PROFIT SHARING INVESTMENT ACCOUNTS-- MEASUREMENT AND CONTROL OF DISPLACED COMMERCIAL RISK (DCR) IN ISLAMIC FINANCE♣

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Abstract

The paper highlights some of the key issues and gaps in the supervision of Islamic Banks, and in particular, addresses the supervisory implications of the role of investment account management. One of the key issues in Islamic banking is how to measure and manage the sharing of returns and risks between shareholders and investment account holders (IAH), so that such risk sharing can become an effective tool of risk management in Islamic finance. A methodology for estimating such risk sharing is developed so that the extent of risks shifted ("displaced") from IAH to shareholders, also referred to as "Displaced Commercial Risk" (DCR), can be measured. Drawing on the recent work on linking the DCR with the "Alpha", which is the share of risk weighted assets funded by IAH that should be included in the denominator of Capital Adequacy formula for Islamic banks(as recommended in the new IFSB Capital Adequacy standard), the paper presents and illustrates an empirical approach for the supervisory assessment of "Alpha".

1. Introduction

The purpose of the paper is to highlight some of the key issues and gaps in the Supervision of Islamic Banks, and in particular, address the supervisory implications of the role of investment account management. One of the key issues in Islamic banking is how to measure and manage the sharing of returns and risks

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between shareholders and investment account holders (IAH), so that such risk sharing can become an effective tool of risk management in Islamic finance. With over 60% of Islamic banks' funding deriving from profit sharing investment accounts (PSIA), based typically on a *Muḍārabah* -- profit sharing and loss bearing-- contract, the way these investment accounts are managed has a major impact on the soundness and economic capital requirements of Islamic banks.[1]. Supervisory assessment of how banks share the credit and market risks with IAH through investment account management has significant implications for Islamic banks' regulatory capital requirements.

Next section presents an overview of issues and challenges in Islamic bank supervision, highlighting the special risk characteristics of Islamic finance.[2] Section 3 develops an approach to estimating the extent of risks shifted ("displaced") from IAH to shareholders referred to as "Displaced Commercial Risk" (DCR). Such a shifting of risks mostly occurs on account of competitive pressures to pay IAH market related returns that might deviate from the underlying asset returns to which the IAH are contractually entitled. It could also arise from pressures—moral suasion—from regulators on Islamic banks to pay market related returns and avoid any loss of principal, in order to prevent possible systemic risks that might arise from customer withdrawals from banks that offer below market returns. Insofar as effective investment account management helps to control the extent of such risk shifting, such management can provide a powerful means to mange the balance sheet risks, and economic capital requirements facing shareholders.[3]

Section 4 provides a step by step practical procedure for the estimation of DCR and "alpha" based on the methodology of the previous section. Section 5 demonstrates, using panel data for a sample of banks covering several countries, how this procedure can be applied to assess displaced Commercial Risk (DCR), and the associated changes in the economic capital requirements for Islamic Banks. Section 6 discusses the supervisory implications of the proposed methodology for the estimation of DCR. Such estimation can facilitate the effective exercise of supervisory discretion on capital adequacy of Islamic banks, as envisaged under the new capital adequacy standards issued by Islamic Financial Services Board (*See IFSB (2005b)*). The exercise of such supervisory discretion can, in turn, provide a

[1] A survey of Annual Reports of a sample of Islamic banks in different countries showed that, about 62% of total assets of those banks were funded, on-average, by profit sharing investment accounts. See Sundararajan (2005). For a discussion of the conditions governing *Muḍārabah* contracts that govern such accounts, see Udovitch (1970).

[2] For an analysis of risk characteristics of Islamic finance, see Sundararajan (2007).

[3] For a discussion of Displaced Commercial Risk in Islamic banking see Islamic Financial Services Board (2005a).

powerful incentive for effective Investment account management, risk management generally, by Islamic banks.

2. Issues and Gaps in Islamic Finance Supervision

A review of supervisory systems and practices and the related financial system infrastructure in several jurisdictions with sizeable presence of IIFS, and the recent experience in implementing Basel II and IFSB standards together highlight a several issues and gaps in the supervision of Islamic Finance.

2.1. Legal Infrastructure

Legal and institutional framework for Islamic finance supervision is not explicit in many jurisdictions, with the same framework applying to both conventional and Islamic finance, and perhaps with some operational adaptations that are often not transparent. In a few jurisdictions, however, a separate regulatory and supervisory focus on Islamic finance is beginning to emerge. In addition, legal infrastructure for finance—particularly laws governing insolvency and creditor rights, contract enforcement, formation of trusts and securitization—are not robust, and not well adapted to support the requirements of Islamic finance. A work program for designing –and building a consensus on--an effective legal framework for Islamic finance needs to be developed, taking into account the cross-sectoral aspects of IIFS and the key role of Islamic asset securitization for risk management and capital market development in Islamic Finance. These observations suggest that:

A comprehensive set of studies on various legal aspects of Islamic finance should be undertaken to develop a medium term work program on designing —and building a consensus on-- an effective legal infrastructure for Islamic finance going forward.

2.2. Observance of Basel Core Principles

Compliance with Basel Core Principles of Effective Banking Supervision is weak in areas such as market risks, liquidity risks, operational risks, validation of supervisory information, and consolidated supervision; these areas of supervision are also the most critical for implementation of Basel II for conventional banks and the equivalent IFSB standards for Islamic Banks.

Furthermore, several additional factors affect the effectiveness of supervision in the case of Islamic finance.

- First, effective liquidity risk management for Islamic finance is constrained by inadequate development of Sharīʿah compatible short-term financial instruments and markets, and non-transparent or separate monetary operations arrangements for IIFS.

