

Displacement Commercial Risk (DCR) and the Level of Risk Sharing between Unrestricted Investment Account Holders (URIAHs) and Shareholders in an Islamic Bank

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Abstract

Islamic banks are exposed to a unique risk such as Displaced Commercial Risk (DCR). DCR arises when the Islamic banks forgo part or all its share of profits on the unrestricted investment account holders' funds in order to increase the return to the unrestricted investment account holders. The level of risk sharing indicates the level of DCR absorbed by the shareholders of an Islamic bank for the bank pay to a competitive rate to the unrestricted investment account holders. Displacement commercial risk and level of risk sharing are two important concepts for Islamic bank and the regulatory authority. To demonstrate the concepts, this paper employs the Value at Risk (VaR) model to estimate the DCR and level of risk sharing in two Islamic banks in Bahrain. The results indicate that one of the banks experienced a DCR of between \$15.342 million and \$15.843 million with a risk sharing level of 97% while the second bank did not face DCR and has a risk sharing level of 0%. The paper concludes that since the capital adequacy ratios of Islamic banks are very sensitive to changes in DCR and level of risk sharing, setting a common risk sharing level for the industry is not a good idea as this will result in either overstating or understating the capital requirements of Islamic banks and this has some implications on resilience and stability of the banks as well as their competitiveness in the marketplace

Keywords: Islamic bank, shareholders, displaced commercial risk, level of risk sharing, value at risk, unrestricted investment account holders

DOI: 10.7176/EJBM/15-16-04

Publication date: September 30th 2023

1. Introduction

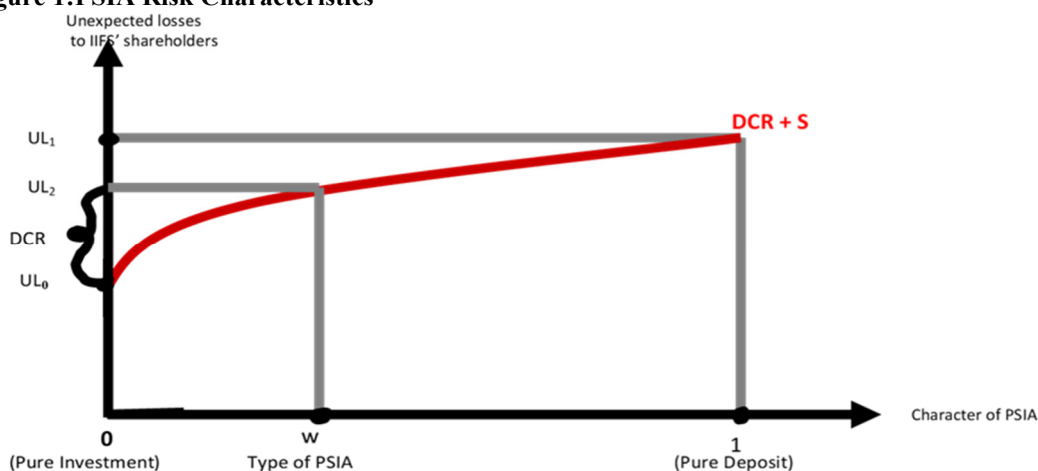
Islamic banks mobilize funds for investments from various sources using different contracts. One of such sources is the profit sharing and loss bearing contract known as mudharabah. In this type of contract, the capital provider (investor) provides the funds while the funds manager (normally the bank) manages the funds. Profits are shared according to the agreed profitsharing ratio (PSR) between the capital provider and the bank while losses, if any, are borne by the capital provider unless there is a case of proven negligence on the part of the bank. There are two types of mudharabah contracts: the restricted mudharabah (the restricted investment account holders (RIAHs)) and the unrestricted mudharabah (unrestricted investment account holders (URIAHs)). In the restricted investment account, the investor specifies the types of investments where, how and when his/her funds should be deployed and as such the investor bears the entire risk of the investment while in the unrestricted investment account holders, the bank is at liberty to commingle its funds with that of the investors and invest in a business venture of its choice and it is under this type of arrangement that the bank owes some fiduciary responsibility to the capital providers as well as share some risk with the capital providers. The unrestricted investment account holders are a significant retail funding source for Islamic banks (Baldwin et al (2019)); with over 60% of Islamic banks' funding coming from the unrestricted investment accounts (URIAAs), based typically on a Mudharabah (profit sharing and loss bearing (PLS)) contract (Sundararajan (2008)). According to Baldwin et al (2019) in the Levant region (Syria, Jordan, Palestine and Lebanon), South Asia (Pakistan and Bangladesh), and Indonesia, URIAAs are more than 75% of total deposits as at 2018. For other regions, namely Africa (Nigeria and Sudan), the GCC (Bahrain, Qatar, Oman, and Kuwait), and the Rest of the World (defined as Iran, Turkey, and Yemen), URIAHs as a percentage of total deposits fluctuated between 2013 and 2018 but were nevertheless consistently the most important retail funding source for Islamic banks. The case of Malaysia was exceptional. Malaysia saw a pronounced decline in the use of URIAHs pursuant to the introduction of its Islamic Financial Services Act of 2013. This legislation changed the funding landscape for Islamic banks by prohibiting the smoothing of returns paid to investment account holders (IFSB, 2017). Islamic banks in Malaysia had previously smoothed returns paid to URIAHs to align returns paid on PSIAAs to benchmark rates. As a result of this change, the proportion of PSIAAs decreased significantly from 41% in 2013 to 14% by 2018. Thus, URIAHs are important source of Islamic banks' funding and the use of URIAHs as a source of funds exposes Islamic banks to a special form of risk known as displacement commercial risk (DCR) for the banks to stay competitive. Displaced Commercial Risk is a relatively new term in the banking literature, and it is so named because of the 'displacement' of risk from the investment account holders to the bank's shareholders as the returns to the URIAHs consists of higher than actual profits generally drawn from equity.

