The Economic Journal, **104** (*May*), 584–596. Published by Blackwell Publishers, 108 Cowley Road, Oxford OX4 1JF, UK and 238 Main Street, Cambridge, MA 02142, USA.

ISLAMIC ECONOMICS: THE EMERGENCE OF A NEW PARADIGM*

John R. Presley and John G. Sessions

We illustrate the potential impact of the Islamic doctrine on western economic relationships by focusing on the prohibition of interest (*riba*) in Islamic economics. We show that the alternative method of financier remuneration (i.e. *mudarabah* profit-and-loss sharing) will, under certain conditions, enhance capital investment on account of its ability to act as an efficient revelation device. By applying ideas developed in the western contract literature, we show that a *mudarabah* contract between the manager of a project and a syndicate of investors may permit a more efficient revelation of any informational asymmetries between the two.

Western economists have been somewhat remiss in the last decade in failing to recognise what has the appearance of a new paradigm in economics – that of Islamic economics. This neglect is not surprising: most of the sophisticated literature on the subject is published in Muslim countries and is not, therefore, easily available to western economists. There is now, nevertheless, sufficient momentum behind the development of Islamic economics for it to be taken very seriously. This paper, therefore, has the primary objective of stimulating interest in Islamic economics in the hope that it will encourage the recognition in Western literature of this 'new' paradigm and lead to contributions to its evolution from economists of all persuasions.

The paper takes a particular focus, namely the prohibition of interest (*riba*) in Islamic economics. The payment of *riba* is explicitly prohibited by the Quran and investors must instead be compensated by other means. The prevalent method for such remuneration is by means of *mudarabah* profit-and-loss sharing; *mudarabah* defines a sharing contract where the return to lenders is in accordance with an agreed ratio in the profit/loss outcome of the project in which they have invested. By applying the ideas developed in the western contract literature by Holmstrom and Weiss (1985) and Meyer (1986), we show that the use of *mudarabah* might act as an efficient revelation device. The basic idea is that if the project outcome is stochastic, and if managers have an informational advantage regarding this stochasticity over investors, then a *mudarabah* contract between managers and investors will lead to a more efficient revelation of that information.

The paper is set out as follows: Section I outlines some general background issues relevant to Islamic economic thought whilst Section II considers in particular the prohibition of interest within Islam. Section III introduces the idea of *mudarabah* as an efficient revelation device. Our formal model is set out in Section IV whilst some final comments are collected in Section V.

* This work has benefited from discussions with Saul Estrin, Hussein Sharif Hussein and Umer Chapra. Helpful comments were also received from two anonymous referees. We should like to express a particular debt of gratitude to Haitham Kabbara for his inspiration and guidance in this area. The usual disclaimer applies.

I. BACKGROUND

The first misconception which must be abandoned quickly is that Islamic economics is a new paradigm. That Islamic economics has come to the fore in recent years in certain Muslim states is indisputable, but it has been in the background of the Islamic economy since the publication of the Holy Quran, and, in this sense, is much older than the theoretical foundations of most Western economic paradigms. Islam comprises a set of principles and doctrines that guide and regulate a Muslim's relationship with God and with society. In this respect Islam is not only a divine service, like Judaism and Christianity, but also involves a code of conduct which regulates and organises mankind in both spiritual and material life. An examination of the contemporary literature on Islamic political economy yields a number of substantial differences between this new paradigm and modern 'capitalistic' economics in key areas. These arise from the basic principles of Islam, In particular that:

(i) God is the creator and owner of wealth and people are the vicegerent of God; however people can pursue and use wealth in the form of a trusteeship from God (Quran 20: 6).

(ii) It is a divine duty to work. Social justice is the result of productive labour and equal opportunities such that everyone can use all their abilities in work and gain just reward from that work effort.

(iii) Justice and equality in Islam means that people should have equal opportunity and does not imply that they should be equal in poverty or in riches (Chapra, 1985). However, it is incumbent on the Islamic state to guarantee a subsistence level to its citizens, that is a minimum level of food, clothing, shelter, medical care and education (Quran 2: 275–9). The major purpose is to moderate social variances within Islamic society, and to enable the poor to lead a normal, spiritual and material life in dignity and contentment.

