

Are Islamic Banks Sufficiently Diversified? An Empirical Analysis of Eight Islamic Banks in Malaysia

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Abstract

The aim of this study is to analyze the diversification among financial activities of Islamic banks and how it affects banks performance. We used the Herfindahl-Hirschman Index (HHI) to measure the degree of asset/liability diversification and risk-adjusted performance as criteria of assets allocation and management compensation. We found that retail and commercial activity are the most profitable activity, which lead to an overinvestment in those activities. Some banks show high average correlation between commercial and retail activities, and corporate and investment activities. The analysis of the efficiency shows that none of these banks falls on the frontier which means that they should change the structure of their portfolio in order to become less concentrated. They should also allocate more assets to treasury activity.

Keywords: Diversification, performance, Islamic banks, HHI, MPT.

JEL classifications: C01, G11, G21.

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1. Introduction

It is commonly known that the portfolio risk can be reduced when assets with different price movements are combined. Accordingly, diversification among products, activities and sectors should increase return. The intuition is that a diversified portfolio is less volatile than the average of the volatilities of its assets. The Modern Portfolio Theory (MPT) of Markowitz (1952) enables investors to estimate expected risks or returns of their portfolios. They can either maximize the overall portfolio return for a given level of overall risk or minimize overall portfolio risk for a given level of overall portfolio return.

Many papers analyzed how diversification affects performance. Most of these studies highlight the positive effect of diversification on performance and on risk reduction. For instance, Saunders and Walter (1994) conducted a simulation analysis of large mergers among the largest financial intermediaries in the US. Their results show that when companies provide varied financial services, their level of risk will be lower than the specialized banks. Templeton and Severiens (1992) provided evidence on the impact of increasing the level of diversification on decreasing risk when the nonbanking activities are uncorrelated with the banking activities.

In conventional banks, results about the effects of diversification on performance are contrasting. For instance, Cubo-Ottone and Nurgia (2000) found a significant and positive relation between abnormal returns and diversification products as a result to mergers and acquisitions of banks. Focarelli et al. (2002) used Italian balance-sheet data on mergers and acquisitions of banks and highlighted the increase of ROE after a merger, and a long-run increase of profitability. However, some papers found a low or negative impact of diversification on bank performance. Mercieca et al. (2007) provided evidence that there is no direct benefit of diversification within and across business lines and a negative relation between non-interest income and bank performance. Goddard et al. (2008) noticed that revenues from non-interest activities have increased in US credit unions. They examined the impact of revenue diversification on their financial performance between 1993 and 2004. Their main conclusion was that diversification strategies should vary according to the credit union size. For instance, small-sized unions should avoid diversification and concentrate on loans and savings activities while large-sized ones should look for new product opportunities related to their main expertise.

We have to notice that the issue of diversification is not extensively discussed in Islamic banks unlike the issue of performance and efficiency which are well discussed, particularly in the last ten years. For instance, Yudistira (2004) analyzed the impact of financial crises on the efficiency of 18 Islamic banks over the period of 1997-2000. He found that Islamic banks performed badly after the global crisis 1998-1999 but they improved their performance subsequently. In addition, small and medium-size banks faced diseconomies of scale and publicly listed banks are less efficient. Sufian (2007) adopted the same approach as Yudistira (2004) to examine efficiency in domestic and foreign Islamic banks in Malaysia between 2001 and 2004. He provided evidence that these banks slightly improved their efficiency in 2003 and 2004. Moreover, domestic Islamic banks are found marginally more efficient than foreign Islamic banks. More recently, many papers focus on the efficiency of Islamic banks in large-size samples because of the availability of banks datasets. Srairi (2010) used a sample of conventional and Islamic banks over the period 1999-2007. He showed that Islamic banks set up in the Gulf region are relatively more efficient to increase profits and decrease costs. However, they are still less efficient than conventional banks.

In contrast, Abdul-Majid et al. (2010-a) used an output distance function approach to study the efficiency of Islamic banks. They provided evidence that some countries notably Sudan and Yemen displayed higher inefficiency in comparison with other countries namely Bahrain and Bangladesh. In addition, the majority of their banks had higher returns to scale than conventional banks. They focused also on the efficiency of Malaysian banks through different approaches (Mokhtar et al., 2006 and Abdul-Majid et al. 2010 b and 2011) and provided evidence that fully Islamic banks and conventional banks operating Islamic banking windows have lower efficiency than other banks. But these banks still have low potential to get around their inefficiency.

