Does PLS Solve Moral Hazard Problems?

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Abstract

Discussion of Islamic private equity (PE) financing modes rarely provides detailed analytical insights into their properties: there is no rigorous analysis of their features. The current paper analyzes how and when Profit Loss Sharing (PLS) financing methods can solve asymmetric information problems. I focus on Mudarabah and Musharakah financing schemes and consider agency models under moral hazard.

The model shows some interesting results. First, I show that Mudarabah financing provide powerful incentive schemes to the entrepreneur. As the Islamic PE fund is not actively involved in the project and the project success depends on the entrepreneur's effort, it leads to the first best solution.

Second, my results provide evidence that Musharakah financing cannot solve moral hazard problem. One explanation could be the fact that the project is jointly funded by the two parties and that both of them provide non-contractible efforts which diminish their incentives.

Keywords: *Islamic private equity, PLS principle, Shari'ah, incentives.*
JEL classifications: G23, G24.

Introduction

In the last decade, Islamic private equity (PE) has grown dramatically all over the world (Fenn et al., 1995, Demaria, 2006). First, it knows a tremendous development in Muslim countries, particularly in the Middle East. The key players in Islamic PE are banks. For instance, Arcapita Bank and Gulf Finance House set up investment funds to take stakes in growing unlisted firms.They raise capital in different regions all over the world and in new business lines long time dedicated to conventional players (Ba, 1996, Kettel, 2012). Last years, many conventional financial institutions show increasing interest for Islamic PE: they start operating Islamic Windows in order to attract more depositors, financiers and investors. Nowadays, to make Islamic actors better cope in conventional counterparts, conventional regulators set up Islamic benchmarks, like for example, the Dow Jones Islamic Market Index in New York and the FTSE Global Islamic Index in London (Abidi, 2009).

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In 2007, more than US$ 400 billion were raised and US$ 600 billion were invested in different sectors (Gierath, 2010). In 2008, the number of Islamic projects in Kuwait has tripled and exceeded the number of their conventional counterparts compared to 2003. There are more than 130 Shari'ah compliant mutual funds operating in Malaysia -the Centre of Islamic finance- and 120 in Saudi Arabia. In the UAE, the number of Islamic PE fund has almost quadrupled between 2005 and 2008: they increased from 15 to 63.

The lack of liquidity and the reluctance of investors and financiers after the subprime crisis decrease the amount of funds allocated to the funding of small and innovative enterprises. Without collateral and real guaranties, banks become more and more selective and cannot provide debt financing particularly for new projects like start-ups. Moreover, entrepreneurs are most often wealth-constrained and/or have no business experience. They bring to the project their know-how and some technical skills. They cannot raise financing in the debt or the public equity markets.

Like conventional PE, Islamic PE improves employment and economic growth. It is based on partnerships in non-listed firms, like for example start-ups and more mature firms. However, conventional and Islamic PE industries display different features. Islamic PE is based on ethical criteria fixed by the Shari'ah (the Islamic law). Accordingly, Islamic PE is interest-free financing and cannot finance haram projects, i.e. illicit (like for example gambling, casinos, wine and pornography). This means that Islamic PE funds have fewer opportunities of investments than their conventional counterparts. Moreover, they bear higher risks because of the Profit Loss sharing PLS principal: instead of receiving fixed interest rates, they are paid share on the profits or losses generated by their assets/businesses. In addition, the entrepreneur is most often not the capital provider.

There are two main financing schemes in Islamic PE:

- Mudarabah financing mode is very close to the conventional venture capital financing. It funds innovative small and medium enterprises (SMEs) and start-ups. The entrepreneur is wealth-constrained but can bring skills and know-how to the project. Unlike conventional PE, the Islamic PE fund raises equity but has no control rights and cannot get actively involved in the project. However, the entrepreneur has to report information to the managers in the PE fund at least every three months. If the project succeeds, the profit is shared according to pre-agreed ratios. Otherwise, financial losses are born by the capital provider while the entrepreneurs lose the fruitful of their efforts (Chatti and Yousfi, 2012).