(iv) The scope of economic intervention is broad and can include state interference in many areas of economic activity (Saqr, 1980, p. 59). Such interference can take many forms, including general guidance and regulation by the State, but also might embrace more direct state ownership and direction. The duties assigned to the State under Islam primarily consist of commanding, counselling, controlling and protecting. The Quran orders society to obey God, His Prophet and their rulers (Quran 4: 59) (in that order). An Islamic economic system operates on the fundamental principle that the forces of supply and demand should work freely in the determination of prices in all markets. Only in exceptional circumstances is there a justification for state intervention and, even here, the objective of such intervention is not to hinder freedom of trade but to secure more perfect information in the market place or to regulate or organise economic activities so as to protect economic freedom without harming either buyers or sellers.

(v) There is no justification for the payment of interest on loans.

It is this latter basic principle that this paper seeks to explore in more depth.

II. THE PROHIBITION OF INTEREST

Perhaps the most far reaching and controversial aspect of Islamic economics, in terms of its implications from a Western perspective, is its prohibition of interest (*riba*). The elimination of interest payment would clearly involve the rewriting of capitalist economics as it exists today and would produce a major change in the functioning of both the national and international economic and financial systems.

In banning *riba*, Islam seeks to establish a society which is again based upon fairness and justice (Quran 2: 239). According to Islam, all income should be commensurate with work effort. Lending money for interest permits the lender to augment his capital without effort as money does not create a surplus value by itself. Only through the marriage between labour and capital can a surplus or a deficit result: it is fairer, therefore, for a provider of capital to share the profit or loss with the borrower than to obtain a fixed return, regardless of the outcome of the borrower's business.

The prohibition of interest is necessarily a complex issue; in general, however, there are a number of themes running through the modern Islamic literature which can be summarised here:

(i) An individual who abstains from consumption, by saving, is not entitled automatically to a financial reward for that abstention.

(ii) There can be no justifiable reason why a lender should automatically receive a reward simply through the act of lending. Interest as a reward for saving has no moral foundation or justification.

(iii) A sharp distinction exists between money and capital: money is not equated with capital, although it may be regarded as potential capital; the transformation of money to capital requires the addition of enterprise, that is risk taking and the knowledge of how to productively combine factors of production with money (Presley, 1988, pp. 68–9). The lender has no right to an automatic reward for supplying money unless he shares in the provision of enterprise: even then the reward is not fixed or guaranteed, but dictated by the proportion of this contribution; this, in turn, determines his justifiable share of profits (or losses).

(iv) Fairness has two dimensions: the supplier of capital has a right to a share in profits which is commensurate with the risk and work effort supplied; it should not therefore be determined by the current going market rate of interest, but by the rate of return on the individual project for which the capital is supplied; only time will dictate whether this exceeds or falls short of the current market rate of interest.

(v) The creditor/debtor relationship breaks down in Islam. The lender becomes a partner in the business or project, sharing in the provision of enterprise and therefore not distanced from the use to which money is put.

This position on interest can be classified by reference to property rights. 'Money represents the monetised claim of its owner to property rights.' (Presley, 1988, p. 70). Lending money is no more than a transfer of this property right. If the borrower does not utilise the loan productively to

generate incremental wealth, then there is no claim to additional property rights to either borrower or lender. In contrast, if money is used productively in creating additional wealth, the lender as well as the borrower has a claim to a share of that additional wealth, but not in terms of a fixed return irrespective of the level of that additional wealth.

III. MUDARABAH PROFIT-AND-LOSS SHARING AS AN EFFICIENT REVELATION DEVICE

The prohibition of interest has lead to the creation of alternative schemes for the remuneration of capital. The prevalent method of compensation is by means of a *mudarabah* profit-and-loss sharing contract where the return to the lenders of capital is in accordance with an agreed ratio in the profit/loss outcome of the project in which they have invested.

We do not discuss in detail the general development of *mudarabah* profit-and-loss sharing under Islam. There are many excellent surveys to which the interested reader is referred.[1] Our aim here is to illustrate the impact of Islamic economics upon contemporary western economic literature by highlighting a particular aspect of *mudarabah*, namely its ability to act as an efficient revelation device.[2]

To be specific we focus on the example of a single project undertaken by a single manager, the outcome of which is determined by the level of capital investment, the level of managerial effort, and the state of nature, which we envisage in terms of some random shock to demand or technology. We examine the situations where capital is financed through *riba* and *mudarabah* based contracts respectively and show that, under certain conditions, the latter will act to raise the level of capital investment in the project.

The key assumption is asymmetric information. The manager is assumed to have superior information to investors in two respects: First, having signed a contract with investors the manager is able to observe the demand or productivity conditions affecting the project before committing to production decisions; and second, he alone observes his personal level of effort. Such an asymmetry is not unusual and, indeed, rationalises the manager's involvement in the project. But whilst the manager's relative informational expertise suggests that he should be delegated some authority over production decisions, the exploitation of this expertise is problematic. Since effort is private information, the manager cannot be compensated directly for its provision. A revelation problem therefore arises with the manager's preferences over productive inputs only coinciding with those of investors if he personally bears the entire risk of adverse shocks.