(IFSB-15, 2013). This risk, if not mitigated, is also one of the principal causes of withdrawal risk which may further deteriorate to liquidity risk. The logic that prevails is that it is in the best interest of the equity holders to pay competitive returns even if it is at their expense, as this will prevent the depositors from withdrawing their accounts and migrating to other banks and thus reducing withdrawal risk due to low returns (Khan & Ahmed, 2001). Thus, the sharing of risk between the investment account holders and the shareholders in an Islamic bank. The DCR is managed by Islamic banks using profit equalization reserve (PER) and investment risk reserve (IRR) to guarantee both the URIAHs' funds and a particular rate of return to the URIAHs. If these reserves are adequate to avoid the transfer of income from shareholders to Investment Account Holders, then there is no exposure to DCR. However, if these reserves are insufficient then DCR exists and there is transfer of some proportion of shareholders returns to depositors (Farooq and Vivek (2012)). Thus, DCR is specific to Islamic Banks arising out of the management of unrestricted investment accounts because banks must pay a competitive rate of return on the investments rather than the actual. This has important implications on the capital adequacy of Islamic banks because any risks borne by the shareholders on the PSIA should be reflected in the capital ratio. It is therefore obvious that DCR is an important concept in Islamic banking and despite its importance, the concept is still not fully understood and appreciated by the customers, operators as well as the regulators and it is the objective of this paper to bring to fore the concept of DCR. Consequently, the paper is structured as follows: Section 2 defines DCR and level of risk sharing and also discusses why do banks decide to take DCR, section 3 highlights the importance of DCR and level of risk sharing in Islamic banks, section 4 briefly discusses DCR mitigation in an Islamic bank, section 5 surveys the methods of estimating DCR and risk 4 sharing level in Islamic banks and recommends the best one to use in this paper, section 6 is a case study involving two Islamic banks from Bahrain where the estimation of DCR and level of risk sharing are demonstrated while section 7 discusses the implications arising out of the case studies and draws conclusion of the paper.

