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# Financial leverage and the channeling of resources: profit loss sharing under the framework of Islamic financial institutions

## Abstract

Financial leverage, called *Riba* in the terminology of Islamic finance, increases the investors' rate of return on an investment when it is high and lowers it when it is low. It is, therefore, a risk increaser. Such a magnifying effect has undeniably deepened many financial crises. Islamic financing offers possible alternatives. This paper investigates such alternative, called profit loss sharing (PLS). Under PLS, both the lender and the borrower, assume the investment's risk based on a pre-agreed formula. Using the traditional cash flow discount model, the study shows that, if successfully implemented, PLS does a better job channeling resources to investors than conventional lending. The article presents that lower reserve requirements magnify the gap between the two financing alternatives.

## Introduction

Following the teachings of the Qur'an, Muslims' holy book, *Riba* is not allowed. *Riba*, in its most basic form, is the repayment of a loan with a higher amount. Put it another way, it is the charging of interest on a loan. One of the most advanced arguments against *Riba* is that charging interest without any service rendered doesn't promote social justice.

Because conventional banking is not appropriate for the demanders of a *Riba* free system, Islamic financial institutions have been mushrooming and thriving over the past few years in many countries around the globe. These kinds of institutions have not yet reached full maturity, but are quite interesting as they offer different kind of products.

Islamic banks offer many solutions around charging interest. Many of these solutions are difficult to implement and sometimes expensive. Their major advantage, however, is that they offer the convenience of peace of mind for Muslims. Unfortunately, there are no known theoretical models that rigorously compare these solutions to a conventional loan. We attempt to bridge this gap by investigating one potential substitute of a regular loan.

Although not widely used, PLS is a potential substitute of a regular loan. It consists of sharing profits or losses from an investment, of which a portion was borrowed from the bank, based on a pre-agreed formula. In this paper we show that a pro rata PLS agreement between a borrower and a bank creates more value than a regular loan from a conventional bank. We show that in times of high expectations there is a transfer of wealth from borrowers to banks which creates more lending opportunities. In times of low expectations, wealth is transferred from banks to investors, this transfer is, however, partially counterbalanced by a decreased level of borrowing.

A banking system that relies on PLS rather than conventional borrowing truncates investors' returns and channels more resources to potential investors, thus, it creates more social justice. In other words, such an economic system eliminates the leverage effect by forcing investors to earn the exact rate of return on the investment regardless of the borrowed amount and makes more funds available in periods of high expectations and less funds available in periods of low expectations.

Financial leverage has been studied extensively in corporate finance. Theories, formulated by Modigliani and Miller (1963), Myers (1977), DeAngelo (1980), Jensen (1986), Zwiebel (1996), and many others, studied the impact of capital structure on the value of the firm. However and to the best of our knowledge, there are no studies linking financial leverage to the well being of the financial system as a whole. More specifically, conventional borrowing existence is not challenged anywhere in the literature or the real world. With the emergence of Islamic finance as force other alternatives are now available. The merits of these alternatives are not yet fully understood. This paper is an attempt to highlight PLS as a possible alternative to conventional borrowing.

Before proceeding with the development of the model, it is worth stressing that at this point PLS is rarely used by banks. Blair (1995) reports that less than 20 percent of investments, made by Islamic banks world-wide, fall under the category of PLS, even banks like Mudaraba companies (MCo's) in Pakistan and the Islamic development bank (IBD) that were exclusively created to work under a PLS regime do very little of it. Dar and Presley (2001) offer some explanations:

1. PLS contracts create an incentive to report less profit and, thus, create an agency problem.
2. Islamic banks are forced by heavy competition from conventional banks, who are more competitive to avoid risky investments.

3. The nature of PLS contract gives rise to a "sleeping partnership" between management and shareholders.
4. Banks cannot raise funds through equity to finance short-term projects and, thus, have to resort to other modes to remain liquid.
5. A secondary market for Islamic financial instruments are almost non-existent in most countries.

This paper is structured as follows. First, we develop a model that compares profit rates of conventional lending and PLS for both the investor and the lender. Second, using a cash flow discount model, we show that because investors returns under PLS are smaller in absolute value than conventional lending more funds are freed for additional lending. Third, we demonstrate that the amount of the additional funds freed is proportional to the bank's reserve requirements. Finally we conclude.

## 1. The model

A traditional loan involves charging the borrowers a fixed interest rate. A PLS system, on the other hand, involves sharing profits or losses on the funds, invested between the borrower and the lender. Let's assume in this model that this sharing is performed on a pro rata basis. An investor, who borrows for example the third of the amount, needed for an investment, enjoys two thirds of the gains or losses. The lending institution gets or pays the rest.

We use the following notation:

$W_e$ is investor's initial wealth;

$W_b$ is amount borrowed by the investor from the lending institution;

$W = W_e + W_b$ is total amount invested;

$r$ is investment's expected return;

$r_b$ is conventional bank's lending;

$m = \dfrac{W_e}{W}$ is share of the investment's return received by the investor;

$1 - m = \dfrac{W_b}{W}$ is share of the investment's return received by the bank.