Kablan and Yousfi (2011) examined efficiency of Islamic banks operating in both Muslim and non-Muslim regions. They argued that Malaysian and Pakistani banks display the highest scores. One explanation is that government in these countries undertook many reforms to make these banks better involved in their financial markets. Moreover, Islamic banks operating in the United Kingdom have the lowest average efficiency score.

On the contrary, some studies, such as in Beck et al. (2010) showed little significant differences between conventional and Islamic banks in business orientation. They conclude that conventional banks are more cost effective and less

stable when they have lower market shares than their Islamic counterparts while Islamic banks display higher capital-asset ratios.

Despite the booming development of Islamic banking, to the best of our knowledge, there are no papers on the effect of diversification on performance. In the current paper we raise the following question: *are Islamic banks sufficiently diversified?*

To answer this question, we focus on diversification among financial activities and analyze how it affects banks performance. We used the Herfindahl-Hirschman Index (HHI) to measure the degree of asset/liability diversification and risk-adjusted performance as criteria of assets allocation and management compensation. We used Sharpe, Treynor and Jensen indices to analyze risk-adjusted performance. Data are collected from the annual financial statements of eight Malaysian banks over the period 2004-2008.¹ We choose a sample of Malaysian banks because Malaysia is being established as an important centre of Islamic finance through cooperation with the centres of Islamic finance in Bahrain and in Dubai to jointly develop the global Islamic finance market (Haque, 2010). Bin-Bahari (2009) conducted a comparative study between Malaysian and GCC (Gulf Cooperation Council) Islamic banks. He found that the number of Islamic banking principles applied in Malaysian banks is higher than in their counterparts. Moreover, some transactions are completely rejected in Malaysia because they are source of conflicts between scholars which could explain how Malaysia becomes the first financial choice of many Muslims. Such restrictions may be considered as signal of the strict application of Shari'ah.

In the absence of unified accounting and disclosure codes in Islamic banking system, we considered a small sample size². S&P argues that financial disclosure of Islamic banks does not very often meet the standards of global best practices, which hinders their growth. This may also explain why there are not yet studies dealing with the issues of diversification among products, financial activities and sectors in Islamic banking.

¹ Some databases, like for example *Datastream* and *Bankscope*, provide more data over longer period than us. But, they do not provide information we need in our study in contrast with annual reports.

² The Malaysian Islamic Banking Act of 1983 enables to better control and unifies practices in these banks. There was also the creation of centralized and separate Shari'ah boards in the Bank Negara Malaysia (the Central Bank) and the Securities Commission. The Malaysian government tries now to reform the banking sector to meet Basel II capital requirements and international accounting standards.

In 2008, the Islamic Financial Services Board (IFSB)³ had spearheaded global initiatives to standardize Islamic financial transactions. Standardization remains a significant challenge for practitioners, regulators and depositors, particularly at the macroeconomic level since countries display different characteristics in terms of regulation.

There are many types of diversification. Bank's diversification activities can be captured according to different criteria: interest and non-interest income activities. Banks can also diversify into non-interest income products and services that are directly linked to an existing interest income generating activity. However, in the sake of Islamic banks, there are no interest income activities (Mercieca et al., 2007). Accordingly, we focus only on non-interest income activities. Then, we distinguish four activities like in conventional banking:

First, banks can have activities related to sales and trading of various financial instruments, equity research and asset management. This is the corporate banking activity.

Second, investment banking activity aims at advising and helping different institutions raising capital to undertake, mergers and acquisitions, LBO and IPO.

Thirdly, commercial banking encompasses the bank's activities that are related to commercial enterprises or corporations. Unlike commercial banking, retail or consumer banking consists in range of products and services provided to consumers and small businesses.

Finally, treasury is considered a core function in conventional banking. However, it is the heart of Islamic banking. It aims at providing necessary funds at a cost efficient manner that diminishes financial risks. There must be enough liquidity to meet all the current and future obligations of the bank for all the line activities.

However, they must be Shari'ah compliant: they cannot charge interests since it is *ribā* and cannot invest in prohibited sectors. Consequently, they have narrower investment market than their conventional counterparts. As diversification is not always possible, Islamic banks are easily affected by shocks and crisis. Even if the effects of the subprime crisis were limited, they incurred real losses. It would be more appealing to analyze diversification among sectors and to compare with

³ IFSB is the global standard-setting body for Islamic finance, capital markets and insurance.

conventional banks but because of the lack of data availability; we were not able to perform the analysis. However, this study is a first step to understand how these banks diversify their activities. First, we estimated risk-adjusted performance of Islamic Malaysian banks. Then we studied the effects of diversification across activities on banks' performance, in particular on risks. Finally, we deduced the efficient frontier and the optimal portfolio according to the MPT.

