

A CAPM for Mixed Islamic and Conventional Markets with an Application to the Valuation of Islamic Investment Accounts

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Introduction

– Motivation

- No Valuation Model for Islamic Investment Accounts which are the cornerstone of Islamic Banking.

- This is mainly due to the complexity involved in their valuation:
 - + Their profit-and-loss sharing nature makes their cash flows dependent on the cash flows of the underlying investments.
 - + The majority of Islamic banks now exist in countries where a mixed financial system is in place.

– What is a “fair” return on Islamic Investment Accounts?

- Literature: Returns on Islamic investment accounts are compared to an exogenous benchmark
 - + rate of return on Sukuks (ISRA, 2010)
 - + average mark-up used by Islamic banks on their sale-based products (Murabahah) (Bacha, 2008; ISRA, 2010)
 - + Islamic Zakat Rate (Hanif, 2010)
 - + LIBOR (Al-Ajmi et. al, 2011)
 - + rate of inflation (return on goods) (Bacha, 2008; ISRA, 2010; Hanif, 2010)
 - + the rate of economic growth and the money supply (M2) (Smolo, 2009)

– What is a “fair” return on Islamic Investment Accounts?

- Literature: Adapt the conventional CAPM to Islamic investment accounts – and finding a proxy for the riskless rate.

- + interest rate of zero (Selim, 2008)

- + creation of an exogenous rate of return benchmark for Islamic products (ISRA, 2010) – assumed not specified

- + rate of return on Sukuk as a proxy (ISRA, 2010)

– Problems with these approaches:

1. Non-theoretically derived proxy as an input of a valuation model.
2. Do not address the difference in market portfolio (presence of non-Sharia'ah compliant stocks).
3. Ignore the institutional fact that Islamic banks operate on a mixed financial market.

– Objectives:

- First, we develop a valuation model for Islamic investment accounts capable of dealing with the risk of Islamic investment accounts, and fits the institutional details of a mixed financial market.
- Second, we apply our model to Malaysia and Bahrain.

The Model

– Assets Available in the Market and Types of investors

Asset	Conventional Investor	Islamic Investor
Islamic Investment Account	Available	Available
Interest bearing riskless assets	Available	Not Available (As they include the element of interest/Usury and are thus non-Sharia'ah Compliant)
Current Account (Non-Interest Bearing) – Cash	Available, but dominated by the risk free interest rate bearing account, hence, in zero demand	Available
Capital Market (Islamic Shares)	Available	Available
Capital Market (non-Islamic Shares)	Available	Not Available (By definition non-Sharia'ah compliant)

Table 1: Available Assets for each Investor Type

– Decision Problem of Conventional Investor

$$R_{k_C, Pf, t+1} = \sum_{i=1}^{n_{IS}} w_{k_C, IS, i} \cdot (R_{IS, i, t+1} - r) + \sum_{i=1}^{n_{NIS}} w_{k_C, NIS, i} \cdot (R_{NIS, i, t+1} - r) + \sum_{i=1}^{n_{IA}} w_{k_C, IA, i} \cdot (R_{IA, i, t+1} - r) + r$$

$$\max_{w_{k_C, t}} E_{k_C} \{ R_{Pf, t+1} \} - \frac{a_{k_C}}{2} \cdot \text{var}_{k_C} (R_{Pf, t+1})$$

$$\text{var}_{k_C} (R_{Pf, t+1}) = w_{k_C, t}^T \cdot \Omega_{k_C} \cdot w_{k_C, t}$$

$$\Omega_{k_C} = \begin{pmatrix} \Omega_{IS, k_C} & COV_{IS, NIS, k_C} & COV_{IS, IA, k_C} \\ COV_{IS, NIS, k_C} & \Omega_{NIS, k_C} & COV_{NIS, IA, k_C} \\ COV_{IS, IA, k_C} & COV_{NIS, IA, k_C} & \Omega_{IA, k_C} \end{pmatrix}$$