- Musharakah financing mode is the most commonly used method in Islamic PE. The project is jointly financed by the entrepreneur and the PE fund who also share the control of the target. In this case, the PE fund is a member of the board of directors. Mushrakah financing is very similar to non-venture conventional PE (LBO, capital growth,...). However, Islamic PE projects cannot get debt financed as interests are not Shari'ah compliant, but could use "Sukuk" certificates. Contrary to Mudarabah, few rules should be taken into account to distribute the project revenue:

  - ✓ The profit is shared between the two parties according to the pre-agreed ratios fixed at the time of effecting contract; otherwise the contract is not valid under Shari'ah. The profit share depends on the financial contribution of each partner, but also on the efforts allocated to the business: It is not allowed to fix the revenue of the partners or any rate aligned to their capital shares.
  - ✓ The losses in Musharakah depend on the capital contribution. They are born by the two parties: each one mustbear loss exactly according to the capital share.

There are many theoretical and empirical papers on conventional PE financing that analyze the interaction between the financial capital structure and incentives when there is an information asymmetry, due to unobservable efforts. For instance, Bergemann and Hege (1998), Casamatta (2003), Cornelli and Yosha (2003), Schmidt (2003), Repullo and Suarez (2004), Dessi (2005), Yousfi (2012 a)...They study the link between capital structure in innovative projects and the incentives of efforts under double-sided moral hazard. They highlight the importance of adequate incentive-rewarding schemes, the role of the stage financing and convertible securities to mitigate the moral hazard problem. They focus on the venture Capital (VC)[2] and Leveraged Buy Out (LBO)[3].

[2] The venture capital is used to finance start-ups and very innovative projects that can generate high amount of cash-flows and have high potential of growth particularly in the first stages (see Gompers and Lerner, 1994).

[3] Many public companies that go private issue a combination of debt and private equity to finance their LBO. In many countries, most notably in the United States, these companies are financed with debt and a small amount of equity, hence the term leveraged: they are typically financed with anywhere from 60% to 90% debt (Jensen, 1986, 1989; Kaplan, 1989; Kaplan and Stein, 1993; Kaplan, 1997; Kaplan and Strömberg, 2008; and many others). Between the mid- and late 1980s such transactions absorbed most new private equity capital.

There is also an extensive literature on the effect of PE financing on the project performance, the active role of the PE fund, the choice of financial capital structure, the exit of the PE fund, asymmetric information, see among others Desbrières and Schatt (2002), Schwienbacher (2002), Giot and Schwienbacher (2007), Groh and Gottschalg (2008) and Schmidt, Steffen and Szabó (2008) and Yousfi (2012 b).

Despite the fact that there is a booming development of Islamic financial literature, particularly on the performance and efficiency of banks (see among others Aggrawal and Yousef, 2000, Yudistra, 2004; Salah and Rami, 2006; Mokhtar et al., 2006; Chong and Liu, 2009, Abdul-Majid et al., 2010 a,b, 2011, Beck et al., 2010; Srairi, 2010, Chatti and Yousfi, 2012, and Kablan and Yousfi, 2012...), there is a large gap that is not covered yet. For instance, academic literature does not provide rigorous analysis of the financial capital structure in Islamic PE projects, and of the previous financing modes, what are their role under asymmetric information, how to deter opportunistic behavior of the entrepreneur,...

One explanation is the young age of Islamic PE industry and the lack of data[4]. Another explanation is that researchers and professionals are trained and qualified in conventional finance. To fill this gap, most often they generalize what was shown in the conventional industry.

The objective of the current paper is to analyze the link between the financial capital structure and the agents' incentives under asymmetric information. I study both Mudarabah and Musharakah financing modes when the project performance depends on the effort provided by each agent. I consider that efforts are not observable. To the best of my knowledge, this is the first study conducted to explore the features of such financing modes. Adopting an analytical approach, I present two general agency models. The current paper is related to the literature on the capital structure in conventional PE under moral hazard. Unlike

Unlike studies on conventional PE, like for example Casamatta (2003) and Repullo and Suarez (2004), debt cannot be used to fund Islamic PE projects. Interests are not allowed by shari'ah and the PE fund cannot actively participate in the project. This means that both financing modes are based on equity contracts with different features adjusted to suit PLS principle.

I present two simple agency models in which the entrepreneur is wealth-constrained and has an idea of investment to implement. The PE fund has to provide capital and participates actively in the project only in Musharakah. The project performance

[4] When it is available the data are poor and cannot be used to conduct valuable studies.

depends on the agents' efforts. My objective is to analyze the optimal financial contracts form the point of view of the entrepreneur.

My paper provides some interesting results.

First, I show that Mudarabah enables to mitigate the moral hazard problem and lead the entrepreneur and the PE fund to provide the first best levels of effort. These efforts depend on the level of risk of the project. The explanation is that Mudarabah provides powerful mechanism schemes. First, the profit share of the entrepreneur depends closely on the level of risk of the project. Second, the threat to have no payment in case of failure increases the entrepreneur's incentives.