Our study aims at assessing some features of Malaysian Islamic banks diversification. Our paper is therefore structured as follows. Section 2 presents our measures of diversification and performance, and data. Estimation and results are discussed in Section 3. Section 4 concludes the paper.

2. Methodology

2.1. Risks in Islamic Banking

In banking activity, there are three main types of risks: market risk, credit risk and operational risk. As their conventional counterparts, Islamic banks are subject to these risks.

First, both kinds of banks are exposed to significant and negative fluctuations of prices and therefore to the market risk, they have different techniques to overcome it, however. In conventional banks, the use of future contracts decreases this risk. However, these contracts very often lead to speculation which is prohibited in Islamic transactions. According to the Sharī'ah, there is no wealth creation in such transactions. Speculation is based on wealth transfer not on added value: it increases the gains of one party by taking advantages of the second party. Again, the equivalent financial product of option and speculation aim at protecting both parties by sharing profits and losses between them. For instance, option is replaced by the contract of *Bay' al-urbūn*⁴. As explained before these banks have limited investment opportunities. Because they cannot invest in prohibited sectors, they may face higher risks than their conventional counterparts.

Second, when the borrower cannot meet his payments, the bank is then exposed to credit risk. One explanation is that the quality borrower was overvalued. Moreover the higher the credit risk, the higher the interest rate fixed by the bank. If payments must be scheduled after a first default, the bank sets high interest rate.

⁴ In this contract, the buyer has to pay in advance a partial amount of the good price as a security deposit. This amount may be lost if he decided not to buy. It is a way to force him to meet his obligation.

There are some similarities between conventional and Islamic banks concerning credit risk: they are facing default risk and also a selection problem of customers like for example adverse selection problems. They also ask for collateral as a security deposit to get financed.

However, there are some differences in the process of credit distribution:

- Unlike conventional banking, Islamic banking is interest-free banking.
- Islamic banks offer funds on the basis of *Murābahah*⁵ (sale with profit) or *Mushārakah*⁶.
- The client is exposed to lower risks than in interest based financing: if the asset is damaged, losses are borne partially or totally by the bank as it is legally an owner.
- Islamic banks are more selective than conventional ones because they have limited investment opportunities and they must select high quality client to which they will grant loans.
- Islamic banks are also exposed to a different structure of risks that are not borne by conventional banks: risks related to the asset/investment opportunity. This explains to some extent why the average financing cost in Islamic banks is higher than in conventional ones.
- Instead of receiving fixed interest rates, they are paid share on the profits or losses generated by their assets/businesses.

Third, operational risk is more complicated in Islamic banks than in conventional banks. One explanation is the high number of contracts that should be written in each stage of the transaction. This takes time and needs the involvement of many parties (the bank, the Sharī'ah board, and the bank's client, the vendor) to ensure transparency. In addition, regulation varies significantly from one country to another. For instance, there is neither unified disclosure code nor common contract clauses. This poses new legal risk particularly for Islamic banks operating in

⁵ The client would like to purchase a particular asset at a fixed date but he is wealthy constrained. Under specific conditions, the bank will buy the asset for him at a certain price (cost plus profit). He has then to identify the best offer/seller in the market. Accordingly, the Islamic bank will appoint the client as its "*wakīl*" (bank's agent) to acquire the asset on the bank's behalf. The bank acquires the asset and sells it to the client. The vendor will deliver the asset to the bank's client as it is the bank's agent.

⁶ The bank and the client must contribute jointly to the funding of the project and all of them are involved actively in the project while the client brings Know-how. Profits and losses are shared between them according to their financial contribution or on agreed ratios.

conventional banking system or conventional banks operating Islamic windows competing with Islamic banks. Moreover, uncertainties associated with Shari‘ah compliance lead to fiduciary and reputational risk. Besides, Basel II provides principles of effective banks’ control that cope with Islamic banking. However, risk measurement and risk management practices are not completely suited for Islamic banks’ operational characteristics and still need further adaptations (Abdullah et al., 2009). Islamic banking activities are based on partnership. They share the fruit of their investments with their depositors and the fruit of financed economic activities with their borrowers. Projects losses are therefore supported by Islamic banks unlike their conventional counterparts. This means that they are subject to more operational risks than conventional banks.