- Second, the critical role of transactions in commodities and real assets in Islamic finance is a source of additional operational risks and market risks, and also raises the issue of how best to separate commercial transactions from financial intermediation in order to ensure that the latter remains the main purpose of IIFS. This issue is being addressed in part in the recently issued IFSB Exposure draft on "Special Issues in Capital Adequacy Requirements: Sukuk Securitization and Real Estate Investment"
- Third, the effectiveness of internal systems and controls to ensure Sharīʿah compliance, and complement the broader Sharīʿah governance arrangements, might be another source of operational risk for IIFS. The development of guidelines, and supervisory assessment procedures, for internal review of Sharīʿah compliance (often referred to as "Sharīʿah compliance review") including the review of Information Technology systems, is in the early stages of development in many jurisdictions (The importance of such work, both at country levels and by international bodies, is recognized in IFSB and IRTI (2006)).
- Fourth, transparency and governance infrastructure for Islamic finance is weak in many countries. For example, AAOIFI standards have not been adopted in many countries, and in some countries where they have been adopted the implementation has been weak, due to weak accounting and auditing environment.

These observations suggest that further stock taking of country experiences and development of guidelines, standards, and good practices would be useful in the following areas:

- Review of current practices in investments and transactions in real assets and commodities in Islamic finance and the development of supervisory and prudential norms for investments and transactions in real assets. (This could include investments in real estate, potentially a major source of risk)

- Review of emerging liquidity risk management procedures in IIFS and the current practices in prudential regulation of liquidity risks, and the development of Guidelines on Liquidity risk management for IIFS. This work will complement and will be a natural follow up to the ongoing work on developing Islamic Money markets by the IFSB Task Force on the Subject. While the Task force will help develop a broad policy strategy to build the systemic liquidity infrastructure for Islamic finance, prudential rules and supervisory norms on liquidity risk management

need further development in order to reflect the specific aspects of liquidity infrastructure for IIFS.

- While broad standards exist (from AAOIFI) for internal and external Sharīʿah review and audits, further guidelines on Sharīʿah compliance review both as part of internal control guidelines, and as part of supervisory review, should be developed to minimize operational and reputation risks of Sharīʿah non-compliance.
- Development of guidelines on the minimum requirements for IIFS IT systems, including Sharīʿah compliance issues in IT systems, could help contain operational risks.
- Development of supervisory guidance on risk measurements and disclosure, to complement the existing accounting standards for IIFS, supported by periodic monitoring of disclosure practices of IIFS. This work should go hand in hand with a medium term strategy to strengthen accounting and audit standards and the accounting and auditing environment.

2.3. Implementation of Basel II and IFSB Standards

Basel II implementation for conventional banks, and in some countries for both conventional and Islamic banks have been announced to begin in 2007 and 2008, but practical issues, such as weak risk management systems, and insufficient data for risk measurements remain in many countries. In addition, plans for implementation of new IFSB standards on risk management and Capital adequacy has not been announced in most countries, reflecting in part the fact that these standards were issued only recently, and there are many practical issues in the application of IFSB standards that remain to be tackled. More specifically, the following issues require particular attention to facilitate implementation of IFSB standards that are, in effect, adaptations of Basel II for Islamic banks.

- Develop Guidelines for effective measurement and disclosure of "Displaced Commercial risk" (DCR), and for the exercise of Supervisory discretion on the extent of such risk that should be considered in the "supervisory discretion formula" in the IFSB Capital Adequacy Standard (CAS). In most countries the systems for measurement of DCR is weak, and hence the elements to be considered in the exercise of supervisory discretion on the share "alpha" of risk weighted assets funded by PSIA that should be included in the denominator of the IFSB capital adequacy formula, remain undeveloped. A methodology for measuring DCR and estimating "Alpha" has been

developed, and this is presented and illustrated in Sections 3-5 of this paper. This should provide further inputs into developing supervisory guidance "alpha" and on the use of supervisory discretion formula.

- Further guidance on rate of return calculations and on the use of specially constituted reserves (Profit Equalization Reserves (PER), and Investment risk reserves (IRR)) to manage the risk return mix of PSIA, and the related disclosures (as envisaged in the TMD standard developed under the current ADB project). In particular prudential limits on the use of PER and IRR would be important to prevent banks from unduly reducing the returns paid out to IAH in order to build such reserves and avoid incurring DCR. It would seem important to ensure that such guidance will also complement the supervisory assessments of DCR, and could draw on good practices in some countries, and complement the existing AAOIFI accounting and reporting standards. For a discussion of issues in assessing the appropriate levels of PER and IRR, see Sundararajan (2006).

- Development of guidelines on how to recognize External credit Assessment Institutions (ECAI) suitable for Islamic Finance. The adoption of standardized approach to measurement of credit risk requires ECAIs, which have the capacity to incorporate specific features of Islamic finance instruments, and IIFS, in their rating decisions, and develop a dedicated rating methodology for Islamic finance Instruments as an asset class(with sub classes).

- Development of Guidance on the measurement of "non performing financing" for different types of Islamic finance Instruments, based on country practices, and further analysis of "definition Of default" in the context of different Islamic finance contracts. The definition of default needs standardization and harmonization in order to measure effectively both probability of default and to arrive at adequate decisions on rating and risk weights. Also the extent to which loss given default would be affected by Sharīʿah considerations of equitable treatment of creditors is an unexplored issue.

- Development of guidance on good practices in designing Credit Registries and Credit Information Systems that include Islamic finance contracts. This could prove to be a valuable tool for effective risk measurement in Islamic banks, based on pooled data, and data sharing.