If the manager is risk averse then such a policy, whilst productively efficient, is sub optimal (see Holmstrom and Weiss (1985)). Furthermore, a policy of

[1] See for example Mannan (1983), Siddiqi (1991) and, in particular, Udovitch (1970).

[2] *Mudarabah* type arrangements are not peculiar to Islam. The use of profit-sharing as a method of labour remuneration has aroused considerable interest amongst Western commentators (see Estrin *et al.* (1987) and Weitzman (1983, 1984, 1985, 1987)).

paying the manager a fixed return independent of outcome is also inefficient because there is no incentive for him to supply more effort when its marginal revenue product is high.

One way out of the dilemma is to design an incentive compatible contract which ensures that the cost of misinformation by the manager is sufficiently high as to make honesty his best policy. To obtain such incentive compatibility with minimum loss in efficiency requires the contract to specify inefficiently low levels of productive inputs in particular states of the world (see Hart (1983), Hart and Holmstrom (1987)).

In what follows we assume two states of nature only, 'good' and 'bad', and a production technology such that both total and marginal revenue products are higher in the good state than in the bad state. Under these assumptions an incentive compatible *riba* contract implies that capital investment in the bad state is set below the full information productively efficient level, whilst in the good state it is set at the productively efficient level. These results arise from the manager's temptation under a *riba* contract to substitute capital for effort and thereby reduce effort cost, which is not public knowledge. Intuitively, a reduction in investment in the bad state has only a second-order effect on the return from the project, but nevertheless imposes a first-order cost on the good-state manager should he choose to misinform investors as to the demand or productivity conditions affecting the project. This permits the compensation differential between the two states to be reduced whilst maintaining incentive compatibility.

Under a *mudarabah* profit-and-loss sharing contract it is managerial effort which picks up the role of policing the contract. A *riba* contract creates an explicit mapping between the input and remuneration of capital. Under a standard incentive compatible *riba* loan contract the manager is left free to chose the individually optimal level of effort in each state contingent on the specified level of investment. A *mudarabah* contract, in contrast, creates an explicit mapping between the remuneration of capital and the outcome of the project, the prohibition of interest implying that compensation cannot be tied directly to the level of capital investment.

Mudarabah therefore allows the contract to control the manager's incentive to exert effort directly, since this effort affects the relationship between capital investment and the outcome of the project. Under a *mudarabah* contract the manager is left free to chose the individually optimal level of investment in each state contingent on his contractually specified level of effort. It is shown that these individually optimal levels correspond to the full information productively efficient levels such that a mean-variance improvement in capital investment is obtained – average investment is increased whilst inefficiently large fluctuations around this level are reduced.

To address these issues somewhat more rigorously we move now to our formal model.

IV. THE MODEL[3]

We investigate the characteristics of a single investment project. There is a large number of such projects available in the economy, the return to each of which requires capital investment and managerial effort. Individuals differ in terms of their attributes and are endowed with either managerial ability or capital. Capitalists are risk neutral and individually or collectively search for potential investment opportunities.[4] Once such an opportunity has been spotted they hire a single, risk averse manager to coordinate the project.

We assume that the contract negotiated between the manager and the syndicate provides for the former to retain the value of the project net of an agreed return to the latter. The outcome of a project is assumed to be stochastic, depending on the state of nature.[5] Thus the return to the syndicate will also be state dependent.

Production

The outcome of a project depends upon managerial effort, e, capital investment I, and a random shock representing the state of nature, Θ. For simplicity only two states of nature are assumed: 'bad', denoted by Θ_1 and assumed to occur with probability $(1-\phi)$ and 'good', denoted by Θ_2, and assumed to occur with probability ϕ. Project outcome in state i is denoted:

$$z_i = f^i(I, e), \tag{1}$$

$\forall i = 1, 2$. Managerial effort is essential for a successful (i.e. positive) outcome and this effort implies a cost. We follow Grossman and Hart (1981) in regarding this cost in terms of an opportunity cost for alternative income rather than as an opportunity cost for leisure. This permits the cost to be measured in monetary terms which is independent of the manager's level of income.