Subject to a shortselling constraint on IA: $w_{k_C, IA} \geq 0$

– Decision Problem of Islamic Investor

$$R_{k_I, Pf, t+1} = \sum_{i=1}^{n_{IS}} w_{k_I, IS, i} \cdot R_{IS, i, t+1} + \sum_{i=1}^{n_{IA}} w_{k_I, IA, i} \cdot R_{IA, i, t+1}$$

$$\max_{w_{k_I, t}} E_{k_I} \{ R_{Pf, t+1} \} - \frac{a_{k_I}}{2} \cdot \text{var}_{k_I} (R_{Pf, t+1})$$

$$\text{var}_{k_I} (R_{Pf, t+1}) = w_{k_I}^T \cdot \Omega_{k_I} \cdot w_{k_I}$$

$$\Omega_{k_I} = \begin{pmatrix} \Omega_{IS, k_I} & COV_{IS, IA, k_I} \\ COV_{IS, IA, k_I} & \Omega_{IA, k_I} \end{pmatrix}$$

Subject to shortselling constraints $w_{k_I, IS, t} \geq 0$, $w_{k_I, IA, t} \geq 0$, $w_{k_I, 0} \geq 0$

– Market Equilibrium reflecting Mixed Market

$$\sum_{k_C=1}^{K_C} w_{k_C,Is,i} + \sum_{k_I=1}^{K_I} w_{k_I,Is,i} = w_{M,Is,i}$$

for Islamic shares $i = 1, \dots, n_{Is}$

$$\sum_{k_C=1}^{K_C} w_{k_C,nIs,i} = w_{M,nIs,i}$$

for non-Islamic shares $i = 1, \dots, n_{nIs}$

$$\sum_{k_C=1}^{K_C} w_{k_C,IA,i} + \sum_{k_I=1}^{K_I} w_{k_I,IA,i} = w_{M,IA,i}$$

for Islamic investment accounts $i = 1, \dots, n_{IA}$

– Valuation Equation for Expected Required Returns of Islamic Investment Accounts

$$\begin{pmatrix} E\{R_{IA,1,t+1}\} \\ \vdots \\ E\{R_{IA,n_{IA},t+1}\} \end{pmatrix} = \begin{pmatrix} r \\ \vdots \\ r \end{pmatrix} \cdot \frac{1}{1 + \frac{a_C}{a_I}} + \left[\frac{a_C}{1 + \frac{a_C}{a_I}} \cdot COV_{M,IA} \right]$$

where

$$COV_{M,IA} = (COV_{M_{IS},IA} + COV_{M_{nIS},IA} + VAR_{M_{IA}})$$

$$COV_{M_{IS},IA} = \begin{pmatrix} cov(R_{M_{IS},t+1}, R_{IA,1,t+1}) \\ \vdots \\ cov(R_{M_{IS},t+1}, R_{IA,n_{IA},t+1}) \end{pmatrix}, COV_{M_{nIS},IA} = \begin{pmatrix} cov(R_{M_{nIS},t+1}, R_{IA,1,t+1}) \\ \vdots \\ cov(R_{M_{nIS},t+1}, R_{IA,n_{IA},t+1}) \end{pmatrix}$$

$$\text{and } VAR_{M_{IA}} = \begin{pmatrix} var(R_{M_{IA},1,t+1}) \\ \vdots \\ var(R_{M_{IA},n_{IA},t+1}) \end{pmatrix}$$

$$\frac{1}{a_C} \equiv \sum_{k_C=1}^{K_C} \frac{1}{a_{k_C}} \text{ and } \frac{1}{a_I} \equiv \sum_{k_I=1}^{K_I} \frac{1}{a_{k_I}}$$

– Alternatively, for an arbitrary Islamic investment account “i”

$$E\{R_{IA,i,t+1}\} = \frac{r}{1 + \frac{a_C}{a_I}} + \left[\frac{a_C}{1 + \frac{a_C}{a_I}} \cdot cov(R_{IA,i,t+1}; R_{M,t+1}) \right]$$

– a “modified” riskless rate

– Risk: Not only do the other investment alternatives that are available for Islamic investors matter (Islamic shares and Islamic investment accounts), but also risk connections to non-Islamic shares.