2.4. Risk Mitigants in Islamic Finance

The development of product innovations and risk management procedures to mitigate risks in Islamic Finance has been fairly limited in scope so far. Various forms of Sukuks that can be used in asset-liability management are still nascent, and face a range of legal impediments still. Work on designing Sharīʿah compliant short-term instruments and repurchase transactions in longer term Sukuks is still in early stages. Several Sharīʿah compliant derivative products for hedging are gradually emerging, but these are still proprietary products with limited regulatory and market acceptance, and can benefit from greater standardization of contracts. In addition, effective investment account management as a means to manage the balance sheet risks through a control of DCR can be a powerful risk mitigant in Islamic finance, an option not available to conventional banks. The development of techniques to manage DCR, and providing supervisory incentives for managing DCR are still in early stages, and are discussed more fully in section 4, and 5 of this paper

2.5. Cross-Border Issues

Cross border issues specific to Islamic finance supervision arise in two areas in particular:

1). Sharīʿah compatibility of Islamic instruments across borders;

2). Consolidated supervision of operations that combine Sharīʿah compliant (in one jurisdiction) and non- Sharīʿah compliant (in another jurisdiction) elements. Additional guidance on these issues will be helpful.

3). Guidance on home-host relationships in the international operations of IIFS (particularly on cross border cooperation on Sharīʿah rules and principle, and in conducting consolidated supervision).

2.6. Design of safety Nets

Design of safety nets in Islamic finance, in particular deposit insurance, insolvency regime, and lender of last resort, should ideally take into account the role of PSIA in risk sharing, and other Sharīʿah considerations that affect probability of default as well as loss given default. In so far as the distribution of losses among the counter parties to a transaction unique to the type of Islamic Finance contracts, this needs to be taken into account in the design of safety nets and in the assignment of ratings and risk weights for Islamic finance Products. These issues require further study and discussions, before guidance documents can be prepared.

- A study of country practices in deposit insurance and the treatment of

PSIA in deposit insurance.

- A comparative study of Insolvency regimes and creditor rights from the perspective of Islamic finance, including the seniority and rights of investment account holders. (This could be part of the study proposed under the Legal infrastructure in section 1 above.)

3. Investment Account Management and Estimation of DCR

A fundamental issue facing Institutions Offering Islamic Financial Services (IIFS) is how to measure and manage the sharing of returns and risks between shareholders and investment account holders (IAH), taking into account the risk-return preferences of each, and bearing in mind that IAH will in general be more risk-averse than shareholders. In principle, under the *Muḍārabah* contract that typically governs the Profit Sharing Investment Accounts (PSIA) held by IAH, all losses on investments financed by their funds are to be borne by IAH, while the profits on such investments are shared between the IAH and the IIFS as manager of the investments (*Muḍārib*) in the proportions specified in the contract. In practice, however, the managements of IIFS may engage in a range of practices that cushion the returns paid to IAH, thus protecting the cash flows from IAH funds against variations in the IIFS's income from assets financed by those funds, in order to pay market-related compensation to IAH.

3.1. Investment Account Management

Such investment account management practices, designed to provide an adequate level of compensation for the IAH while protecting them from volatility in their returns, may be a response either to regulatory pressures on IIFS to avoid withdrawals by IAH that could result in systemic risk, or to competitive pressures on IIFS to maintain their market share of IIFS funds and to manage their liquidity. For example, an IIFS may maintain the profit payout to its IAH at market related levels, even though asset returns are higher, by setting aside amounts to a Profit Equalization Reserve (PER) from profits before the allocation of those profits between IAH and the IIFS and/or to an Investment Risk Reserve (IRR) from the profits available for distribution to the IAH after allocating the IIFS's share of profits as *Muḍārib*. The part of the accumulated PER that constitutes equity of IAH and shareholders can then be drawn down to smooth the payouts to IAH and shareholders, when investment returns decline; the accumulated IRR, which belongs entirely to IAH, can be used to cover any losses (negative asset returns) attributable to IAH that might arise from time to time. In addition, when asset returns are low, and PER is insufficient, IIFS management may transfer some portion of their income or reserves to IAH, thereby offering returns to IAH that are

close to market levels despite insufficient asset returns.

Such transfers of resources from IIFS owners to IAH could be achieved by reducing the *Muḍārib's* share below the contractually agreed percentage, and/or by otherwise allocating a lower profit share to shareholders temporarily in order to benefit the IAH, thereby cushioning the impact on IAH of low asset returns. The combination of these policies -- setting aside and drawing down reserves that serve as equity of IAH, accepting cuts in the *Mudarib's* share, and transferring current income or other shareholder funds to IAH if needed and permissible -- can alter the time profile of IIFS shareholders' profits, and hence the magnitude of risks (unexpected losses) to which they are exposed compared to the situation where all losses on IAH investments are fully borne by the IAH. Issues in measuring this "displacement" of risk from IAH to IIFS shareholders -- so-called "Displaced Commercial Risk" (DCR) -- are among the core concerns of this section of the paper.

Thus, in practice, there is considerable ambiguity in the nature and characteristics of PSIA in Islamic Banks. The nature of PSIA could vary among banks and jurisdictions, from being deposit-like products (that carry no risk of loss of principal) in some, to being investment-like products (that bear the risk of losses in the underlying investments) in others. Depending upon the extent of investment risks actually borne by the PSIA, these instruments could, in principle, be positioned anywhere in the continuum from being pure deposits (in the conventional sense) to pure investments. The resulting challenge for IIFS and their regulators is to assess where in the continuum the PSIA in a specific bank in a specific jurisdiction lie, and what this implies for the level of risks for shareholders and hence for the level of regulatory and economic capital requirements for that bank.

The recently issued Islamic Financial Services Board (IFSB) Capital Adequacy Standard recommends that supervisors should assess the extent of risks borne by PSIA, based on management decisions on the payout to IAH, and should reflect these assessments in the computation of capital adequacy. This is referred to as "supervisory discretion formula". More specifically, the IFSB supervisory discretion formula for the capital adequacy ratio (CAR) specifies that a fraction "alpha" of the assets funded by PSIA may be included in the denominator of the CAR, where the permissible value for "alpha" is subject to supervisory discretion. The supervisory assessment of how an IIFS manages the risk-return profile of PSIA would determine "alpha", with "alpha near zero" reflecting a pure investment-like product, and "alpha close to one" capturing a pure deposit-like product. Next sub section will provide a methodology to estimate DCR and "alpha" (which is a function of DCR), so that there is a clear rationale and a

quantitative basis for the exercise of supervisory discretion on "alpha". Last section of the paper will spell out the consequent supervisory implications.