Measuring both effort and investment in terms of their costs implies a profit function of the form:

$$\Pi_i = f^i(I, e) - I - e. \tag{2}$$

We make the following assumptions regarding production technology:

Assumption 1. For $i = 1, 2$

(*a*) $f^i(I, e)$ is strictly increasing, twice continuously differentiable and strictly concave;

(*b*) $f^i_{Ie}(I, e) \geqslant 0$;[6]

(*c*) $f^i_I(I, e), f^i_e(I, e) < 1$ for sufficiently large i, e;

[3] The following model is a simplified, uni-variable screening application of the analyses set out in Holmstrom and Weiss (1985) and Meyer (1986).

[4] In what follows we will use the term 'syndicate' to denote the group of investors within a particular project.

[5] The 'outcome' of a project is interpreted in terms of its monetary value.

[6] In what follows we use the notation $g^i_k(.)$ to define the partial derivative of a function $g^i(.)$ with respect to the argument k in state i.

(*d*) $f^i(I, 0) = 0, \forall i.$

Assumption 2. For all $(I, e) > 0$

(*a*) $f^2(I, e) > f^1(I, e)$,
(*b*) $f^2_I(I, e) > f^1_I(I, e)$,
(*c*) $f^2_e(I, e) \geq f^1_e(I, e)$.

These assumptions follow Holmstrom and Weiss (1985) (hereafter HW). Assumption 1 is relatively standard. Part (*c*) assures that input levels will be finite and part (*d*) implies that effort is necessary for any output. Assumption 2 states that both the total and marginal revenue of each input is higher in the 'good' state (i.e. $\Theta = \Theta_2$).

The return from the project net of investment costs in state i is denoted:

$$y_i = f^i(I, e) - I. \tag{3}$$

Similarly, the effort required on the part of the manager to ensure a return of y with investment I in state i is denoted $e^i(x)$, where $x = (I, y)$, and which is defined implicitly through:

$$y = f^i[I, e^i(x)] - I, \tag{4}$$

which implies a value added profit function for the project in terms of I and y:

$$\pi^i(x) = y - e^i(x). \tag{5}$$

Information and Contracts

The central feature of what follows is the asymmetry of information between managers and capitalists. The manager is assumed to have superior information on two accounts: First, he alone can observe the value of e; and second, having signed his contract with the syndicate, he is able to observe the realisation of Θ before committing himself to production decisions. The syndicate observes neither e nor Θ. All other variables are common knowledge.

The information superiority of the manager rationalises his presence within the project – since he alone knows factor productivities it is efficient for him to be delegated some control over production decisions. However, problems arise because his preferences for production decisions do not coincide with those of capitalists. The manager has an incentive to substitute effort for investment in an attempt to reduce the cost of supplying effort which is not publicly observable.

This problem is dealt with by the design of an incentive compatible contract which provides the manager with a return as a function of the publicly observed variables y and/or I. An alternative, but equivalent, approach, is to regard the contract as specifying how much the manager should pay the syndicate as a function of y and/or I. We adopt the later interpretation and define $s(I, y)$ as a contingent payment schedule from the manager to the syndicate. Since there are only two states of nature it follows that the manager will chose at most the pairs (I_1, y_1) when $\Theta = \Theta_1$ and (I_2, y_2) when $\Theta = \Theta_2$.

A *riba* contract between the manager and the syndicate will consist of a

schedule relating s to the amount invested in the project, I.[7] Note that this will leave the manager free to choose the individually optimal level of π, via e, given the state of nature, Θ, and the level of capital input, I. Since $\Theta_i \in [\Theta_1, \Theta_2]$, such a contract may be described by:

$$\delta^r = \{(I_1, s_1), (I_2, s_2)\}. \tag{6}$$

Thus the *riba* contract therefore leaves the manager free to chose the optimal level of y in each state. If we define managerial utility through the concavely increasing function $u(c_i)$, where $c_i = \pi^i(x_i) - s_i$ denotes net managerial return in state i, then a *riba* contract implies:

$$u'(c_i)\,[1 - e^i_{y_i}(x_i)] = 0 \tag{7}$$

for all $i = 1, 2$. Since the manager observes Θ before choosing e and I he can always ensure a particular relationship between y and I by choosing e appropriately. The freedom to set y optimally in each state thus implies a freedom to set e optimally in each state.[8]

With a *mudarabah* contract, capital remuneration in the form of interest is prohibited. Instead capitalists are induced to invest in the project by being offered a share in the outcome of the project. We will assume that a *mudarabah* contract consists of a schedule relating s to the net outcome of the project, y, and that it may be described by:[9]

$$\delta^m = \{(y_1, s_1), (y_2, s_2)\}. \tag{8}$$

The *mudarabah* contract, whilst restricting the manager's optimal choice of y through e, permits the manager freedom over I so that:

$$u'(c_i)\, e^i_{I_i}(x_i) = 0 \tag{9}$$

for all $i = 1, 2$.[10]