2. What are DCR and Risk Sharing Level and why do Islamic banks take DCR?

The Islamic Finance Services Board (IFSB) formally defined Displaced commercial risk (DCR) as the extent of additional risk (volatility of returns) borne by an Islamic bank's shareholders compared to the situation where the unrestricted investment account holders (URIAHs) assume all commercial risks as specified in the Mudārabah contract. As per the Mudārabah contract, an Islamic bank in its capacity as Mudārib does not bear losses if they are not due to negligence and/or misconduct. Hence, the definition of DCR does not include covering of losses of URIAHs, which in principle are covered by Investment Risk Reserve (IRR). Displaced commercial risk is an unexpected loss that the bank can absorb to ensure that URIAHs are remunerated at a competitive rate (Toumi, 2010). This risk arises when an Islamic bank underperformed during a period and is unable to generate adequate profits to pay URIAHs a rate of return higher than what should be payable under the actual terms of the investment contract (AAOIFI, 1999; Khan and Ahmed, 2001; Van Hennie and Iqbal, 2008). The reasons for this are quite clear in the Islamic banking environment. If banks do not provide rates like conventional deposits, then investment account holders will move their funds to a bank (Islamic or otherwise) that does define displaced commercial risk (DCR). The issue of DCR arises because of the risk characteristics of profit-sharing investment accounts (PSIA) which is the main source of funding of Islamic banks in most jurisdictions. The characteristics of PSIA in Islamic banks could vary among banks and jurisdictions, from being deposit-like products (fixed return, capital certain, all risks borne by shareholders) in some, to being investment-like products (variable return, bearing the risk of losses in underlying investments) in others (Arshad 2015). The figure 1 below provides the theoretical framework for the DCR and the risk sharing nature of the PSIA.

Figure 1:PSIA Risk Characteristics



Source: IFSB (2011)

In figure 1 above figure, UL0 denotes unexpected losses borne by Islamic banks' shareholders when PSIA bear all commercial risks. UL1 denotes the unexpected losses that would be borne by Islamic banks' shareholders if PSIA were treated as if they are ordinary depositors who receive a market return and do not bear any commercial risks. UL2 denotes the unexpected losses that would be borne by Islamic banks' shareholders when PSIA is in between pure investment and pure deposit As "w" (which is the summary measure of characteristics of PSIA), moves from zero to 1, the character of PSIA changes from being a pure investment-like product to more of a pure depositlike product, requiring increasing amounts of shareholder capital. Additional capital requirements – that is, the increase as "w" shifts from zero (pure Mudārabah outcome) to its actual level "w" – given by (UL2 – UL0) – is the measure of DCR (minimum). The maximum possible value of DCR is given by (UL1 – UL0). According to the IFSB (2011) the risk sharing level, denoted by alpha (α), is defined as the ratio of actual risk transferred to shareholders – that is, the minimum DCR to the maximum DCR possible. It also represents the level of commercial risks absorbed by the shareholders of Islamic banks.

The Islamic banks may decide to take DCR because of some reasons:

1. Competitive pressures to pay the URIAHs a market-related return that might deviate from the actual asset returns to which they are contractually entitled to in order to prevent withdrawal of funds and possible liquidity crisis compels Islamic banks to take some DCR
2. Regulators applying moral suasion, or exercising authority, to approve Islamic banks' payouts to URIAHs, leading Islamic banks to pay returns to URIAHs that take into account prevailing market rates in order to mitigate systemic risk that may arise from customers making withdrawals in response to poor returns.
3. Management strategy: Islamic banks' management may manage investment risks as well as expectations of URIAHs so that the extent of risk (i.e. the volatility of returns) that is retained by shareholders, and the amount of risk that is borne by IAH, is managed through a set of tools, thereby controlling the capital requirements of Islamic banks.
4. Opportunity cost of capital: Islamic banks may evaluate the return on capital to be employed for DCR purposes and the cost of not taking the DCR and take a decision as to whether to take DCR or not.