2.2. *Measures of Risk adjusted Performance*

In this subsection, we present the measures used to estimate these risks. The banking literature provides three measures of risk-adjusted return that are extensions of financial index: return on risk-adjusted capital (RORAC), risk-adjusted return on capital (RAROC) and risk-adjusted return on risk-adjusted capital (RARORAC). They enable us to analyze risk management from different areas even in Islamic banking (Bandyopadhyay and Saha, 2008, Guill, 2007, Robert and Bishop, 2007, Shimko, 1997 Uyemura et al. 1996).

These measures are:

- RORAC presented in Bankers Trust in the late 1970s to compare investments that have different levels and profiles of risk (Guill, 2007). It is based on capital at risk and is given by:

$$RORAC = \frac{\text{Net Income}}{\text{Allocated Economic Capital}}$$

where *Allocated Economic Capital* is the firm's capital, adjusted for the maximum potential loss based on the probability of future returns or volatility of earnings. The economic capital is adjusted for the maximum potential loss after calculating probable returns and/or their volatility. It is a very useful method of quantifying and managing acceptable levels of exposure to risk.

- RAROC measures risk-based profitability and compares returns of a range of projects. It is given by:

$$RAROC = \frac{\text{Revenue} - \text{Expenses} - \text{Expected loss} + \text{income from capital}}{\text{Economic Capital}}$$

- RARORAC is an extension of RAROC and RORAC ratios and encompasses both the risk-adjusted economic capital and the risk-adjusted return of an investment. It is calculated by dividing risk-weighted return by the economic capital after including the diversification benefits. The risk-weighted return is given by the sum of the net profit before results on divestments, provisions for credit risks after replacing by estimated values, cycle-neutral expected losses on loans and investment securities (KPMG, 2007). The RARORAC is given by:

$$RARORAC = \frac{\text{Risk Adjusted Return}}{\text{Capital at Risk}}$$

It is straightforward to see that there is a double risk adjustment made, in both numerator and denominator. RARORAC cannot cover systemic risk but measures market risk, credit risk and operational risk. This ratio is very useful to analyze the link between the three types of risks in different scenarios where there might be too-high concentration of risks.

2.3. Risk Measures

In financial literature, RAROC is commonly used in the same meaning of the three ratios presented in the previous subsection, even though we are estimating one of them RORAC, RAROC or RARORAC (Landskroner et al., 2005). In *Internal Systematic Risk* approach, systematic risk of a unit is measured inherent to the bank's portfolio (covariance between the bank's activity and the portfolio of all activities) and not to the market portfolio. The difference stems from the fact that, unlike the common assumption of perfect capital markets in which all assets are tradable, in banking a large proportion of the bank's assets and liabilities are not tradable, especially in the banking book. For instance, the bank's business (activity) units are of limited marketability.

Froot and Stein (1998) develop a two-factor pricing model for banks in which the first factor is the market factor, as in the CAPM, and the second is the bank's (non-tradable) portfolio factor. They have defined an internal systematic risk (and price of risk) based on the covariance with the bank's portfolio. We used two approaches to estimate the performance: the stand-alone approach where assets are considered asset by asset and the portfolio approach in which correlations between business units in banking activities are taken into account. We adopted a variance-

covariance approach to compute the value at risk (VAR)⁷ of the line activities and the bank as a whole.

Three indices were used in banking finance to measure RAROC (see among others Bandyopadhyay and Saha, 2008, Guill, 2007, Robert and Bishop, 2007, Shimko, 1997 Uyemura et al. 1996)

- The first index RAROCs is an extension of the Sharpe index (Shimko, 1997) and is written:

$$RAROCs_i = \frac{\Pi_i - \Pi_{fi}}{\sigma_{\Pi_i}}$$

where Π_i is the average profits (net operating profit or net profit from ordinary items) in activity i , Π_{fi} is the average of earnings in the risk free share of the activity i and

σ_{Π_i} is the standard deviation of the profit of activity i during the whole period T (5 years).

- The second index *RAROCt* is an extension of the Treynor index. It is given by:

$$RAROCt_i = \frac{\Pi_i - \Pi_{fi}}{B_{\Pi_i}}$$

where B_{Π_i} is the risk index or the CoVaR in the activity i .

- The third index RAROCJ is an extension of Jensen index and measures the earnings of the activity i . It is written:

$$RAROCJ_i = \frac{A_i}{K_i}$$

where:

⁷ The VaR measures the risk of loss on a specific portfolio of financial assets. For a given portfolio, probability and time horizon, VaR is the threshold value such that the probability that the mark-to-market loss on the portfolio over the given time horizon exceeds this value (assuming normal markets and no trading in the portfolio) is the given probability level

$A_i = \Pi_i - \left[\Pi_{f_i} + \beta_{\Pi_i} (\Pi_{B_i} - \Pi_{f_i}) \right]$ is function of the factor of activity i 's beta and the average market return and can be considered a measure of Economic Value Added EVA⁸ of the activity i ; it has many uses in banking, particularly in capital budgeting (Uyemura et al., 1996)

$$K_i = \frac{1}{T} \sum_{t=1}^T R_{bt} \cdot K_{it}$$

is the average investment in activity i .