A key issue for Islamic banks is how to manage the risk sharing properties of PSIA -- both restricted and unrestricted -- in order to mitigate partly the risks to shareholders that would arise in case the IIFS has to protect the IAH against return volatility,, thereby exposing shareholders to some displaced commercial risk (DCR). Thus, in addition to collateral, guarantees, and other traditional risk-mitigants, the management of risk-return profiles, particularly of unrestricted investment account holders, could be used as a key tool of risk management. Appropriate policies toward PER (and possibly IRR) coupled with a systematic approach to the transfer of resources to IAH (through adjustments in the *Muḍārib* share or other means to manage incomes to bank owners) can help to match the returns to IAH with the extent of risks assumed by the IAH. Under current practices, IIFS seek to provide a stable return to investment account holders *through suitable adjustments in the use of PER and in transfers from IIFS via reductions in the Muḍārib share when appropriate, and to prevent any loss of IAH capital through the use of IRR*. Such adjustments in reserves and transfers should, in principle, allow for some mitigation of risks to IIFS shareholders (i.e. to the bank's own capital) through investment account management. In practice, however, many banks with sharply divergent risk profiles and returns on assets seem to be offering almost identical returns to investment account holders, which are broadly in line with the general rate of return on deposits in conventional banks. That is, in practice, there seems to be a significant absorption of risks by IIFS, i.e. by their own bank capital.

These relationships have been analyzed empirically in Sundararajan (2005). The evidence reveals a significant amount of return smoothing, and a significant absorption of risks by bank capital (and thus, only a limited sharing of risks with investment accounts). This finding raises a broader issue of how best to measure empirically the extent of risk sharing between unrestricted investment accounts and bank capital. A framework for measuring such risk sharing, based on measures of volatility of *Muḍārabah* profits under alternative scenarios, is presented in Sundararajan (2007b). The section below builds on this measurement framework.

The definition and measurement of *Muḍārabah* profits are first discussed; and then a methodology is presented for estimating DCR based on a value-at-risk (VAR) methodology.

3.2 Methodology for the Estimation of DCR

For measuring risks and risk sharing based on these definitions, *Muḍārabah* Profit (RM) -- that is, the *distributable* profit after the appropriation to PER -- can

be written as:

$$RM = A\,(R_A\text{-}S_p) - AR_P - K\,R_K = A\,(R_A\text{-}S_p - R_P) - K\,R_K$$

Where A = the total assets of the (commingled) *Muḍārabah* fund

R_A = rate of return on those assets before provisions,

R_p = appropriation to PER (as a % assets),

S_p = Provisions as a % of assets,

K = shareholders' funds

A = K + DI. That is, total assets (A) equal the sum of shareholders' funds (K), and PSIA funds (DI).

The rate of return on shareholders' capital, R_K, may thus be written as follows:

$$R_K = (R_A - S_P) - D_K \qquad (1)$$

Where D_K is any transfer of profits by the IIFS from its shareholders to its IAH[4], expressed as a *percentage* of shareholders' capital. Thus, when D_K is zero, the shareholders receive a share of the total asset return proportionate to their contribution to the commingled pool. If $D_K > 0$, shareholders have transferred some resources to IAH in order to provide a targeted return to IAH (see below for further discussion), in the process reducing shareholders' returns.

The Rate of Return for Investment Account holders (R_I) can then be calculated by taking their share β of the *Muḍārabah* profit on their investment DI, and subtracting any appropriation to the IRR (R_{IR}, expressed as a percentage of IAH deposits).

$$R_I = \beta RM/DI - R_{IR} = \beta\,[A\,(R_A\text{-}S_p\text{-}R_P) - K\,R_K] / DI - R_{IR} \qquad (2)$$

In practice, there are two ways to categorize how R_K is determined. One approach, practiced in many jurisdictions, (for example, see the Rate of Return Framework provided by Bank Negara Malaysia), is to treat R_K as an endogenous decision variable that is determined by management. For example, the Bank management may choose $D_K > 0$ -- and hence the overall return to shareholder funds -- such that the IAH receive a targeted return that is commensurate with their risk bearing capacity (or consistent with their risk appetite; see below for further

[4] D_k is therefore a *donation* (expressed as a rate) from the shareholders to the IAH out of the shareholders' share of profits on commingled funds, as distinct from a *reduction of the Muḍārib share* (1-β) to a level below the percentage specified in the *Muḍārabah* contract. Although the effects of the donation and the reduction may be the same, the reduction may be made when there are no commingled funds.

clarification of this idea). An alternative approach is to assume that the return to a component of capital in the commingled pool is proportional to its contribution to the pool, and hence the investment return to capital before deducting the appropriation to PER is the same as the return (R_A-S_P) obtained from the assets financed by the commingled funds. In this case, $D_K = 0$. The variable D_K thus serves to indicate (in terms of a rate) a "donation" from shareholders that is determined from time to time to ensure that the risk-return expectations of IAH are met. [Since D_K is deducted from the profit rate ($R_A - S_P$) before distribution to IAH, only a share β of D_K will be attributed to IAH.]