– Price of risk (weighting of the risk aversion parameters of both investors)

– Deriving the Risk Aversion Parameters

$$a_C = \frac{r \cdot (E\{R_{M_{IA},t+1}\} - E\{R_{M_{IS},t+1}\})}{\text{cov}(R_{M_{IA},t+1}; R_{M,t+1}) \cdot E\{R_{M_{IS},t+1}\} - \text{cov}(R_{M_{IS},t+1}; R_{M,t+1}) \cdot E\{R_{M_{IA},t+1}\}}$$

$$a_I = \frac{r \cdot (E\{R_{M_{IA},t+1}\} - E\{R_{M_{IS},t+1}\})}{\text{cov}(R_{M_{IS},t+1}; R_{M,t+1}) \cdot (E\{R_{M_{IA},t+1}\} - r) - \text{cov}(R_{M_{IA},t+1}; R_{M,t+1}) \cdot (E\{R_{M_{IS},t+1}\} - r)}$$

– Inserting the Risk Aversion Parameters into the Valuation Equation

$$\begin{aligned}
 & E\{R_{IA,i,t+1}\} \\
 &= \frac{\text{cov}(R_{M_{IS},t+1}; R_{M,t+1}) \cdot E\{R_{M_{IA},t+1}\} - \text{cov}(R_{M_{IA},t+1}; R_{M,t+1}) \cdot E\{R_{M_{IS},t+1}\}}{\text{cov}(R_{M_{IS},t+1}; R_{M,t+1}) - \text{cov}(R_{M_{IA},t+1}; R_{M,t+1})} \\
 &+ \left[(E\{R_{M_{IS},t+1}\} - E\{R_{M_{IA},t+1}\}) \cdot \frac{\text{cov}(R_{IA,i,t+1}; R_{M,t+1})}{\text{cov}(R_{M_{IS},t+1}; R_{M,t+1}) - \text{cov}(R_{M_{IA},t+1}; R_{M,t+1})} \right]
 \end{aligned}$$

– **Risk:** is now defined similarly to a (kind of) beta factor (risk contribution of the asset to be valued $\text{cov}(R_{IA,i,t+1}; R_{M,t+1})$ divided by the risk of the market portfolio).

– **Price of Risk:** market risk premium $E\{R_{M_{IS},t+1}\} - E\{R_{M_{IA},t+1}\}$ (expected return difference between the two asset classes that are available to Islamic investors).

– Two major implications for its practical application

- First, the riskless rate r is not contained explicitly in the valuation formula.

- Second, the required expected return contains only ingredients that are principally observable.

– Application to Malaysia and Bahrain:

- First, to illustrate what market portfolio parameters of the valuation equation are readily available.

- Second, to find out whether each bank offers its own unique set of investment projects and, thus, risk profiles.

- What is NOT the focus of our attention is to find out whether Islamic investment accounts offer an adequate return or not.

– Malaysia Data Set:

- Investment Accounts of all 16 Islamic Banks in Malaysia: obtained from quarterly results of each bank

+ Return:

$$\textit{Return on IA} = \frac{\text{Income attributable to Mudharabah Funds}}{\text{Volume of Mudharabah funds}}$$

+ Volume: Volume of Mudharabah Funds

- The quarterly riskless return: calculated from the annual rate on Malaysian government treasury bills obtained from the website of the central bank

- Capital Market Investments:

- + As a proxy for the entire stock market in Malaysia, the Share Index Bursa Malaysia EMAS (FBMEMAS.LS)

- + Islamic Shares, the Share Index Bursa Malaysia EMAS Sharia'ah (FBMS.LS)

- Returns: Discrete quarterly returns were calculated for each index by downloading the daily data for all days between 1Q2006 and 3Q2013

- Volume: The Market Capitalization data was only available starting from the period 2Q2008 which limited the sample to 21 observations ranging till 2Q2013.

- Should Net Market Capitalization or Full Market Capitalization be used?
 - Difference is the adjustment for free-float bias
 - + Good idea: free float describes what is available for investment purposes.
 - + Bad idea: volume of shares low compared to volume of Investment Accounts.
 - For both definitions, a problem of constituents arises (which is even more pronounced in Shariah Indices). This constituents problem is adjusted in the index points, but not in the market capitalization.
- Suggested Solution:
 - We take 3Q2013 as a base-year and calculate a “Compensated” Market Capitalization based on the index returns.
- We end up using a Compensated Net and Full Market capitalization as a Robustness Check

– Following problems must be addressed:

- There is no official (market) index of Islamic investment accounts:
 - + index of Islamic investment accounts was computed by hand as the weighted average returns on Islamic investment accounts by volume across all banks
- There is no official (market) index of non-Islamic Shares:
 - + non-Islamic market capitalization was calculated as the difference between the entire market capitalization (EMAS), and the market capitalization of Islamic shares (EMAS Shariah). The returns on non-Islamic shares were then calculated taking into consideration the market capitalization as weights.