On the contrary, I show that Musharakah does not solve the moral hazard problem. Despite the fact that the PE fund provides effort to increase the project performance, it is not enough to increase the agents' incentives. This result is consistent with Yousfi (2012a). She shows that a standard equity contract quite similar to Musharakah, does not improve the agents' incentives and leads to the second best.

The paper is structured as follows. The model on Mudarabah financing is presented and discussed in Section 2. I consider an extension of this model to study the incentive effects of Musharakah financing in Section 3. Section 4 concludes the paper.

2. Mudarabah financing

I consider an entrepreneur E (hereafter she) interested in an investment opportunity that costs K. The entrepreneur is wealth-constrained but has the required skills and Know-how to manage the investment. She asks for financing from a PE fund A (hereafter he) who provides the capital K in exchange for share of profit.

The investment is risky and generates a verifiable random revenue R that can take two values: R^u in case of success and R^d in case of failure (R^d is the liquidation value/collateral of the project) such that $R^d \leq K \leq R^u$.

The probability of success $p(e)$ depends on the entrepreneur's effort e $(e \in \Re_+)$. This effort is costly and non-contractible as it is unobservable. I assume that the probability function $p(e)$ is increasing and concave and that $p(0) = 0$. The latter condition means that the entrepreneur must exert a strictly positive effort otherwise the project fails with probability one. Intuitively, the project success depends on the

conditions that the entrepreneur must exert a strictly positive level of effort and she obtains the capital K [5]. All agents are risk neutral.

2.1 The timing of the game

- First, the entrepreneur and the PE fund operate in a competitive market where there is a continuum of PE funds. They sign an equity contract and can exit the project only at the maturity date.
- Second, the PE fund raises the capital K and the entrepreneur has to exert the effort e which could be managerial or technical effort. The entrepreneur's effort is costly. Let $c_E(e)$ denote the cost function. This function is increasing, convex and satisfies $c_E(e) = c'_E(e) = 0$.
- Finally, the project is completed and the PE fund leaves the project. If the project succeeds, the entrepreneur and the PE fund share R^u: they are paid respectively αR^u and $(1-\alpha)R^u$, $(0 \le \alpha \le 1)$. If the project fails, A perceives all the revenue R^d and the entrepreneur gets zero payoff.

2.2 Financial contract

The E's and A's shares of benefit given respectively by α and $(1-\alpha)$ must be determined endogenously. The PE fund provides capital in exchange for share of success revenue. He accepts to participate in the project if his expected gain is positive:

$$E\pi^A = (1-\alpha)p(e)R^u + [1-p(e)]R^d - K \ge 0 \qquad (PC_A)$$

This is the participation constraint of the PE fund. Because of the competition among PE funds, the entrepreneur chooses the best offer among those proposed by all the PE funds in the market: they will compete to finance the entrepreneur's idea. Thus, competition will lead the PE fund A to propose the equity contract that binds (PC_A) to be selected by E. In other words, A is selected only if $E\pi^A = 0$, otherwise there is always another PE fund in the market who can propose better offer.

The entrepreneur expected gain is written:

[5] The idea is to ignore the case in which the project may lead to the success despite the fact that the entrepreneur adopts an opportunistic behavior (e=0).

$$E\pi^E = \alpha p(e) R^u - c_E(e) \quad (1)$$

2.3 The model without moral hazard

Now, consider that the entrepreneur's effort is contractible. The social value of the project $V(e)$ is given by:

$$V(e) = p(e)\Delta R - c_E(e) + R^d - K$$

where $\Delta R = R^u - R^d$. The first best level of effort e^{FB} is given by the first order condition of $V(e)$:

$$\left.\frac{dV(e)}{de}\right|_{e^{FB}} = p'(e)\Delta R - c'_E(e^{FB}) = 0 \quad (2)$$

which implies:

$$\frac{c'_E(e^{FB})}{p'(e^{FB})} = \Delta R \quad (3)$$

The ratio of the marginal cost to the marginal probability is proportional to the level of risk measured by the difference between the success and failure revenues. Equation (3) shows that the entrepreneur effort does not depend on the project size K but on the type of the project ΔR:

- ✓ If the project is very risky, in the sense ΔR is very large, and then the level of first best effort is very high. This implies that the optimal financial contract must provide powerful incentive schemes.
- ✓ If the project is not very risky, in the sense ΔR is not very large, then e^{FB} is not very large and the incentive schemes are not so powerful.