First, assuming R_K is endogenous, the return to equity can be written as the sum of investment income earned by shareholders from their share of the commingled funds (KR_K), income earned as *Muḍārib* ((1-β)RM, where (1-β) is the *Muḍārib* share), and the share of PER accruing to the shareholders((1-β).A.R_P) that is added back, all expressed as a proportion of total capital; other sources of shareholder income, for example from other banking services and other non-PSIA assets, are ignored for simplicity. The return on shareholders' equity, R_E, as defined above, is shown in equation (3) below.

$$R_E = (1-\beta)\ \{RM/K + A\ R_P/K\} + \ R_K \qquad (3)$$

Combining equations (1), (2) and (3), and simplifying the expressions, yields:

$$R_I = \beta\ (R_A-S_p) - \beta\ A/DI.\ R_P + K/DI.\beta.D_K - R_{IR} \qquad (4)$$

$$R_E = (1 + \overline{(1 - \beta)\ DI / K)).(R_A - S_P}\ ). - \beta\ D_K \qquad (5)$$

Investment risk facing IAH and shareholders can be computed based on the variance of R_I and R_E, respectively. For example,

$$VAR\ (R_E) = \{1 + (1-\beta)\ DI/K\}^2\ VAR\ (R_A - S_P)$$

$$+ \beta^2\ VAR\ (D_K) - 2\ \beta\ \{1+ (1-\beta)\ DI/K\}\ COV\ ((R_A-S_P), D_K) \qquad (6)$$

Similarly, the investment risk to IAH can be computed by calculating the variance of R_I and its components based on equation (4).

Thus, the true risk facing shareholders -- which is the main determinant of the CAR -- is given by equation (6). This risk to shareholders is determined primarily by three components:

1. the variability of investment returns;
2. the variability of the income transfers from shareholders to IAH; and
3. the covariance between investment returns and the income transfers.

The larger the asset return, the less is the need for income transfer from shareholders, and hence this covariance is expected to be negative. The larger this covariance, the larger is the risk to shareholders and hence the larger is the capital requirement. In addition, an IIFS may adjust the *Muḍārib's* share β as an additional mechanism for income smoothing. Under the *Muḍārabah* contract, the investment losses on PSIA funds are to be borne by IAH, and hence β is zero in case of losses (that is, $\beta = 0$, whenever $(R_A\text{-}S_P) < 0$). Similarly, shareholders cannot make up for negative returns by transfers from shareholders' funds (that is, $D_K = 0$, if $(R_A – S_P) < 0$). In view of these constraints on the behavior of D_K and β, *it is assumed that a sufficient amount of accumulated PER and IRR is available to achieve the targeted return to IAH even when asset returns are negative.*

A key implication of equation (6) is that the risks facing shareholders -- and hence the capital requirements -- are independent of PER and IRR, if $D_K = 0$, and β is fixed. That is, if an IIFS can manage the value and returns on Investment accounts entirely though adjustments in PER and IRR, without recourse to any income transfer from shareholders, then there is no displaced commercial risk that requires additional capital requirements, and hence "alpha" is zero. This observation raises the following questions. What is the desired or adequate level of PER/IRR , the use of which will ensure that there is no displaced commercial risk (DCR =0, or "alpha" in the IFSB supervisory discretion formula is zero) and hence PSIA can be treated as pure investment product requiring no additional capital requirements on Islamic banks (other than for operational risk)? Alternatively, given a specific policy relating to DCR, what should be the desired level of PER/IRR that will help support that policy? In the extreme, if DCR is at its maximum possible value, with alpha equal to one, then PSIA is similar to deposits, and then what should be the right level of PER/IRR that would ensure that IAH returns behave like bank deposit returns. These issues are addressed in Sundararajan (2007a).

In the rest of the paper, D_K will be treated as an endogenous variable determined as a function of developments in market rates of return, investment returns, the availability of PER and IRR, etc., in order to achieve a desired rate of return for IAH. For simplicity, it is assumed that R_I is determined as a weighted average of a market rate of return benchmark (R_m) and the actual investment return ($R_A\text{-}S_P$), as shown in equation (7) below.

$$R_I = w\, R_m + (1\text{-}w)\,(R_A\text{-}S_P) \qquad (7)$$

If w= 0, then IAH payouts are strictly based on investment returns, and hence $\alpha = 0$; this corresponds to PSIA being treated as pure investments. If $w = 1$, then IAH payouts are strictly determined based on the market rate of return, and hence $\alpha = 1$;

this corresponds to PSIA being treated as pure deposits as in conventional banks. If $0 < w < 1$, then the appropriate value of D_K that yields the desired return to IAH as specified in equation (7) can be derived by substituting equation (7) into equation (4), and then extracting an expression for D_K as shown in equation (8) below:

$$D_K = A/K.\ R_P + 1/\beta.\ DI/K.\ w.\ R_{m+}\ DI/K.\ (1\text{-}w\text{-}\beta)/\beta.\ (R_A - S_P) + 1/\beta\ .R_{IR}\ .DI/K \quad (8)$$

Thus, the size of transfer from shareholders required to achieve a desired return to IAH depends upon the level of PER and IRR used, the market rate of return, and the investment rate of return. On substituting equation (8) into equation (5), a new expression for return to equity can be derived, as shown in equation (9) below.

$$R_E = \{1 + (DI/K).\ w\}\ (R_A - S_P) \text{ -- } \beta.\ (A/K).\ R_P - (DI/K).\ w.\ R_m - (DI/K).\ R_{IR} \quad (9)$$

Alternative expressions for R_E can be derived corresponding to alternative scenarios concerning D_K, w, R_P, R_{IR}, and β. The variability of R_E corresponding to each of these scenarios provides the basis for estimating DCR and "alpha" as further described below.

For example, If $D_K = 0$, β is fixed, and all income smoothing and loss mitigation are done through PER and IRR, then the expression for R_E and hence the variance of R_E (see equation (5)) is independent of "w", so that the DCR is zero, and no additional capital is required (other than for operational risk) to cover DCR in respect of assets funded by PSIA.

If $D_K = 0$, but β is endogenous, then DCR needs to be recognized in the computation of capital requirements.