2.4. Data

The measures of the performance are estimated for eight Malaysian Islamic banks, using financial statements data over the period 2004-2008. There are 29 Islamic banking institutions in Malaysia: 12 full-fledge Islamic banks (nine domestic stand-alone Islamic banks and three foreign Islamic banks), height conventional banks operating Islamic windows, four Islamic investment banks and five development finance institutions offering Islamic banking services (Moody's global banking, 2008). However, only eight banks offer annual reports with reliable data for our analysis. These banks do not adopt similar accounting and disclosure practices. They vary significantly in terms of presentation and content.

Some banks in our sample have already grouped retail and commercial activities together while others grouped corporate and investment banking activities. For the sake of simplicity, we distinguish two activities to keep more banks in our sample: retail and commercial activity and corporate and investment activity.

Thus, Islamic banks in our sample have four banking activities: corporate and investment activity; retail and commercial activity; treasury and others activities. Note that the data of the net operating profits (ordinary net income), the segmental results and the investments (segmental assets) in the different activities, were calculated in the annual financial statements of these banks.

The total amount of asset assigned to the banking activity i ($i=1, \dots, 4$) at time t is denoted $K_{i,t}$. The total assets is equal to the sum of assets invested in each activity. The RAROC indices calculations are based on the free risk-free rate R_{ft} , however, as explained before, in Islamic banking interest is prohibited. Consequently, we take as risk-free rate the rate of the sovereign *Şukūk* of Bank

⁸ EVA (Economic Value Added) measure is recently introduced in banking to measure the bank performance as a function of the true cost of capital. It includes the cost of equity capital employed by the bank.

Negara Malaysia (Central Bank of Malaysia). We choose Malaysian Islamic banks because Malaysia is the only Islamic country that issued *Shukūk* yearly between 2004 and 2008. The objective of Malaysian authorities is to promote transparency through disclosing such kind of information on their website ³ (website of BNM).

The following table describes our sample in 2008:

Table-1
Description of the Sample of Islamic Banks used for the Analysis

Bank	Foundation	Kind	Total Assets Millions \$	Market Share (%)
Affin Islamic Bank Berhad	2005	S.D.B.G	1741	3.15 %
Al Rajhi Banking & Investment Corporation Berhad	2005	F.I.G	1376	2.49 %
Bank Islam Malaysia Berhad (BIMB)	1983	D.S.A.G	6775	12.26 %
CIMB Islamic Bank Berhad	2003	S.D.B.G	5349	9.68 %
EONCAP Islamic Bank Berhad	2006	S.D.B.G	2035	3.68 %
Hong Leong Islamic Bank	2005	S.D.B.G	2329	4.12 %
Kuwait Finance House (KFH) Malaysia Berhad	2005	F.I.B	2764	5 %
RHB Islamic bank Berhad	1997	S.D.B.G	2687	4.86 %
TOTAL			25056	45.36 %

Source: Moody's Global Banking (2008)

- S.D.B.G Subsidiaries of Domestic Banking Group
- F.I.G. Financial Islamic Group
- D.S.A.G Domestic Stand Alone Group
- F.I.B. Foreign Islamic Group

³ <http://www.bnm.gov.my/index.php?ch=12&pg=623&eId=box1> and <http://www.bnm.gov.my/index.php>

3. Results and Discussion

Table-2
ROA by Activities of Eight Malaysian Islamic Banks between 2004 and 2008

Bank / Activities	Retail and Commercial Banking	Corporate and Investment Banking	Treasury	Others	Total Bank
Affin Islamic Bank	2.64	1.73	0.45	1.72	1.61 (1)
Al Rajhi banking and Investment Corporation Malaysia Berhad	-1.62	0.81	0.8	0	0.00 (6)
Bank Islam Malaysia Berhad (BIMB)	-0.22	-0.9	0	93.14	-0.37 (7)
CIMB Islamic	1.02	0.96	1.05	-33.51	1.01 (5)
EONCAP Islamic Bank Berhad	2.51	-4.65	0.58	0	-0.52 (8)
Hong Leong Islamic Bank	2.19	1.77	-0.34	0	1.21 (3)
KFH Malaysia Berhad	0.68	2.13	0.92	-5.58	1.24 (2)
RHB Islamic bank	1.14	1.61	0.54	1.57	1.10 (4)

The average rate of assets of activity i is $ROA_i = \frac{1}{T} \sum_{t=1}^{T=5} ROA_{it} = \frac{1}{T} \sum_{t=1}^{T=5} \frac{\Pi_{it}}{A_{it}}$ where

ROA_{it} is the net profit of activity i in year t divided by average assets of activity i during the year.