3. Why are DCR and level of risk sharing important in Islamic Banks?

DCR ensures that the return to the URIAHs is comparable to the market benchmark and thus mitigates withdrawal risk when actual return on the URIAHs' assets is far below the market benchmark and this promotes systemic stability. DCR is a pillar 2 risk, and it helps Islamic banks in estimating their economic capital requirements. On the other hand, the level of risk sharing (alpha level) is an important parameter that is used by the regulators in determining the capital adequacy requirements for Islamic banks. According to the IFSB, there are two formulars through which the capital adequacy ratio of Islamic banks could be computed: (1) the Standard formula and (2) the Supervisory discretion formula. Under the standard formular, URIAs are treated as pure investment products and therefore the Risk Weighted Assets (RWA) funded by URIAs are excluded from the denominator of the Capital Adequacy Ratio (CAR), while under the supervisory discretion formula, URIAs are treated as close substitutes for conventional deposits. According to this approach, a specified proportion (denoted by "alpha") of the RWA funded by URIAHs is included in the denominator of the CAR. This "alpha" is the level of risk sharing between the URIAHs and shareholders of Islamic banks and it also represents the amount of commercial risks absorbed by the Shareholders of Islamic banks. The CAR supervisory discretion formula for Islamic banks is represented as follows:

$$\begin{array}{c}
 \text{Eligible Capital} \\
 \hline
 \{ \text{Total Risk-Weighted Assets (Credit + Market Risks) Plus Operational Risk} \\
 \text{Less} \\
 \text{Risk-Weighted Assets Funded by Restricted PSIA (Credit and Market Risks)} \\
 \text{Less} \\
 (1 - \alpha) [\text{Risk-Weighted Assets Funded by Unrestricted PSIA (Credit and Market Risks)}] \\
 \text{Less} \\
 \alpha [\text{Risk-Weighted Assets funded by PER and IRR of Unrestricted PSIA (Credit and} \\
 \text{Market Risks)}] \}
 \end{array}$$

- Total RWAs include those financed by both restricted and unrestricted PSIA.
- Credit and market risks for on- and off-balance sheet exposures.
- Where the funds are co-mingled, the RWAs funded by PSIA are calculated based on their pro-rata share of the relevant assets. PSIA balances include PER and IRR, or equivalent reserves.
- "Alpha (α)" refers to the proportion of assets funded by unrestricted PSIA which shall be determined by the CBN.
- The relevant proportion of RWAs funded by the PSIA's share of PER and by IRR is deducted from the denominator. The PER has the effect of reducing the displaced commercial risk, and the IRR has the effect of reducing any future losses on the investment financed by the PSIA.

4. Mitigating DCR in Islamic Banks

Even though DCR is important in an Islamic bank, there is still the need to mitigate DCR by minimizing the impact of smoothing URIAHs' returns on shareholders' income. Islamic Banks normally take precautionary steps by setting up special reserves, such as a profit equalization reserves (PER). The PER is used to stabilise the profit payouts to URIAHs and not the actual profits earned. In addition, Islamic Banks also maintain an investment risk reserves (IRR) which may be used to cushion losses attributable to URIAHs. It should however be noted that the formulation of prudential reserves may not entirely mitigate the DCR. This is because of the limitations of PER and IRR as excess accumulation of these PER and IRR may be constrained by the supervisory authorities (IFSB, 2011) The PER is created by appropriations from the gross returns of URIAHs' assets, before the deduction of the bank's profit share. Some portion of the PER is within the equity of URIAHs. An Islamic bank may also subsidise (positive) contractual returns by reducing its current-period profit share, or by making direct allocations from shareholders' equity (Sundararajan, 2008). Notably, however, if contractual returns to unrestricted PSIA are negative (i.e. if losses arise), then due to Shari'ah impermissibility, the bank cannot make up URIAHs' losses using its own capital. In this case, the bank would make up losses by drawing upon an Investment Risk Reserve (IRR). The IRR is created by allocations made from the contractual returns of URIAHs after all other deductions (being for PER, provisions, and the bank's profit share) from previous periods. The IRR, if sufficient, can be used to smooth returns to URIAHs and/or to make up total contractual losses.