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- The composition of the Islamic share index changes dramatically over time thus biasing massively the return of the market portfolio of Islamic shares:
 - + In the case of Malaysia, these are compensated within the index by using a specific undisclosed factor to compensate the difference in price and market capitalization. In other words, no further “by hand” adjustments are needed.

– Bahrain Data Set:

- Investment Accounts of all 6 **Retail** Islamic Banks in Bahrain: obtained from quarterly results of each bank

+ Return:

$$\textit{Return on IA} = \frac{\textit{Profit on Unrestricted Investment Accounts}}{\textit{Volume of Unrestricted Investment Accounts}}$$

+ Volume: Volume of Unrestricted Investment Accounts

- The quarterly riskless return: calculated from the annual rate on Bahraini Government Treasury Bills obtained from the website of the Central Bank

- Capital Market Investments:

- + As a proxy for the entire stock market in Bahrain, the Bahrain Bourse All Share Index (BHSEASI:IND)

- + Islamic Shares, the S&P Bahrain Domestic Sharia'ah Index (SPSHDBHD)

- Returns: Discrete quarterly returns were calculated for each index by downloading the daily data for all days between 1Q2006 and 3Q2013

- Volume: The Market Capitalization data was only available starting from the period 2Q2008 which limited the sample to 30 observations ranging till 2Q2013.

– Following problems must be addressed:

- There is no official (market) index of Islamic investment accounts:
 - + index of Islamic investment accounts was computed by hand as the weighted average returns on Islamic investment accounts by volume across all banks

- There is no official (market) index of non-Islamic Shares:
 - + non-Islamic market capitalization was calculated as the difference between the entire market capitalization (All-Share Index), and the market capitalization of Islamic shares (Bahrain Domestic Shariah). The returns on non-Islamic shares were then calculated taking into consideration the market capitalization as weights.

- The composition of the Islamic share index changes dramatically over time thus biasing massively the return of the market portfolio of Islamic shares:
 - + In the case of Bahrain, no publicly announced re-adjustments are made by Bahrain Bourse or S&P thus the index must be recomputed by hand as follows: The index weights of 2Q2013 are taken and the index is re-computed based on these weights for the past quarters of our sample.

– Major Findings

$$E\{R_{IA,i,t+1}\} = \frac{r}{1 + \frac{a_C}{a_I}} + \left[\frac{a_C}{1 + \frac{a_C}{a_I}} \cdot cov(R_{IA,i,t+1}; R_{M,t+1}) \right]$$

– Risk Aversion Parameters:

- In Malaysia: Both Risk Averse, Islamic Investors more Risk Averse
- In Bahrain: Conventional Risk Seeking, Islamic Risk Averse

– Our „modified“ riskless return was:

- In Malaysia: always less than the T-Bills Rate
- In Bahrain: always greater than the T-Bills Rate