Table 2 presents the average return on asset (ROA) and the average profits in the four banking activities (business units) for the eight banks. ROA indicates the profitability of the firm once expenses and taxes are paid and gives an idea about the management performance (Van Horne and Wachowicz, 2005). Our statistics show that Affin Islamic Bank has the highest ROA (1.610%), which implies that it has the best performance in our sample. EONCAP Islamic Bank Berhad has a negative ROA (-0.520%), since the corporate and investments activities have a negative impact on the bank's performance and despite the fact that the other

activities (retail and commercial activity and treasury activity) have a positive effect (respectively 2.510% and 0.580%). One explanation is that this bank was recently founded (2006) and has some difficulties to attract customers and depositors. We notice also that BIMB is the only bank in the sample that does not practice treasury activity unlike other banks.

Table-3
Average Profits by Activities of Eight Malaysian Islamic Banks
between 2004 and 2008 (thousand US\$)

Bank/Activities	Retail and Commercial Banking	Corporate and Investment Banking	Treasury	Others	Total bank
Affin Islamic Bank	4788 (33)	3097 (21)	4375 (30)	2302 (16)	14562
Al Rajhi banking and Investment Corporation Malaysia Berhad	-2307 (-68)	5862 (173)	-165 (-5)	0	3390
Bank Islam Malaysia Berhad (BIMB)	-6727 (-45)	-6849 (-46)	0	-1448 (-9)	-15024
CIMB Islamic	1927 (15)	3191 (25)	16396 (127)	-8603 (-67)	12911
EONCAP Islamic Bank Berhad	25530 (262)	-15383 (-158)	-413 (-4)	0	9734
Hong Leong Islamic Bank	21681 (96)	2763 (12)	-1923 (-8)	0	22521
KFH Malaysia Berhad	4392 (28)	9690 (61)	4190 (26)	-2400 (-15)	15872
RHB Islamic bank	7374 (22)	8537 (26)	6440 (20)	10426 (32)	32777
Average Activity	7964 (65)	1116 (9)	3504 (28)	-289 (-2)	12295

() The average contribution of the activity in the total profit of the bank (%) .

Table 3, which presents the average profits of the 4 activities, shows that the retail and commercial activity provides 65% of the total profits in our sample: It is the most profitable activity among the four banking activities for the eight banks. It is followed by treasury activity (28%) and corporate and investment activity (9%). It is straightforward to see that BIMB and EONCAP had affected largely the

results of the corporate and investment activity (respectively - 46% and - 158%). They are subsidiaries of domestic banking groups and have high market shares.

In conclusion, Malaysian banks show high standard deviation (large dispersion of results between banks and between activities). One explanation is that some banks are subsidiaries of large and multinational group while the others were recently founded so they face diseconomies of scale. Average profits vary significantly among banks and activities according to their expertise, size and market share.

The main findings in this table are the following:

Table 4 show that the performance measures (Sharpe and Treynor) for BIMB is 1.17 resulting to BIMB to score the best overall performance, followed by EONCAP Islamic Bank Berhad, Affin Islamic Bank and Kuwait Finance House Malaysia Berhad, while Al Rajhi, CIMB Islamic, RHB Islamic bank and Hong Leong Islamic bank have a negative value of the ratio. For the banks which have a negative value, this means that they generate an average rate of return lower than the rate of *Ṣukūk*. Note also that the risk-adjusted ratios provide slight different results from ROA analysis. For instance, according to RAROCS and RAROCT, the BIMB is now ranked the first (it was ranked seventh). One explanation is that BIMB's performance is mainly explained by competitive advantages over the other banks. It is the first bank operating in Malaysia, from the year 1983, and it is taking advantage of economies of scale due to its expertise.

We now analyze the contribution of each activity on the total performance of the bank. According to all the measures, the retail and commercial banking have the highest effects on the bank's performance: RAROCS = 0.56, RAROCT = 0.79 and RAROCJ = 0.0174. However, the Treasury activity had registered the worst performance value, having negative rates for all the measures: RAROCS = - 2.69, RAROCT = - 0.55 and RAROCJ = - 0.018, except KFH Malaysia Berhad which recorded positive values of the three ratios (RAROCS = 0.24, RAROCT = 0.32 and RAROCJ = 0.0113) in treasury activity. This result can be explained by the fact that this bank invests all its assets in the treasury activity. In 2008, the bank had a put all his assets (100%) in the treasury activity.