We assume a one period model in this paper and calculate returns as follows:

$$One\ period\ return = \frac{Terminal\ wealth - Initial\ wealth}{Initial\ wealth}.$$

Let us assume that an investor invests an amount $W$ of which $W_b$ is borrowed and $W_e$ is personal equity ($W = W_e + W_b$). After one period, the investor earns a return $r$ on the investment. If $W_b$ is borrowed from a conventional bank, the investor returns the amount, borrowed $W_b$ plus interest $r_b W_b$ regardless of the outcome of the investment. At the end of the period, the investor ends up with $W(1+r) - W_b(1+r_b)$ and the lender with $W_b(1+r_b)$. The investor return from the transaction is $r + \left(\dfrac{1}{m} - 1\right)(r - r_b)$ and the lender's return is $r_b$.

On the other hand, if the money is borrowed under a PLS agreement, the investor returns $W_b$ and shares the gains or losses $rW$ from the investment with the bank on a pro rata basis. At the end of the period, the investor ends up with $W(1+mr) - W_b$ and the lender with $W(1-m)\,r + W_b$. Both the investor and the lender earn the investment's return $r$.

The following Table summarizes the returns which the investor and the lender enjoy under a conventional loan and a PLS agreement.

| | Investor | Lender |
|---|---|---|
| Initial wealth invested | $W_e$ | $W_b$ |
| Terminal wealth under a PLS system after one period | $W(1+mr) - W_b$ | $W(1-m)\,r + W_b$ |
| One period return of a PLS system after one period | $r$ | $r$ |
| Terminal wealth of a conventional loan after one period | $W(1+r) - W_b(1+r_b)$ | $W_b(1+r_b)$ |
| One period return of conventional loan after one period | $r + \left(\dfrac{1}{m} - 1\right)(r - r_b)$ | $r_b$ |

Let us assume next that $r > r_b$. When a loan is conventional a lower (higher) $m$ produces a higher (lower) return. In other words, an investor, who can borrow a large proportion of the total amount invested, enjoys a return that is higher than $r$. This is familiarly known as the leverage effect. Under a PLS agreement the investor earns the exact return $r$ produced by the investment regardless of the amount borrowed.

Let us also assume now that we have two investors, borrowing and investing the exact same amounts and making the same investment. One investor acquires the funds through a conventional loan and the other through a PLS agreement. Using the results shown in the previous Table and some basic algebra, we can show that the investor borrowing under a PLS agreement ends up with a lower amount compared to the conventional borrower. The exact difference is:

$$G_I = \left(\frac{1}{m} - 1\right)(r - r_b)w_e. \tag{1}$$

On the other hand, the bank, lending funds under a PLS agreement, ends up with a higher amount compared to a conventional bank. The exact difference is:

$$G_L = (r - r_b)W_b. \tag{2}$$

By substituting $m$ in equation (1) we can show that:

$$G_I = G_L = G. \tag{3}$$

Equation (3) shows that when there is a PLS agreement and $r > r_b$ resources are shifted from the borrower to the lender. Because financial leverage under a PLS agreement is not possible, the investor forgoes the extra return $\left(\left(\frac{1}{m} - 1\right)(r - r_b)\right)$. That extra return is shifted to the lender.

At first sight there appear to be no value creation but only a shift of resources from the investor to the lender. However, the lender can use these resources to generate more loans and, therefore, more value. On the other hand, the investor, who chooses a PLS agreement, has an opportunity cost, the opportunity to earn and invest an amount equal to $G$. We show next that the present value of the shift generated by the lender is greater than the present value of the investor's opportunity cost.

Let us assume for sake of simplicity that $r$ remains unchanged and that the investor can reinvest indefinitely and enjoys a yearly return $r$. Under a conventional system the investor receives an extra amount $G$ at the end of the first period, that amount can grow at a yearly rate $r$. The present value of the investor's opportunity cost of using a PLS agreement after $n$ periods is:

$$V_I = \frac{G(1+r)^{n-1}}{(1+r)^n} = \frac{G}{(1+r)}. \tag{4}$$

As mentioned earlier, the lender gains from a shift to PLS agreement. To calculate the present value of that gain, one has to account for the bank's reserve requirement $R$. A lender, who lends under a PLS agreement, generates an extra amount $G$ at the end of

period one. The bank can lend $(1 - R)G$ and generate a return of $r$ from that amount. At the end of the second period, the bank has at its disposal $(1 - R)G(1 + r)$ of which $(1 - R)^2 G(1 + r)$ is available for borrowing. At the end of the third period, the bank has at its disposal $(1 - R)^2 G(1+r)^2$ of which $(1 - R)^3 G(1+r)^2$ is available for borrowing. Recursively the amount available for borrowing at the end of the $n^{th}$ period is $(1 - R)^n G(1+r)^{n-1}$. Therefore, the value $V_L$ of the lender's gain from the shift of resources is the present value of all additional loans made available thanks to the adoption of the PLS system:

$$V_L = \sum_{i=1}^{n} \frac{(1-R)^i G(1+r)^{i-1}}{(1+r)^i} = \frac{G}{(1+r)} \sum_{i=1}^{n} (1-R)^i.$$