Very innovative projects are most often very risky contrary to less innovative projects. Thus, the entrepreneur's effort depends also on the type of the project whether it is innovative or not.

Let $p^{FB} = p(e^{FB})$ denotes the success probability in the first best. Then, the expected gain of the entrepreneur is equal to the optimal social value of the project:

$$V^{FB} = p^{FB}\Delta R - c_E(e^{FB}) + R^d - K$$

which is assumed to be strictly positive.

2.4 The optimal financial contract under moral hazard

Consider now that e is not observable. The entrepreneur chooses the level of effort that maximizes her expected gain:

$$e \in \underset{e \in [0,1]}{\arg\max}\ E\pi^E = \alpha p(e)R^M - c_E(e) \qquad (IC_E)$$

Then, the optimal level of effort e^* is given by the first order condition of $E\pi^E$:

$$\left.\frac{dE\pi^E}{de}\right|_{e^*} = \alpha p'(e^*)R^M - c'_E(e^*) = 0$$

which can be written: $\alpha R^M = \frac{c'_E(e^*)}{p'(e^*)}$. The entrepreneur's objective is to maximize her expected gain which implies:

$$\alpha^* \quad \underset{0 \le \alpha \le 1}{\arg\max}\ E\pi^E = \alpha p(e)R^M - c_E(e) \qquad (4)$$

$$s.t \qquad (PC_A) \text{ and } (IC_E)$$

As (PC_A) is binding, I can write:

$$\alpha p(e)R^M = p(e)R^M + [1 - p(e)]R^d - K \qquad (5)$$

If I replace (5) in (4), the optimal sharing rule α is solution of the following program:

$$\alpha^* \quad \underset{0 \le \alpha \le 1}{\arg\max}\ V(e) = p(e)\Delta R \quad - c_E(e) + R^d - K$$

$$s.t \qquad (IC_E)$$

that is maximizing the social value of the project under the incentive constraint of the entrepreneur. I recall that $V(e) = V^{FB}$ if and only if $e^* = e^{FB}$. Given the condition (3), I obtain: $\alpha^* R^M = \Delta R$ which gives $\alpha^* = 1 - \frac{R^d}{R^M}$. This implies that when the project is very risky, in the sense ΔR is very large; the entrepreneur must have the highest profit share to boost her incentives to exert effort. The intuition is:

- If ΔR is not very large, the entrepreneur's share of revenue does not change significantly when the project fails or succeeds. In this case, the ratio $\frac{R^d}{R^M}$ is too close to 1 and the profit share of the entrepreneur is too low (α^* converges to 0).
- If ΔR is very large, the entrepreneur's share of revenue varies significantly between the two cases. In this case, the optimal profit share of the entrepreneur is too close to 1 ($\frac{R^d}{R^M}$converges to 0).

This contract provides powerful incentive scheme that is the threat to get null payment in case of failure. This leads her to exert the first best level of effort. This contract is similar to an equity contract in which one party provides capital and the other party the effort. It is commonly used to fund innovative firms in the

conventional venture capital. I join Bergemann and Hedge (1998), Casamatta (2003) and Repullo and Suarez (2004) and show that private equity financing solves moral hazard problem under specific conditions. Thus, my general model shows that Mudarabah financing solves moral hazard problem.

3. Musharakah financing

In this section, I consider an extension of the previous model. Both parties are capital providers: the entrepreneur raises the amount of equity δK $(0 \leq \delta \leq 1)$ and the PE fund provides the remaining capital. δ is to be determined endogenously. Both parties are actively involved in the management of the target.

In Musharakah financing, profit share depends on the agent's share in management and their financial contribution. Let α and β denote $E's$ share in management and $A's$ share in management, respectively. These shares are exogenous and fixed by the entrepreneur and the PE fund. I assume that $(\alpha, \beta) \in [0, \frac{1}{2}[^2$ such that $(\alpha + \beta)$ is the total profit share coming from management and $(1 - \alpha - \beta)$ is the total profit share coming from their financial contribution such that $0 < (1 - \alpha - \beta) < 1$.

Accordingly, $\delta(1 - \alpha - \beta)$ is $E's$ share of benefit that depends on her financial contribution and $(1 - \delta)(1 - \alpha - \beta)$ is $A's$ share of benefit that depends on his share of capital.