If $D_K \neq 0$, then R_K is an endogenously determined decision variable that results in DCR, which can be managed by choosing the level of D_K , R_P, R_{IR}, and if necessary β.

The risk measurements that form the basis for estimating DCR and capital requirements are further explained below.

The sharing of risk -- risk defined as unexpected losses (UL), measured by a profit at risk measure -- between investment account holders and shareholders can be calculated as follows: From a monthly time series of *Muḍārabah* profits (as a return on assets), its variance σ^2_p (and the standard deviation σ_p) can be calculated, and assuming normality, Profit at Risk can be measured as

$$PAR = Z_\theta\ \sigma_p\ \sqrt{T} \quad (10)$$

Where: Z_θ = the constant that gives the appropriate one-tailed confidence interval with a probability of $1\text{-}\theta$ for the standard normal distribution (e.g. $Z_{.01} = 2.33$ for a 99% confidence interval).

T = holding period or maturity of investment account as a fraction of a month.

Such aggregate PAR for the jointly funded investments by the IIFS provides a first cut estimate of risks in unrestricted *Muḍārabah* accounts and provides the basis for estimating the size of unexpected losses under various scenarios as explained further below.

First, at a given probability level the unexpected losses UL_0 on the rate of return to shareholders' equity capital (R_{E0}) *when risks are borne fully by IAH* can be calculated by assigning PER and IRR to zero, and setting R_I equal to the unsmoothed investment rate of return, thereby assuming that the IIFS's shareholders do not sacrifice any return in order to cushion the returns to IAH in bad states of the world. In this scenario, the parameter α in the IFSB's capital adequacy formula (IFSB 2005b) is equal to 0.

Second, at the same probability level, the level of unexpected losses UL_1 on the rate of return to shareholders' equity capital (R_{E1}) can be calculated assuming that the rate of return on investment accounts R_I is determined *based on market returns independently of bank income from investments*, as in conventional banks. In this scenario, various decision variables (*muḍārib* share, use of PER, and any transfer of resources from shareholders to IAH, etc.) adjust automatically to ensure that the rate of return to IAH is fully smoothed to equal market rates of return on deposits. In this scenario, $\alpha = 1$.

Third, again at the same probability level, unexpected losses UL_2 on the rate of return to equity capital (R_{E2}) can be computed assuming that R_I is determined based on *a weighted average of market rates of return and developments in bank's profits and losses*, in line with historical experience that reflects a set of policies governing PER, IRR and profit transfers from shareholders to IAH. In practice, both UL_1 and UL_2 can be computed based on historical data that reflect actual policies, and actual return experience of investment accounts and general market rates of return. In this scenario, α has a value between 0 and 1 which can be estimated as follows.

Based on the above, risks left with Investment Account Holders (UL_D) can be measured as

$$UL_D = UL_1 - UL_2 \qquad (11)$$

Risks transferred to shareholders compared to the situation of risks fully borne by IAH can be measured by

$$UL_S = UL_2 - UL_0 \qquad (12)$$

UL_S thus provides a measure of Displaced Commercial Risk (DCR). These measures of risk transfer (UL_D, and UL_S) can form the basis for defining the risk

weight adjustment, i.e. the parameter "α" in the IFSB capital adequacy formula, for the assets financed by investment accounts.

More specifically, the proportion of risk weighted assets (RWA) funded by IAH (net of PER and IRR of IAH) that should be added to the RWA funded by sources other than IAH, can be calculated as

$$\alpha = (UL_2 - UL_0)/ (UL_1 - UL_0) = UL_S / (UL_D + UL_S), \quad (13)$$

where UL_S is the measure of risks (exposures to unexpected losses) transferred to shareholders, i.e. the displaced commercial risk (DCR), computed as UL_2-UL_0, and UL_D is a measure of risks left with investment account holders, computed as UL_1-UL_2.The maximum possible value of DCR is given by $UL_1 - UL_0$, which is the difference between the unexpected losses for shareholders when the PSIA are treated like deposits (UL_1) and the unexpected losses for shareholders when they are treated as pure investments bearing all losses (UL_0).The "α" can be interpreted as the ratio of the actual DCR to its maximum value.

The rationale for equation (13) can be further elucidated as follows. When α = 1, PSIA are akin to conventional deposits, and the capital requirement (UL_1) in this case is based on all assets in the IIFS's balance sheet net of RWA funded by the reserves PER and IRR set aside for IAH (i.e., RWA_T, less R_{IAH}), as shown in equation (14). Risk weighted assets funded by the reserves PER and IRR, denoted by R_{IAH}, are deducted, because these reserves have the specific function of absorbing volatility and UL on the returns from the investments of the IAH and hence the corresponding assets do not require capital (other than for operational risk) from the shareholders of the IIFS. In other words, the Risk Weighted Assets funded by PSIA (RWA_{IAH}), minus the risk weighted assets funded by the reserves (PER and IRR) held for IAH (R_{IAH}), are added to the RWA corresponding to all non-PSIA assets, ($RWA_T - RWA_{IAH}$), in the IIFS's balance sheet.

$$UL_1 = CAR\ (RWA_T - R_{IAH}), \quad (14)$$

Where CAR is the appropriate capital adequacy ratio, such as 8%

When α = 0, RWA funded by PSIA, denoted by RWA_{IAH}, are excluded altogether from total RWA_T. Therefore, the capital requirement (excluding that for operational risk), UL_0 will be based on all non-PSIA assets, ($RWA_T - RWA_{IAH}$), as shown in equation (15).

$$UL_0 = CAR\ (RWA_T - RWA_{IAH}) \quad (15)$$

When $0 < \alpha < 1$, only the proportion α of the RWA funded by PSIA, namely RWA_{IAH}, but *net* of R_{IAH}, is added to the RWA funded by non-PSIA funds. Therefore, capital requirements UL_2 can be written as:

$$UL_2 = CAR \{RWA_T - RWA_{IAH}) + \alpha (RWA_{IAH} - R_{IAH})\} \quad (16)$$

Substituting from equations (14) and (15) into equation (16), we get,

$$UL_2 = UL_0 + \alpha (UL_1 - UL_0)$$

The above expression can be rewritten to yield the formula for α (as a function of the unexpected losses under alternative scenarios) shown in equation (13) above. The computation of Displaced Commercial Risk, and hence of α, and its relationship to investment account management, as reflected in the value of w (the relative weight attached to market return by IIFS in its decisions on payout to IAH) are further illustrated in Sections 4 and 5.