Asymmetric Information

The manager's unique ability to observe Θ (after contracting but before committing to production decisions) lends him an incentive to misinform investors as to its true value. To characterise the optimal asymmetric information contracts under both *riba* and *mudarabah* financing, it is necessary to impose the following incentive compatibility constraints:

$$\pi^1(x_1) - s_1 \geqslant \pi^1(x_2) - s_2, \quad \pi^2(x_2) - s_2 \geqslant \pi^2(x_1) - s_1. \tag{10a, b}$$

Constraints (10a) and (10b) simply ensure that the manager will report $\Theta = \Theta_i$ when state i occurs (see Dasgupta *et al.* (1979) and Myerson (1979)).

[7] It is, of course, permissible for a *riba* contract to relate s to both I and y (and, indeed, in a more general setting, any other observable variables as well). Such a multi-variate screening problem is examined in detail by HW. In this paper we restrict our attention to a 'pure' *riba* contract in which s is related to I only. Such an assumption greatly eases the analytical exposition of our results without compromising unduly their generality.

[8] Note that we are using the term *mudarabah* to indicate that the outcome of the project is an explicit argument of the loan agreement. It is important to note, however, that a *riba* contract need not be one that specifies a fixed payment in all states; payments may fluctuate with a variety of arguments.

[9] We could equally assume that the *mudarabah* contract related s to the 'gross' outcome of the project, z.

[10] Note that s_i, $i = 1, 2$, represents the payment to the syndicate net of the repayment of I, which has already been included as a cost term. Thus the syndicate actually receives $I + s_i$.

Optimal Contracts

We assume that at the time of contracting all parties share the same information about Θ and therefore hold the same beliefs regarding ϕ. The optimal contract is the one which chooses an *ex ante* efficient contract subject to the appropriate incentive constrains. The problem may be written formally as:

$$\max_{\delta} U = (1-\phi)\,u(c_1) + \phi u(c_2) \tag{11}$$

subject to:

$$\pi^1(x_1) - s_1 \geqslant \pi^1(x_2) - s_2, \quad \pi^2(x_2) - s_2 \geqslant \pi^2(x_1) - s_1, \quad (1-\phi)\,s_1 + \phi s_2 \geqslant 0, \tag{11a–c}$$

where $\delta \in (\delta^r, \delta^m)$ and (11*c*) is a zero profit constraint for the syndicate. Recalling our definition of the characteristics of the *riba* and *mudarabah* contracts it is apparent that the desire of the manager to maximise his return on the project will imply further constraints depending on the nature of the contract. To be sure, if the contract is *riba* financed then, from (7), we have two further constraints specifying that the manager chooses the optimal level of y in each state:

$$u'(c_1)\,[1 - e^1_{y_1}(x_1)] = 0, \quad u'(c_2)\,[1 - e^2_{y_2}(x_2)] = 0. \tag{11d, e}$$

Alternatively, under *mudarabah* financing, equation (9) applies and we have the additional constraints that the manager chooses the optimal level of investment in each state:

$$u'(c_1)\,e^1_{I_1}(x_1) = 0, \quad u'(c_2)\,e^2_{I_2}(x_2) = 0. \tag{11f, g}$$

Finally for future reference note that we will use the term $\lambda_j, j = a, b, \ldots g$, to refer to the appropriate Kuhn–Tucker multiplier applying to the particular constraint (11*j*).

For ease of reference the characteristics of the optimal contract with *riba* and *mudarabah* financing, under both symmetric and asymmetric information, are set out in Table 1 below:

Table 1

Optimal Contracts and Information

	Contract Type	
	Riba	*Mudarabah*
Symmetric information	$\max_{\delta^r}$ (11) subject to (11*c*), (11*d*), (11*e*)	$\max_{\delta^m}$ (11) subject to (11*c*), (11*f*), (11*g*)
Asymmetric information	$\max_{\delta^r}$ (11) subject to (11*a*), (11*b*), (11*c*), (11*d*), (11*e*)	$\max_{\delta^m}$ (11) subject to (11*a*), (11*b*), (11*c*), (11*f*), (11*g*)

We will term the solution to (11) under asymmetric information second best. Before we look in detail at the characteristics of such a solution we consider what a first best solution would look like.