5. Method of Estimating DCR and Alpha (α) in Islamic Bank

There are two dominant approaches in the literature for estimating DCR and the level of risk between the URIAHs and the Shareholders in a banking institution; the four (4) steps methodology approach developed by the IFSB in 2011 (IFSB GN4, 2011) and the VAR model approach employed by Toumi, et al, 2010, 2019. The 4-steps methodology developed by the IFSB in 2011 to measure the DCR and level of risk sharing between the URIAHs, and the Shareholders are:

Step 1: Estimating "w"

Step 2: Estimating return to Shareholders under three (3) different scenarios.

Step 3: Computing unexpected losses (UL) to shareholders under the three (3) scenarios.

Step 4: Estimation of DCR and level of risk absorption, Alpha

The parameter "w" according to the IFSB is the weight attached to the market benchmark in the decision of payouts to the URIAHs and is estimated by using the Ordinary Least Square (OLS) Regression method. However, this approach has some shortcomings which include: Firstly, it uses a simple formula of risk measure based on the standard deviation of shareholders' returns on equity which gives a measure of the volatility of returns about their mean. Consequently, employing such a classical and simple volatility formula has two shortcomings: on one side, the average return may not represent the true mean of the return's distribution and on the other side, the problem relates to the arbitrary choice of the length of the historical returns sample (Saita, 2007). Secondly, the IFSB approach ignores the extreme 9 scenario where the URIAHs incur losses and their investment returns are negative. Thirdly, the model constrains the value of "w" to be between 0 and 1 while the two variables that determine the "w" in the regression model are free. Fourthly, the level of risk sharing (alpha) is also constrained to be between 0 and 1, while in fact, the alpha may be greater than 1 as proved by research findings and as such alpha is no longer interpreted as the proportion of IAH assets requiring capital support (IFSB definition) but a multiplier allowing the bank and its regulator to express additional capital required to support DCR in units of risk-weighted assets of URIAHs (Baldwin, 2019). Fifthly research findings suggest that the alpha values for Islamic banks in a particular country do not converge to particular value as such the panel data approach to determine common alpha value for the industry as proposed by the IFSB model is not practicable. To address the shortcomings of the IFSB methodology, the Value-at-Risk (VaR) approach of measuring DCR developed by Toumi, et al, 2010, 2019 suggest

a framework based on quantitative finance techniques instead of the simple standard deviation used by the IFSB 4- Steps methodology. This methodology developed by Toumi, et al, 2010, 2019 consists of four steps to estimate the level of risk sharing by the URIAHs and the Shareholders: (1) calculation of the actual returns on PSIA deposits, (2), identifying the scenarios of DCR exposure to assess the Profits and Losses for shareholders related to DCR, (3) actual DCR estimation, and (4) computing the alpha factor (α , level of risk sharing). This approach is adopted in this paper. However, this approach also has its own weakness: The time horizon for computing risk using the VaR approach as presented by the available data present some weakness for the VaR approach. Nonetheless, it appears to be the best in the literature thus far

5.1 The VaR Model approach (Toumi et al, 2011 2019)

The maximum potential loss that the Islamic Banks shareholders could absorb in case of risk transfer to shareholders, is obtained by VaR, for a given confidence level α' and a given holding period T. It measures the worst loss to be borne by shareholders and represents the capital charge to be set aside to cover such potential loss.

$$\text{The DCR-VaR is given by } p(\tilde{Y} \leq \text{VaR}\alpha) = \alpha \quad (1)$$

Where: $\text{VaR}\alpha$: represents maximum possible loss over a given holding period within a fixed confidence level α' .
 \tilde{Y} : represents random variable denoting the profits and losses which is equal to the transfer (if any) from PSIA holders to the shareholders

This method also consists of four steps in estimating the level of risk sharing between the PSIA and the Shareholders: (1) calculation of the actual returns on PSIA deposits, (2), identifying the scenarios of DCR exposure to assess the Profits and Losses for shareholders related to DCR, (3) actual DCR estimation, and (4) computing the alpha factor (α , level of risk sharing).