Thus, computation of unexpected losses to IIFS that require shareholder capital under alternative scenarios to support income smoothing provides the basis for estimating the adjustment factor α, which is subject to supervisory discretion under the new IFSB capital adequacy formula. When α=1, there is full income smoothing, and capital requirements will be governed by UL_1. When α=0, there is full risk absorption by IAH, with no displaced commercial risk, and the capital requirement is governed by UL_0. The adjustment factor α when there is partial income smoothing, can be computed based on equation (9), and a simplified expression for α can be derived based on the standard deviations of key return variables.

The computation of UL0, UL1, and UL2, can be illustrated for the simple case where IRR and PER are zero, $D_K = 0$, and only $\beta \geq 0$ varies in response to market and investment returns in order to achieve the desired payout to IAH. By combining equations (4) and (7), an expression for β can be derived as shown in equation (17) below:

$$1 - \beta = \{R_A - S_P - A/DI.R_{IR} - (wR_m + (1-w) (R_A - S_P)\}/\{R_A - S_P - A/DI.R_P\} \quad (17)$$

Assuming $R_{IR} = 0$ and $R_P = 0$, the expressions for R_E under alternative scenarios are as follows:

In the case of pure investment, where w= 0, the return on equity R_{E0} is given by:

$R_{E0} = R_A - S_P$. The importance of such work, both at country levels and by international bodies, is recognized in the "10-year Framework for the development of Islamic Financial Services Industry "(IFSB and IRTI (2006) (18)

In the case of pure deposit, where w = 1, the return on equity R_{E0} is given by:

$$R_{E1} = (R_A - S_P) - DI/K. (R_A - S_P - . R_m) \quad (19)$$

In the intermediate case, where0 < w <1, the return on equity R_{E2} is given by

$$R_{E2} = (R_A - S_P) + DI/K.\ w.\ (R_A - S_P - R_m) \quad (20)$$

Similarly, If $D_K \neq 0$, β is fixed, and $R_{IR} = 0$, then return to equity under alternative assumptions regarding w, can be expressed, based on equation (9), as follows.

$$R_{E1} = (A/K).\ (R_A - S_P - \beta R_P) - (DI/K).R_m \text{ , where w=1 (the case of pure deposit)} \quad (21)$$

$$R_{E0} = R_A - S_P - \beta.\ (A/K).R_P, \text{ where w=0, (the case of pure investment)} \quad (22)$$

$$R_{E2} = \{1 + (DI/K).w\}\ (R_A - S_P) - \beta\ (A/K)\ R_P - (DI/K).\ w.\ R_m \text{ where } 0<w<1 \quad (23)$$

Equation (23) represents the intermediate case, where the payout to IAH is a weighted average of market return and investment return.

The standard deviation of the above variables R_{E1}, R_{E0}, and R_{E2}, denoted by σ_1, σ_0, and σ_2, respectively , can then be used to compute the unexpected losses UL_1, Ul_2, and UL_0, respectively; for example $UL_1 = Z_\theta \sigma_1 \sqrt{T}$ .The simplified expressions for the rate of return to shareholders under alternative scenarios, shown in equations (18), (19), and (20), or equations (21), (22), and (23), can provide a first cut estimate of alpha based on equation (13). However, the model based on variations in the *Muḍārib* share alone as the tool of investment account management may be unrealistic. Modeling more realistic scenarios of investment account management which allows both D_K and β to be variable, and takes into account the restrictions on the value of β and D_K arising from the nature of *Muḍārabah* contract, would require simulation methods based on parameters derived from historical data on returns, reserves, and *Muḍārib* share.

Such effective investment account management would help to determine a level of α that is consistent with the risk-return preferences of IAH. Such active management would require disclosure of overall risks facing IAH (and shareholders), and offering IAH a range of products with different risk-return combinations. This in turn would require more active management of assets, with greater reliance on securitizing asset side positions originated by banks, and trading of these securitized assets in the market to match the risk and maturity profile of assets with risk and maturity profile of various funding sources. Such on-balance-sheet risk management based on securitization would seem a more feasible alternative for Islamic Banks than the use of derivatives and other more standard off-balance-sheet risk management tools that are available for conventional banks. This is because Sharīʿah compatible substitutes for futures, options, and swap markets are not yet widespread, and could take time to develop fully. Thus new

product innovations, based on innovative uses of Islamic asset securitizations[5], would facilitate development of products with specific risk return combinations for restricted investment accounts and better control of the risks in unrestricted investment accounts.

4. Illustration of a Procedure to Estimate DCR and "ALPHA"

The procedure for estimating DCR and "alpha" can be illustrated as follows, assuming for simplicity that β is fixed, and IRR is zero.