First Best

The first best solves (11) without imposing the incentive compatibility constraints (11*a*) and (11*b*). It differs from the second best, therefore, in that $\lambda_a = \lambda_b = 0$. The first best solution is denoted (s_i^*, x_i^*) and its full characteristics are detailed in Appendix A. Here we comment on its pertinent features only.

The first best solution $\delta^* = \{s_i^*, x_i^*\}, i = 1, 2$, is independent of contract design and is characterised by:

$$c_1^* = c_2^*, \tag{12}$$

$$e^i_{I_i}(x_i^*) = 0, \tag{13}$$

$$e^i_{y_i}(x_i^*) = 1. \tag{14}$$

From Assumption 2 it follows that $\pi_2^* > \pi_1^*$ such that $s_2^* > s_1^*$. Moreover, Assumption 1 implies that $I_2^* > I_1^*, y_2^* > y_1^*$ and $e_2^* > e_1^*$.

It is apparent, then, that when information is symmetric the optimal contract with either *riba* or *mudarabah* financing yields identical levels of investment, syndicate return, and project outcome. Although the syndicates' reservation constraint (11*c*) forces the manager to bear some risk [see (A 1*a*) and (A 2*a*)], it does not of itself create an explicit role for *mudarabah*. Under symmetric information, the contract is able to specify efficient production choices directly. Syndicate remuneration need not play an allocative role and can be based purely on risk sharing considerations.

Second, it is apparent that the value of ϕ, whilst, of course, affecting the value of the manager's return from the project, does not affect the value of production decisions x_i^*. This is in contrast to the world of second best where there is asymmetric information between managers and investors.

Second Best

The characterisation of the second best solution under *riba* and *mudarabah* financing is detailed in Appendix B. Again we comment here on the salient features only.

The first point to note is that the first best solution is unobtainable under either *riba* or *mudarabah* financing. This follows from HWs observation that constraint (11*b*) can be written as $c_2 \geq c_1 + \Delta(x_1)$, where $\Delta(x_1) = \pi^2(x_1) - \pi^1(x_1) = e^1(x_1) - e^2(x_1) > 0, \forall x > 0$, implying that it must be the case that $c_2 > c_1$. The first best full insurance solution is therefore not possible. Intuitively, if such a solution were obtainable then the good-state manager would have an incentive to falsely claim that he was operating within the bad state of nature. To ensure truthful reporting by the manager in the good state some risk sharing advantages have to be compromised, and the second best solution is characterised by this trade off between reduced risk sharing and increased

efficiency in production. Since $c_2 = c_1 = \Delta(x_1)$ – because (11*b*) will obviously bind at the optimum (see Hart and Holmstrom, 1987) – the trade-off boils down to the choice of $\Delta(x_1)$. It is apparent that $\Delta(x_1) > \Delta(x_1^*)$ is not optimal, since, by increasing the gap between c_2 and c_1, it would imply losses in both productive and allocative efficiency. It must be the case then that $\Delta(x_1) < \Delta(x_1^*)$, which implies that (11*a*) is not an effective constraint such that $x_2 = x_2^*$.

We now look at the optimal second best contracts under *riba* and *mudarabah* financing in turn.

Second Best: Riba

The optimal second best solution under *riba* financing, $\delta^r = \{s_i^r, I_i^r\}$, is detailed in Appendix B1. The salient features are summarised in the following proposition:

PROPOSITION 1. *Under Assumptions 1 and 2 the optimal second best solution under riba financing is characterised by:*

$$c_2^r > c_1^r, \quad s_2^r > 0 > s_1^r, \quad \pi^2(x_2^r) - s_2^r = \pi^2(x_1^r) - s_1^r, \qquad \text{(P1 } a\text{–}c\text{)}$$

$$(1-\phi)\, s_1^r + \phi s_2^r = 0, \quad I_1^r < I_1^*, \quad I_2^r = I_2^* \quad y_i^r = y_i^*, \qquad \text{(P1 } d\text{–}g\text{)}$$

for all $i = 1, 2$. With a *riba* contract the project manager sets effort at the individually optimal level in each state of the world. Informational asymmetries are countered by capital investment which is required to be set at an inefficiently low level in bad states of the world.