5.2 Computing DCR under various Scenarios

According to Toumi et al, 2019 there are three possible scenarios as presented below for computing DCR in an Islamic bank using the return to URIAHs, R_I , market benchmark, R_B , profit equalization reserve as a proportion of URIAHs' Funds, PER_{acc} , investment risk reserve as a proportion of URIAHs' Funds, IRR_{acc} . and Y is the loss to the Shareholders.

Scenario 1

$$0 \leq R_I < R_B; \text{ and } PER_{acc} < R_B - R_I; Y = R_I + PER_{acc} - R_B \quad (2)$$

In this scenario, the rate of return to the URIAHs is positive but less than the benchmark rate, however the PER is less than the difference between return to PSIA and the benchmark return. Under this scenario, the difference between the realized return on PSIA and the benchmark return is not absorbed by the existing PER as such an Islamic bank is exposed to a DCR. Thus, (Y) represents amount of potential loss for the Islamic bank.

Scenario 2

$$R_I < 0 \leq R_B; IRR_{acc} \geq |R_I|; \text{ and } PER_{acc} \leq R_B - R_I; Y = R_I + \gamma IRR_{acc} + PER_{acc} - R_B; \quad (3)$$

where $R_I + \gamma IRR_{acc} = 0$ and γ is the proportion of IRR needed to absorb the actual loss; $0 < \gamma \leq 1$

In this scenario, the rate of return to the URIAHs is negative (loss), the Investment Risk Reserve (IRR) is enough to cover the loss while the PER is inadequate to smooth the PSIA's rate of return to match the benchmark rate. Under this scenario, the loss is fully covered by the accumulated IRR (a proportion or 100 % of accumulated IRR), while the accumulated PER (insufficient) serves to partially smooth the returns to the PSIA. Thus, (Y) represents the amount of potential loss that the Islamic bank Shareholders' must bear.

Scenario 3

$$R_I < 0 \leq R_B; IRR_{acc} \leq |R_I|; \text{ and } PER_{acc} \leq R_B; Y = R_I + IRR_{acc} + PER_{acc} - R_B; \quad (4)$$

In this scenario, the rate of return to the URIAHs is negative (loss), the Investment Risk Reserve (IRR) is not enough to cover the loss and the PER is inadequate to smooth the PSIA's rate of return to match the benchmark rate. Under this scenario an Islamic bank uses the combination of the two types of reserves: the accumulated IRR serves to cover some of the losses and the accumulated PER serves to smooth the return on PSIA (partially or fully depending on the level of PER compared to R_B). Thus, (Y) represents the amount of potential loss that the Islamic banks are exposed.

From the above scenarios, the following template for computing the profits or losses to the Shareholders was developed and presented below:

5.2.1: Computation of Losses/Profits due to the Shareholders

The template for computing the profit or losses to the Shareholders is presented as follows:

Table 1 Template for computing profit or loss to the Shareholders

Year	URIAH Funds	Unsmo. Profit	Smo. Profit	PER	IRR	Unsmo URIAH return (%)	Smo URIAH return (%)	PER/URIAH H Funds (%)	IRR/URIAH H Funds (%)	Benchmark (%)	Loss/Profit from unsmo RR (%)	Loss/Profit from smo RR (%)
VaR (%) at 95% confidence level											xx %	yy %

The various fields of the template are briefly explained as follows:

Year: This represents the frequency of the data which could be weekly, monthly, quarterly, yearly, etc. In this paper the frequency is yearly, and the period covered is 2013 – 2022

URIAH Funds: This represents the average funds belonging to the URIAHs in the banks during a particular year

Unsmo. Profit: This is the unsmoothed profit for the URIAs as at 31st December of a particular year reported in the annual reports of the banks. This is the profit before any form of movement into/out of the PER and IRR reserves maintained by the banks. In most cases, the movement is always into the reserves, that is building the reserves by the banks, however on occasional periods there will be outward movement from the reserves when the URIAHs’ assets underperformed. Thus, the unsmoothed profit, in most cases is higher than the smoothed profits.

