situation also shows that Islamic bank cannot achieve the optimal contract because the probability of profit and value of h is less than zero. Meanings that $\pi^{*b} \leq \pi^b$. Third, Islamic bank is capable to maximize profit and provide incentive to the entrepreneur if $\pi^{*b} \geq \pi^b$. That means probability of profit and value of h is more than zero. Hence, only the third situation can produce the optimal contract in financial intermediation theory. For future research, an extension could be done by replacing the *mudharabah* contract with *musharakah* or debt-related contracts. It will give more complete analysis on the financial intermediation theory.

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