Table 4
Measures of (a) RAROCS (Sharpe Index) , (b) RAROCT (Treynor Index)
and (c) RAROCJ (Jensen Index) per activity i in bank j

Bank j / Activity i	Retail and Commercial Banking			Corporate and Investment Banking			Treasury			Others			Total Bank		
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
Affin Islamic Bank	1.39	2.16	0.023	0.79	1.18	0.013	-0.62	-0.16	-0.008	0.52	0.81	0.015	0.38 (3)	0.38 (3)	0.0003 (4)
Al Rajhi banking and Investment Corporation Malaysia Berhad	-0.61	-0.91	0.018	-0.51	-0.77	-0.017	-1.58	-2.61	-0.013	Na	Na	Na	-0.28 (5)	-0.28 (5)	-0.011 (5)
BIMB	2.33	2.98	0.041	-0.18	-0.24	-0.0021	Na	Na	Na	0.97	1.39	0.78	1.17 (1)	1.17 (1)	0.015 (1)
CIMB Islamic	0.34	0.46	0.0290	-1.91	-2.83	-0.0290	-2.57	-3.58	-0.0292	-3.91	-5.24	-0.0343	-1.12 (6)	-1.12 (6)	-0.0225 (7)
EONCAP Islamic Bank Berhad	1.49	2.26	0.0164	1.04	3.24	0.0083	-0.72	-1.18	-0.016	Na	Na	Na	0.59 (2)	0.59 (2)	0.007 (3)
Hong Leong Islamic Bank	0.01	0.01	0.00008	-1.82	-5.79	-0.0069	-7.14	14.45	-0.040	Na	Na	Na	-15.69 (8)	-15.69 (8)	-0.0171 (6)
KFH Malaysia Berhad	0.23	0.31	0.0177	0.48	0.64	0.0376	0.24	0.32	0.0113	0.55	0.74	0.0477	0.23 (4)	0.23 (4)	0.0120 (2)
RHB Islamic bank	-0.65	-0.92	-0.0054	-1.84	-39.44	-0.0206	-6.48	-11.15	-0.0334	-0.93	-1.34	-0.0139	-4.97 (7)	-4.97 (7)	-0.0247 (8)
Average activity	0.56	0.79	0.0174	-0.49	-5.50	-0.002	-2.69	-0.55	-0.018	-0.56	-0.72	0.15			

(1) the average rank

Finally, we examine the performance of each activity in the whole sample. The performance is measured as a "stand alone" activity and as component of a portfolio. The main findings are:

- Affin Islamic Bank has registered a good performance explained by the share of asset assigned to priority activities such as retail and commercial activity, followed corporate and investment activity. One surprising result is that treasury activity has a negative impact on the performance despite the fact that Affin Islamic bank invests 66% of its assets in this activity. In fact, *“Treasury and Islamic money market operations are involved in proprietary trading in fixed income and foreign exchange, Islamic derivatives trading and structuring, managing customer-based foreign exchange and Islamic money market transactions, funding and investment in ringgit and foreign currencies”* (the annual report of Affin Islamic Bank, 2008). We conclude that treasury activity is a long-term investment and return on investment is realized on the long term. The latter result explains the liquidity problem in banking.
- The good performance of BIMB comes mainly from the high performance of retail and commercial activity: $\text{RAROCS} = 2.33$, $\text{RAROCT} = 2.98$ and $\text{RAROCJ} = 0.041$. This may explain why BIMB has assigned one third of its assets to these activities (the bank has invested nearly 31% in 2008 and 35% in 2004, see Table 5). However, the performance of the corporate and investment banking was relatively poor: all the indices have a negative value, $\text{RAROCS} = -0.18$, $\text{RAROCT} = -0.24$ and $\text{RAROCJ} = -0.0021$.
- At CIMB Islamic, the retail and commercial banking performed well (despite the fact that only 14% of investments in 2008 are allocated to commercial services) while all the other activities performed poorly (negative values). That is why the performance of the bank is entirely negative.
- At EONCAP Islamic Bank Berhad, the good performance was derived mainly from the performance of its large retail and commercial banking (50% of the total investment in 2008 and 70% in 2006) but also from the corporate and investment banking (15% of the total investment in 2008) which have an interesting value of the RAROCS and RAROCJ index (respectively 1.04 and 3.24).