I assume that the probability function $p(e, a)$ is increasing and concave where e and a are respectively $E's$ and $A's$ efforts, $(e, a) \in \mathbb{R}^2_+$. I suppose that $\frac{\partial^2 p(e,a)}{\partial e \partial a} > 0$ to ensure that efforts are complementary. Furthermore, $p(e, 0) = p(0, a) = 0$: it means that both agents must exert strictly positive efforts so that the success probability is strictly positive. Making efforts $(e, a) = (0,0)$ is a Nash equilibrium but it means that the project fails with probability one, hence it is not viable. However, there is another Nash equilibrium which is characterized in the following result that ensures the survival of the project.

The sequence of events in the model is the following:

- At the date 0, E and A sign Musharakah contract.
- At the date 1, E and A have to exert respectively the costly and non-contractible efforts e and a. Let $c_E(e)$ and $c_A(ea)$ denote respectively the cost functions. These functions are increasing, convex and satisfy $c_E(0) = c_A(0) = c'_E(0) = c'_A(0) = 0$.

- At the date 2, the project is completed. Whether the project result is a success or failure, the entrepreneur's share in total profit is $[\alpha + \delta(1-\alpha-\beta)]$and the PE fund's share is $[\beta + (1-\delta)(1-\alpha-\beta)]$.

The participation constraint of the PE fund becomes:

$$E\pi^A = [\beta + (1-\delta)(1-\alpha-\beta)][p(e,a)\Delta R + R^d] - c_A(a) - (1-\delta)K = 0 \qquad (PC_A)$$

The entrepreneur's objective is to maximize her expected gain:

$$E\pi^E = [\alpha + \delta(1-\alpha-\beta)][p(e,a)\Delta R + R^d] - c_E(ae) - \delta K \qquad (6)$$

The model without double moral hazard

The social value of the project $V(e,a)$ is given by:

$$V(e,a) = p(e,a)\Delta R - c_E(e) - c_A(a) + R^d - K$$

The first best efforts e^{FB} and a^{FB} are deduced from the first order conditions of $V(e,a)$given by:

$$\frac{dV(e,a)}{de}\Big|_{e^{FB},\ a^{FB}} = p_e(e^{FB},\ a^{FB})\Delta R - c'_E(e^{FB}) = 0 \qquad (7)$$

$$\frac{dV(e,a)}{da}\Big|_{e^{FB},\ a^{FB}} = p_a(e^{FB},\ a^{FB})\Delta R - c'_A(a^{FB}) = 0 \qquad (8)$$

Equations (7) and (8) lead to:

$$\frac{c'_E(e^{FB})}{p_e(e^{FB},\ a^{FB})} = \frac{c'_A(a^{FB})}{p_a(e^{FB},\ a^{FB})} = \Delta R \qquad (9)$$

As noticed before, the ratios of the marginal cost to the marginal probability are proportional to the level of risk. If the project is very risky, in the sense ΔR is very large, the levels of first best efforts are very high and the entrepreneur and the PE fund need high incentives to implement the first best.

Under double sided moral hazard problem

If efforts are non-observable, the entrepreneur and the PE fund choose the level of efforts that maximize their expected gain:

$$e(a) \in \arg\max_{e \in \mathbb{R}_+} [\alpha + \delta(1-\alpha-\beta)][p(e,a)\Delta R + R^d] - c_E(e) - \delta K \qquad (10)$$

$$a(e) \in \arg\max_{a \in \mathbb{R}_+} [\beta + (1-\delta)(1-\alpha-\beta)][p(e,a)\Delta R + R^d] - c_A(a) - (1-\delta)K \qquad (11)$$

The levels of optimal efforts are given by the first order conditions of (10) and (11). I obtain:

$$[\alpha + \delta(1 - \alpha - \beta)]\Delta R = \frac{c'_E(e)}{p_e(e,\ a)} \qquad (12)$$

$$[\beta + (1 - \delta)(1 - \alpha - \beta)]\Delta R = \frac{c'_A(a)}{p_a(e,\ a)} \qquad (13)$$

By using implicit function theorem, equations (12) and (13) show that the entrepreneur's effort is a decreasing function of the PE fund's effort as they are complementary efforts:

$$e'(a) = \frac{p_{ea}(e,a)c'_E(e)}{p_e(e,a)c''_E(e) - p_{ee}(e,a)c'_E(e)} < 0$$

$$a'(e) = \frac{p_{ea}(e,a)c'_A(a)}{p_a(e,a)c''_A(a) - p_{aa}(e,a)c'_A(a)} < 0$$

As (PC_A) is binding, I can write:

$$\delta K = K - [\beta + (1 - \delta)(1 - \alpha - \beta)][p(e,a)\Delta R + R^d] + c_A(a) \qquad (14)$$