Smo. Profit: This is the smoothed profit for the URIAHs as at 31st December of a particular as reported in the annual accounts of the banks. This is the profit obtained after movement into/out of the reserves. In most cases, the smoothed profit is less than the unsmoothed profit unless when the URIAHs assets underperformed and there is movement out of reserves to the smooth the profits.

PER: This represents the outstanding balance of the profit equalization reserves as at 31st December of a particular year. It is used for the purpose of smoothing profit.

IRR: This represents the outstanding balance of the investment risk reserves as at 31st December of a particular year. This is not strictly used for smoothing purposes. It is used only when there are losses to cover the loss.

Unsmo. IAH Return: This is the unsmoothed rate of return for the URIAHs, which in most cases higher than the smoothed rate of return, and therefore closer to the benchmark rate of return expected by the URIAHs and this represents the actual (minimum) loss, if any, to the Shareholders as the gap between this rate and the benchmark rate is smaller. This is computed as follows:

$$\text{Unsmo. IAH Return} = \text{Unsmo. Profit} / \text{URIAHs' Funds} \quad (5)$$

Smo. IAH Return: This is the smoothed rate of return for the URIAHs, which in most cases lower than the unsmoothed rate of return, and therefore farther away from the benchmark rate of return expected by the URIAHs and this represents the maximum possible loss, if any, to the Shareholders as the gap between this rate and the benchmark rate is larger. This is computed as follows:

$$\text{Smo. IAH Return} = \text{Smo. Profit} / \text{URIAHs' Funds} \quad (6)$$

PER / URIAHs’ Funds (Perrr) = This is the PER expressed as a proportion of the URIAHs’ Funds. This is taken into consideration in determining the both the actual and maximum losses to the Shareholders.

IRR / URIAHs Funds (irrr) = This is the IRR expressed as a proportion of the URIAs’ Funds. This is used only when the rate of return to the URIAHs is negative (<0)).

Benchmark Rate (Br): This is the benchmark rate expected by the URIAHs. It is normally the return of an alternative competitive investment having similar characteristics with PSIAs. It is use for the purpose of computing losses or profits to the Shareholders.

Loss/Profit from Unsmo. RR: This is the loss or profit to the Shareholders arising from the payment of the unsmoothed rate of return to the URIAHs relative to the payment of the benchmark rate and is computed as follows:

$$\text{Loss/Profit from Unsmo. RR (Actual Loss)} = \text{Unsmoothed rate of return} + \text{Perrr} - \text{Br} \quad (7)$$

Loss/Profit from Smo. RR: This is the loss or profit to the Shareholders arising from the payment of the smoothed rate of return to the URIAHs relative the payment of the benchmark rate and is computed as follows:

$$\text{Loss/Profit from Smo. RR (Maximum Loss)} = \text{Smoothed rate of return} + \text{Perrr} - \text{Br} \quad (8)$$

VaR (%): This is Value at Risk of the loss/profit from Unsmo RR and loss/profit from Smo RR which expresses the maximum worst cases of losses that the Shareholders can bear over the study period at 95% confidence level and expressed as a percentage. This is computed using excel as follows:

$$\text{VaR} (\%) = \text{percentile} (\text{array of losses/profit}, 5\%) \quad (9)$$

5.2.2: Estimation of Actual DCR, Maximum DCR and Level of Risk Sharing (Alpha Factor)

Following the computation of profit/losses above, a template for computing the actual DCR, maximum DCR and the level of risk absorption (alpha factor) is developed and presented below:

2012%29.pdf

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