– Results robust across Net and Full Market Capitalization

Required vs Actual IA Expected Returns - 2013Q3

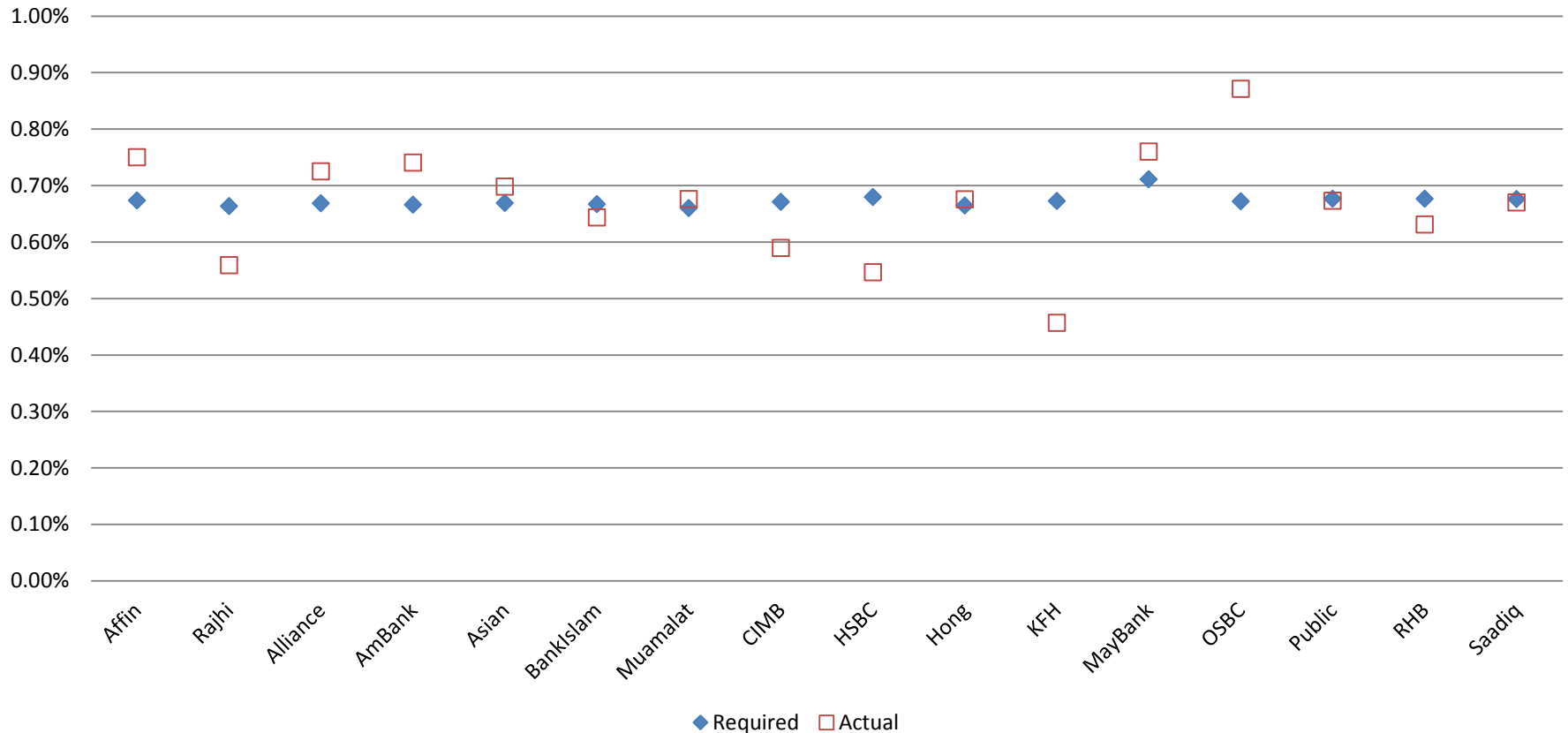


Fig. 1: Empirical Average and Required Expected Returns on Investment Accounts (Customer) across each bank in the Malaysian sample at 3Q2013