If I replace δK by this expression in (6), then I obtain:

$$E\pi^E = p(e,a)\Delta R + R^d - c_E(e) - c_A(a) - K$$

Then, the entrepreneur's objective is:

$$\delta^* \quad \underset{0 \le \delta \le 1}{\arg max} \quad p(e,a)\Delta R + R^d - c_E(e) - c_A(a) - K$$

$$s.t \qquad (12) \text{ and } (13)$$

The entrepreneur and PE fund provide the first best levels of efforts only if (12) and (13) satisfy (9). This implies that

$$\Delta R = [\alpha + \delta(1 - \alpha - \beta)]\Delta R = [\beta + (1 - \delta)(1 - \alpha - \beta)]\Delta R$$

Given the condition $0 \le \alpha \le \frac{1}{2}$, the optimal financial contract is given by[6]

$$\delta^* = \frac{1 - 2\alpha}{2(1 - \alpha - \beta)} \qquad (15)$$

[6] If $\frac{1}{2} \le \alpha \le 1$, the entrepreneur provides only the effort e and has not to issue equity. This is not Musharakah financing method but Mudarabah one.

It depends on the shares in management of the entrepreneur and the PE fund. Equation (15) means that the entrepreneur has to issue the amount of equity $\delta^* K$ while the PE fund raises the remaining capital. It is straightforward to see that the entrepreneur's contribution is decreasing with her share in management. But if A is more involved in the management of the project, in the sense $\beta \geq \alpha$, E should raise the highest amount of equity. As the PE fund's effort is costly, the entrepreneur should raise higher amount of equity to pay the extra cost of his effort.

If I replace (15) in respectively (12) and (13), I show that E and A cannot provide the first best levels of efforts:

$$\frac{c'_E(e^*)}{p_e(e^*,\ \alpha^*)} = \frac{c'_A(\alpha^*)}{p_\alpha(e^*,\ \alpha^*)} = \frac{1}{2}\Delta R \qquad (16)$$

The optimal contract and the efforts given respectively by (15) and (16) do not depend on the project size K.

Accordingly, I conclude that Musharakah does not solve moral hazard problem. One explanation could be that it is based on a standard equity contract that does not provide powerful incentives to induce both parties to make the first best levels of efforts. In fact, the entrepreneur needs to pledge a share of her profit to the PE fund to make him exert the effort α.

This has some consequences. If a increases, both the success probability $p(e, \alpha)$ and the cost $c_A(\alpha)$ increase. Simultaneously, the entrepreneur exert more effort because e and a are complementary. Thus, $p(e, \alpha)$ and the cost of the entrepreneur's effort $c_E(e)$ increase. The increase of the project performance is followed by the increase of the costs which affected negatively the efforts' incentives of the entrepreneur and the PE fund. This result is consistent with Yousfi (2012a).

Conclusion

In the last decade, the number of studies on Islamic finance has increased significantly, particularly those on the performance and the efficiency of Islamic banks, on shari'ah compliant activities and on Islamic rules. However, this is the first paper to analyze the link between financial capital structure in Islamic PE projects and the agents' incentives under asymmetric information. I present a simple agency model and show that Mudarabah financing model mitigates the moral hazard problem when the performance of the project depend on the agents' efforts. The entrepreneur and the PE fund exert the first best level of efforts. One explanation is that the profit share of the entrepreneur depends on the level of risk of the project and she has no payment in case of failure.

Unlike Mudarabah, the entrepreneur and the PE fund finance jointly the project, participate actively to the management of the enterprise and share the revenues in Musharakah. However, this is not enough to provide powerful incentive schemes which leads to the two parties to provide the second best levels of efforts. In fact, Musharakah is quite similar to a standard equity contract in which both parties fund the project and provide effort.

In the current paper, I focused on moral hazard problem but there is no studies on how PE funds choose good partnerships to avoid opportunistic bahavior of the entrepreneur and what are the financial instruments used to monitor both parties. These issues deserve further developments.

Finally, it would be interesting to analyze how the shares of revenues are fixed in Musharakah and how securities like sukuk could improve the agents' incentives.

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