Second Best: Mudarabah

The optimal second best solution under *mudarabah* financing, $\delta^m = \{s_i^m, y_i^m\}$, is detailed in Appendix B1. The salient features are summarised in the following proposition:

PROPOSITION 2. *Under Assumptions 1 and 2 the optimal second best under mudarabah financing is characterised by:*

$$c_2^m > c_1^m, \quad s_2^m > 0 > s_1^m, \quad \pi^2(x_2^m) - s_2^m = \pi^2(x_1^m) - s_1^m, \qquad \text{(P2 } a\text{–}c\text{)}$$

$$(1-\phi)\, s_1^m + \phi s_2^m = 0, \quad y_1^m < y_1^*, \quad y_2^m = y_2^* \quad I_i^m = I_i^*, \qquad \text{(P2 } d\text{–}g\text{)}$$

for all $i = 1, 2$. With a *mudarabah* contract the project manager sets capital investment at the individually optimal level in each state of the world, being restricted by the terms of the contract as to the level of effort he is permitted to exert in each state. Informational asymmetries under *mudarabah* are countered by restrictions on managerial effort, which must be set at an inefficiently low level in bad states of nature.

Riba and Mudarabah Contracts Compared

A *riba* contract creates an explicit mapping between the compensation and the input of capital. Incentive compatibility requires the manager to set inefficiently low levels of capital investment in bad states of the world, whilst leaving him free to set effort at the individually optimal first best level in all

states. If *riba* is prohibited then the return to investors cannot be tied to the level of their capital investment and alternative compensatory arrangements will be required. The prevalent method of *mudarabah* financing ties compensation to the outcome of the project. *Mudarabah* therefore allows the contract to control the manager's incentive to exert effort directly, since this effort affects the relationship between capital investment and the outcome of the project. Under a *mudarabah* contract the manager is left free to chose the individually optimal level of investment in each state contingent on his contractually specified level of effort. Such a contract permits a mean-variance improvement in capital investment – average investment is increased whilst inefficiently large fluctuations around this level are reduced.

V. FINAL COMMENTS

The emergence of Islamic economics as an apparently new paradigm in economics has been met with widespread indifference by many western economists. This is unfortunate: A wider appreciation of Islamic economics will not only improve the Western world's understanding of how Muslim economies (at least in theory) operate, but will also offer an interesting perspective on many accepted Western economic principles. In this paper we have attempted to stimulate Western interest in this 'new' paradigm in the hope that other economists of all persuasions will be motivated into contributing to its evolution.

To illustrate the potential impact of the Islamic doctrine on Western economic relationships we have focused on a particular issue, namely the prohibition of interest (*riba*) in Islamic economics. We have shown that the use of the prevalent alternative method of financier remuneration (i.e. *mudarabah*) will, under certain conditions, lead to an enhanced level of capital investment on account of the ability of *mudarabah* to act as an efficient revelation device. By applying the ideas developed in the Western contract literature by Holmstrom and Weiss (1985) and Meyer (1986), we show that a *mudarabah* contract between a project manager and a syndicate of investors may permit a more efficient revelation of any informational advantage the manager may have over the latter.

Loughborough University

Date of receipt of final typescript: November 1993

References

Chapra, U. (1985). *Towards a Just Monetary System*. Leicester: Islamic Foundation.

Dasgupta, P., Hammond, P. and Maskin, E. (1979). 'The implementation of social choice rules: some general results on incentive compatibility.' *Review of Economic Studies*, vol. 46, pp. 185–216.

Estrin, S., Grout, P. and Wadhwani, S. (1987). 'Profit sharing and employee share ownership: an assessment.' *Economic Policy*, no. 4, pp. 1–60.

Grossman, S. and Hart, O. (1981). 'Implicit contracts, moral hazard, and unemployment.' *American Economic Review*, (Papers and Proceedings), vol. 71, pp. 301–18.

Hart, O. (1983). 'Optimal labour contracts under asymmetric information: an introduction.' *Review of Economic Studies*, vol. 50, pp. 3–35.