Required vs Actual IA Expected Returns - 2013Q3

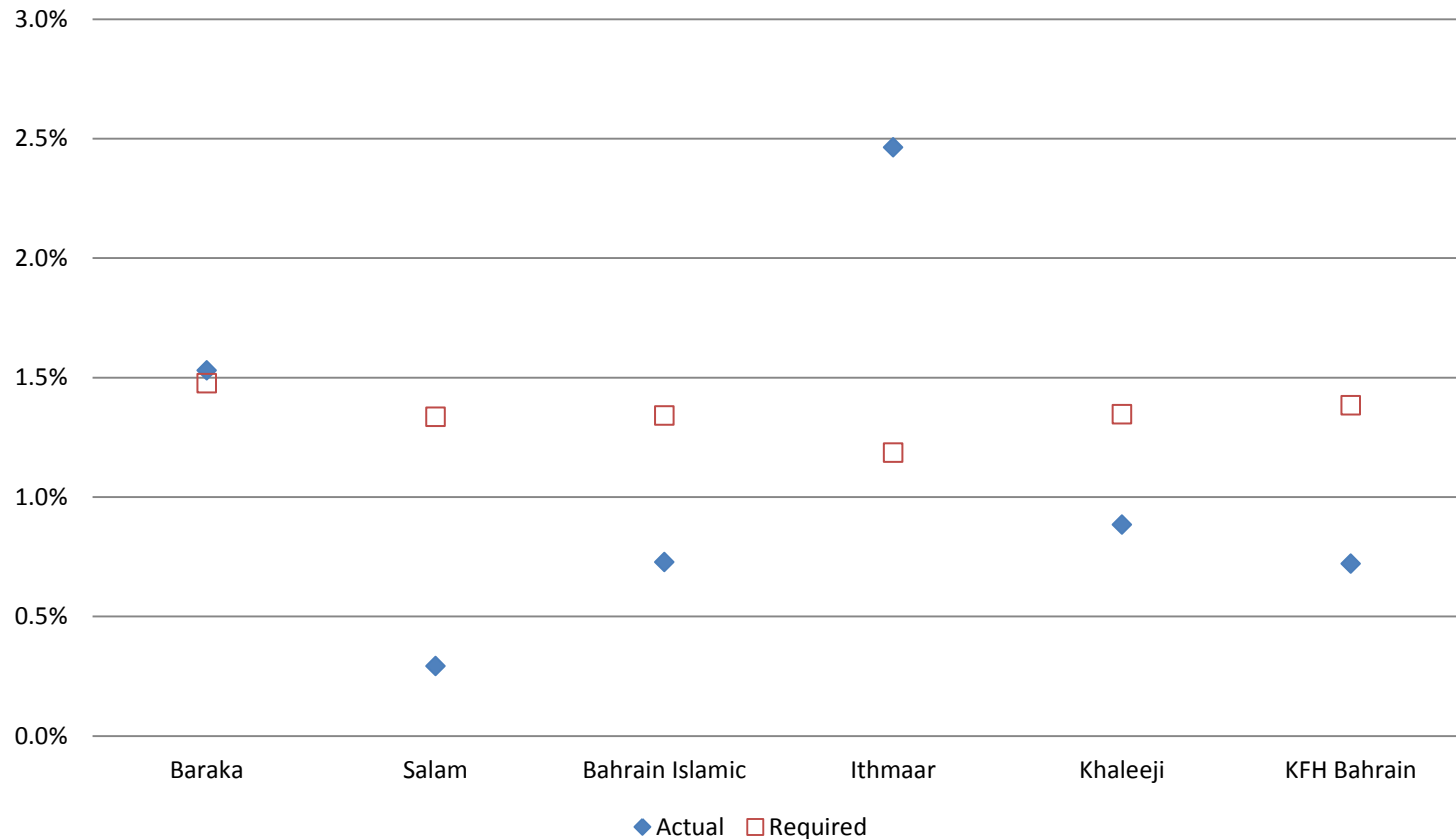


Fig. 2: Empirical Average and Required Expected Returns on Investment Accounts (Unrestricted) across each bank in the Bahraini sample at 3Q2013

- Various investment account products are available in the Malaysian and Bahraini markets
- Each has its own unique set of investment projects and thus unique risk relative to the market.
- Some banks have fallen below their required expected returns while others have either met or exceeded their required expected returns

– Conclusion

- In a first step, we derived a required expected return for Islamic investment accounts (modified riskless rate + a compensation for risk)
- Risk comprises the connection between risk of Islamic investment accounts and risk of the “market” portfolio.
- Not only do the other investment alternatives available for Islamic investor matter (Islamic shares and Islamic investment accounts), but also risk connections to non-Islamic shares matter as well.

- In a second step, we develop the valuation equation further to derive a practically applicable required expected return formula for Islamic investment accounts.
 - removing any explicit reference to the riskless rate r from the valuation formula.
 - ensuring that the required expected return equation contains only ingredients that are principally observable.
- Finally we demonstrate empirically how to implement our valuation equation into practice in the Malaysian and Bahraini markets and illustrate that indeed each bank offers its own unique set of investment projects and risk profiles.

Practical Implications:

- aiding regulators in evaluating the empirical returns on Islamic investment accounts

- ensuring that they are properly “priced” within the market by their respective banks in relation to the degree of risk they undertake.

- increasing the attractiveness of Islamic investment accounts to customers and, hence, the sustainability of the funding base of the Islamic banking system

- allowing “rating” of Islamic Investment Accounts in a method similar to shares or bonds.

Thank You for Your Attention!