Using basic algebra we find:

$$V_L = \frac{(1-R)(1-(1-R)^n)}{R} \frac{G}{(1+r)}. \tag{5}$$

When $n$ is sufficiently large, we obtain the following expression:

$$V_L = \frac{1-R}{R} \frac{G}{(1+r)}. \tag{6}$$

Finally, we reach the following important expression:

$$\frac{V_L}{V_I} = \frac{1-R}{R}. \tag{7}$$

The value of lender's gain from the shift is $\dfrac{1-R}{R}$ times bigger than the investor loss from the shift. Given that the reserve requirements are usually around ten percent, the banking system can generate additional loans that are worth nine times the value of the amount shifted from the borrower when a PLS system is adopted and financial leverage is forgone.

The added value to the bank from the shift is:

$$\Delta V = V_L - V_I = \left(\frac{1}{R} - 2\right)\frac{(r - r_b)}{(1+r)} W_b. \tag{8}$$

For sake of simplicity let us assume that the demand for loans is linearly and positively associated to the expected return of the investment, that is:

$$W_b = ar, \tag{9}$$

where $a$ is a positive constant.

Combining (8) and (9), produces the following expression:

$$\Delta V = a\left(\frac{1}{R} - 2\right)\frac{r(r - r_b)}{(1+r)}. \tag{10}$$

Let us now turn to the case, where $0 < r < r_b$. In such a case all derivations are exactly the same but this time there is a shift of resources from the lender to the borrower and $\Delta V$ in equation (10) is negative. The banks, losses from the shift, are nine times larger than the borrower's gains. But $\Delta V$ is small in absolute value because $r$ is small and, therefore, the demand for loans is small. So although the multiplier factor expressed in equation (7) remains the same regardless of the expected return $r$, the added value to the bank from the shift is larger in absolute value when $r > r_b$, to the loss in value when $0 < r < r_b$. When $r \leq 0$, there is no demand for loans and $\Delta V = 0$.

The following figure summarizes these results:
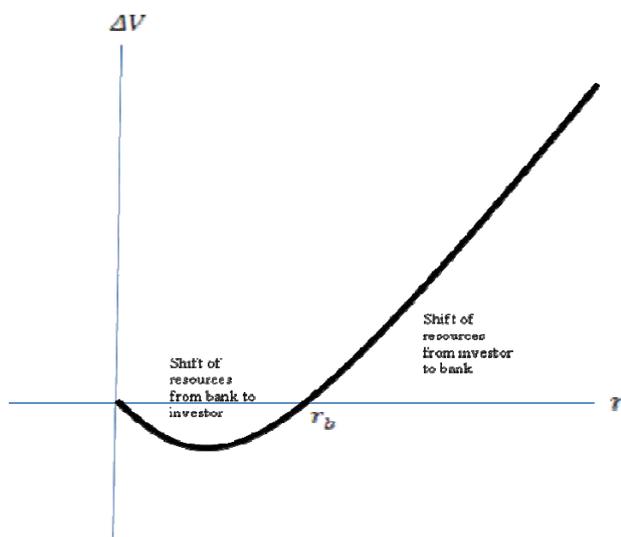


**Fig.1. Added value to the bank from a shift to PLS as a function of the expected rate of return on the investment**

As shown in the above figure, when the expected return is below the borrowing rate and close to zero, lending institutions are better of adopting the conventional system to avoid earning a rate lower than the borrowing rate ($\Delta V < 0$). A bank that decides to adopt a PLS system under these circumstances will shift some of its resources to the unlucky investors. But because the expected return on the investment is low the magnitude of the shift is partially offset by a low demand for funds.

When the expected returns are above the borrowing rate, lending institutions are better of adopting a PLS system, so that they can get the additional returns, the investors would possible have earned the leverage effect. Thus, funds are shifted from the lucky investor to the bank. Because the expected return on the investment is high, the magnitude of this shift is high thanks to the high demand for funds.

The benefits from the shift outweigh the losses and, therefore, PLS appear to be an interesting substitute of a regular loan. When interest rates are high, more resources are made available and in periods of poor performance less funds are available. To further absorb the negative shift away from financial institutions when interest rates are low, central banks can lower interest rates to reverse the sign of $\Delta V$ and stimulate lending activity.

## Conclusion

Financial leverage is a key feature of the banking system. It is as old as money itself and is so central to our financial system that it has never been questioned. Financial leverage inflates positive returns and exacerbates negative returns, as a consequence resources are generally shifted from financial institutions to investors. As noted earlier, a system such PLS is perhaps complicated to implement, but produces fairer returns and liberates more funds for future investments.

This paper has shown that PLS has a serious potential, it can, if widely used, produce more social justice. However, barriers to implementation are still high. If Islamic countries truly care about Islamic financing, innovative ways have to be found, so that PLS and other instruments become more competitive and appealing. That is not the case right now.

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