Hart, O. and Holmstrom, B. (1987). 'The theory of contracts.' In (T. Bewely, ed.) *Advances in Economic Theory: Fifth World Congress*. Cambridge University Press.
Holmstrom, B. and Weiss, L. (1985). 'Managerial incentives, investment, and aggregate implications: scale effects.' *Review of Economic Studies*, vol. 52, pp. 403–26.
Mannan, M. A. (1983). *The Making of Islamic Economic Society*. Cairo: IAIB Press.
Meyer, M. A. (1986). 'Profit-sharing, employment fluctuations and entrepreneurial incentives.' Mimeo. Nuffield College, Oxford.
Myerson, R. B. (1979). 'Incentive compatibility and the bargaining problem.' *Econometrica*, vol. 47, pp. 61–74.
Presley, J. R. (ed.) (1988). *Directory of Islamic Financial Institutions*. London: Croom Helm.
Saqr, M. A. (ed.) (1980). *Al-Iqtisad al-Islami*. Jeddah: International Centre for Research in Islamic Economics.
Siddiqi, M. N. (1991). 'Some economic aspects of mudarabah.' *Review of Islamic Economics*, vol. 1, pp. 21–33.
Udovitch, A. (1970). *Partnership and Profit in Medieval Islam*. New Jersey: Princetown University Press.
Weitzman, M. (1983). 'Some macroeconomic implications of alternative compensation systems.' ECONOMIC JOURNAL, vol. 93, pp. 763–83.
Weitzman, M. (1984). *The Share Economy*. Cambridge, Massachusetts: Harvard University Press.
Weitzman, M. (1985). 'The simple macroeconomics of profit-sharing.' *American Economic Review*, vol. 75, pp. 937–53.
Weitzman, M. (1987). 'Steady-state unemployment under profit-sharing.' ECONOMIC JOURNAL, vol. 97, pp. 86–195.

APPENDIX A: FIRST BEST

A1. *Riba*

$$\left.\begin{aligned} (1-\phi)\,[\lambda_c - u'(c_1^*)] = 0, \quad \phi[\lambda_c - u'(c_2^*)] = 0, \\ (1-\phi)\,s_1^* + \phi s_2^* = 0, \\ -(1-\phi)\,u'(c_1^*)\,e^1_{I_1}(x_1^*) = 0, \quad -\phi u'(c_2^*)\,e^2_{I_2}(x_2^*) = 0, \\ u'(c_i^*)\,[1 - e^i_{y_i}(x_i^*)] = 0, \end{aligned}\right\} \quad \forall i = 1, 2. \qquad \begin{matrix}(\text{A1 } a\text{–}c) \\ \\ (\text{A1 } d\text{–}f)\end{matrix}$$

A2. *Mudarabah*

$$\left.\begin{aligned} (1-\phi)\,[\lambda_c - u'(c_1^*)] = 0, \quad \phi[\lambda_c - u'(c_2^*)] = 0, \\ (1-\phi)\,s_1^* + \phi s_2^* = 0, \\ (1-\phi)\,u'(c_1^*)\,[1 - e^1_{y_1}(x_1^*)] = 0, \quad \phi u'(c_2^*)\,[1 - e^2_{y_2}(x_2^*)] = 0, \\ u'(c_i^*)\,e^i_{I_i}(x_i^*) = 0, \end{aligned}\right\} \quad \forall i = 1, 2. \qquad \begin{matrix}(\text{A2 } a\text{–}c) \\ \\ (\text{A2 } d\text{–}f)\end{matrix}$$

APPENDIX B: SECOND BEST

B1. *Riba*

$$\left.\begin{aligned} (1-\phi)\,[\lambda_c - u'(c_1^r)] + \lambda_b = 0, \quad \phi[\lambda_c - u'(c_2^r)] - \lambda_b = 0, \\ (1-\phi)\,s_1^r + \phi s_2^r = 0, \\ -(1-\phi)\,u'(c_1^r)\,e^1_{I_1}(x_1^r) + \lambda_b e^2_{I_1}(x_1^r) = 0, \\ -e^2_{I_2}(x_2^r)\,[\phi u'(c_2^r) + \lambda_b] = 0, \quad u'(c_i^r)\,[1 - e^i_{y_i}(x_i^r)] = 0, \end{aligned}\right\} \quad \forall i = 1, 2. \qquad \begin{matrix}(\text{B1 } a\text{–}c) \\ \\ (\text{B1 } d\text{–}f)\end{matrix}$$

B2. *Mudarabah*

$$\left.\begin{aligned} (1-\phi)\,[\lambda_c - u'(c_1^m)] + \lambda_b = 0, \quad \phi[\lambda_c - u'(c_2^m)] - \lambda_b = 0, \\ (1-\phi)\,s_1^m + \phi s_2^m = 0, \\ (1-\phi)\,u'(c_1^m)\,[1 - e^1_{y_1}(x_1^m)] - \lambda_b[1 - e^2_{y_1}(x_1^m)] = 0, \\ [1 - e^2_{y_2}(x_2^m)][\phi u'(c_2^m) + \lambda_b] = 0, \quad u'(c_i^m)\,e^i_{I_i}(x_i^m) = 0. \end{aligned}\right\} \quad \forall i = 1, 2. \qquad \begin{matrix}(\text{B2 } a\text{–}c) \\ \\ (\text{B2 } d\text{–}f)\end{matrix}$$