1. Estimate "w" –the average weight attached to market return by Islamic bank management in their decision on payout to IAH--based on historical data on asset return, market return, and actual return paid out to IAH.
2. Compute UL0 by applying PAR measure (eq.10) to the time series on R_{E0} shown in eq. 22.
3. Compute UL1 by applying PAR measure (eq.10) to the time series on R_{E1} shown in eq. 21.
4. Compute UL2 by applying PAR measure to the time series on R_{E2}, shown in equation 23; This time series can be computed based on the estimated value of "w" and the actual time series on asset returns ($R_A - S_P$), PER (R_P), Market return (R_M), and balance sheet ratios. If IRR is non zero, then the equation 24 shown below could be used to compute a time series of returns corresponding to each possible value of "w".
5. $RE2 = \{1+ (DI/K).w\} (R_A - S_P) - \beta (A/K) R_P - (DI/K). w. R m-- DI/K. R_{IR}$ 24)
6. Estimate DCR and "alpha" using equations 12 and 13 respectively.

5. Empirical Illustration

Based on balance sheet information for 14 banks in 12 countries for the years 2002-2004, panel data was gathered for $RA_1 = (R_A - S_P)$, R_I and R_M. A regression equation of $(R_I - RA_1)$ on $(R_M - RA_1)$ was estimated using Ordinary Least Squares, in order to estimate the implicit weight "w" attached to market rates by bank management (as outlined in step 1, section 4, above).

$(R_I - RA_1) = 1.1232 + 0.6427 (R_M - RA_1)$

(1.18) (5.12)

ADJ .R^2 = 0.47, SEE = 3.28

The estimated weight of 0.64 for this sample of banks illustrates that the

[5] However, there are currently a number of impediments to full asset securitization in Islamic finance, notably legal difficulties in many emerging markets to providing the security holders with effective recourse to the underlying assets (see DeLorenzo and McMillen, 2007).

market rates receive a major weight in the decisions on rates to be paid to IAH.

Also, for various values of w ranging from zero to one (w =0, w = 0.1, w=0.2, w=0.3, w=0.4, ……etc. to w = 0.9, and w= 1.0), RE2 was estimated using equation 24. For each w, the corresponding unexpected loss, DCR, and "Alpha" were computed using the methodology outlined in steps 2 to 6 above. The estimated value of unexpected losses—a multiple of the standard deviation of return to equity under alternative values for "w"-- rises from about 2% of equity when w=0, to over 115% of equity when w=1. This increase represents the maximum possible value of DCR.. The DCR increases very sharply relative to "w", initially, and the increase in DCR becomes proportional to increases in w subsequently. The ratio of DCR for a given value of "w" to the maximum possible value of DCR yields the "alpha" corresponding to each "w".. The empirical relationship between w and α for this sample of banks is illustrated in the table below.

Estimates of "Alpha" for Different Investment Account Strategies

w:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
α:	0.086	0.187	0.289	0.391	0.477	0.594	0.695	0.797	0.905

The above computation suggests that for practical purposes, an estimate of "w" could provide a good approximation to the appropriate "alpha" needed for capital adequacy calculations .The relationship between "w" and 'alpha" will, however, depend upon the variance and covariance of the key return variables , and hence this relationship is likely to vary according to country and bank specific circumstances.

6. Supervisory Implications

The IFSB capital adequacy standard allows a share ("alpha") of risk weighted assets funded by PSIA net of PER/IRR to be included in the denominator, with the share "alpha" subject to supervisory direction and approval. If supervisory authorities act as though "alpha" is equal to zero when in fact it should be set close to one, Islamic banks would be significantly undercapitalized, with consequent threats to financial stability. Conversely, supervisors acting as though alpha is close to one when in fact it should be set much lower, will result in Islamic banks being required to carry excess amounts of capital, which will impair their ability to compete. Thus accurate supervisory assessments of alpha are critical to fostering stability without undermining the competitive position of IIFS, and to providing

adequate incentives for IIFS to manage the DCR in respect of their PSIA.

This paper ,therefore, sets out a methodology whereby an appropriate value for alpha can be approximated statistically, using a set of relevant data. Using data on profits, asset returns, market returns, reserves set aside, actual payout rate to IAH, and *muḍārib's* share, the methodology calls for the computation of profit-at-risk measures under alternative policies on investment account management. These measures serve to compute DCR, and "alpha" is simply the ratio of actual DCR to maximum possible value of DCR. In order for the necessary data to be available, Islamic banks need to make the necessary disclosures, at least to the supervisor if not to the public.

Supervisory authorities would need to design appropriate model validation approaches to assess the value of DCR assumed by banks and hence the value for "alpha". Such supervisory discretion on "alpha" would provide a powerful stimulus to Islamic banks to strengthen their investment account management as the core risk mitigant in Islamic finance.

Public disclosure of relevant data would, however, have the substantial added advantage that information intermediaries such as rating agencies and research analysts would have ready access to it, thus contributing to market discipline. Moreover retail oriented disclosures of relevant data can help manage the risk-return expectations of IAH. With these purposes in mind, IFSB has issued recommendations for disclosure of data to assess DCR and other IAH related disclosures. ((See IFSB (2007). Islamic banks should, of course, produce the necessary data for their own purposes as part of their risk management procedures with respect to DCR and capital adequacy.

In addition, as part of risk management, Islamic banks need to have an idea of the appropriate levels of PER and IRR, given their exposure to DCR. For the reasons indicated above, the purpose of setting aside these reserves is not simply to improve the CAR as calculated formulaically. Rather, the appropriate value of alpha needs to be determined taking account of the incidence of DCR and the actual mitigating effects of these reserves. More specifically, prudential limits on the levels of PER and IRR would be useful to avoid excessive build up of such reserves at the expense of adequate remuneration of IAH in line with the realized asset returns. At the same time the level of PER and IRR should be adequate to help manage the DCR at the desired level. Supervisory guidelines on the adequate levels, and limits, of PER and IRR could be provided as a complement to the accounting guidelines on the definition of *Muḍārabah* profits that would be available for distribution to IAH. The recognition and treatment of PER and IRR in capital adequacy calculations also vary among jurisdictions, and these also need to be standardized. Such policies would assist in bringing about level playing field

and strengthen disclosure and competition among Islamic banks.

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