Table-5
Correlation Coefficients of Profits between Banking Activities with Total Profit of Banking Groups and the System between 2004 and 2008

Bank /Activities	Retail and Commercial Banking	Corporate and Investment Banking	Treasury	Others
Affin Islamic Bank	0.96	0.99	0.98	0.95
Al Rajhi banking and Investment Corporation Malaysia Berhad	0.99	0.98	0.90	0
BIMB	0.99	0.96	0	0.80
CIMB Islamic	0.99	0.90	0.95	0.99
EONCAP Islamic Bank Berhad	0.99	0.48	0.92	0
Hong Leong Islamic Bank	0.90	0.47	-0.74	0
Kuwait Finance House (KFH) Malaysia Berhad	0.97	0.99	0.98	0.99
RHB Islamic bank	0.94	0.06	0.77	0.92
Average per activity	0.96	0.72	0.68	0.93

Table 5 shows strong correlations between the earnings of retail and commercial activity, corporate and investment activity and the bank earnings in the 8 banks (respectively 96% and 72%). Only EONCAP Islamic Bank Berhad and Hong Leong Islamic Bank show slight different results: correlation between earnings of corporate and investment banking and total earnings are not too strong (respectively 48% and 47%). In RHB Islamic Bank, correlation between the earnings of the corporate and investment banking and the total earnings of the bank is almost nonexistent (6%). On the other hand, the correlation of treasury is relatively high (68%). This measure is very high in all the banks of our sample (approximately 90%) except for the Hong Leong Islamic Bank where we find a negative value (-0.74). Finally, correlations between the activities do not vary significantly between banks, thus one may compare the performance of various activities across banks.

3.1. *The Modern Portfolio Theory (MPT)*

Hereafter, we estimate the optimal portfolio's structure of each bank. Then, we compare it with its current portfolio in 2008 (see Table 6). We identify the relationship between the risk and the return of a portfolio by looking at four portfolios of our banks. To calculate the optimal portfolio and the efficient frontier, MPT assumes that the portfolio return is a linear function of the weights of each asset in the portfolio. The expected return of the portfolio $E(R_p)$ is written:

$$E(R_p) = \sum_{i=1}^m w_i E(R_i)$$

where $E(R_i)$ is the expected return of asset class i ($i = 1, \dots, m$), w_i is the share of money invested in asset i and m is the number of asset classes. Then, the expected return of portfolio can be written:

$$E(R_p) = W' [E(R)]$$

where $[E(R)]$ is the matrix of the expected returns for the portfolio assets and W' is the transpose of the matrix of assets weights. The portfolio risk contains both systematic and unsystematic risks. The systematic risk depends on many factors in the market such as macroeconomic conditions and currency fluctuations. It cannot be diminished through portfolio diversification (Devinney et al., 1985). However, unsystematic risk depends on many specific factors (management, quality of labor) which are closely related to the characteristics of each asset. MPT suggests that the portfolio's standard deviation σ_p is the appropriate measure of this kind of risk. It is based on the assumption that the level of risk of a portfolio is lower than the sum of weighted risk of its assets. The portfolio risk is then written:

$$\sigma_p = \sqrt{\sigma_p^2} = \sum_{i=1}^m w_i^2 \sigma_i^2 + 2 \sum_{i=1}^m \sum_{j=1}^m w_i w_j \sigma_{ij}$$

where σ_p is the portfolio standard deviation, σ_i is the standard deviation of returns in asset class i and σ_{ij} is the covariance of returns between asset classes i and j . Accordingly, the overall portfolio risk is given by: $\sigma_p = W' C W$ where C is the covariance matrix of assets returns. The efficient frontier and the optimal portfolio are solution of the following optimization problem:

$$\left\{ \begin{array}{l} \text{Min } \sigma_p = W'CW \\ s/c \quad W'\mu = \mu_p \\ \quad \quad W'e = 1 \end{array} \right.$$

where μ is the vector of assets returns and μ_p is the optimal vector of assets returns. Appendices provide more details.

Table 6
Portfolio's Composition of Islamic Banks (December 31 2008)

Bank /Activities	Retail and Commercial Banking	Corporate and Investment Banking	Treasury	Others
Affin Islamic Bank	13% (13%)	15% (12%)	66% (68%)	0
Al Rajhi banking and Investment Corporation Malaysia Berhad	18% (11%)	51% (0%)	31% (89%)	0
Bank Islam Malaysia Berhad (BIMB)	31% (35%)	69% (65%)	0	0(0)
CIMB Islamic	14% (0)	20% (0)	60% (95%)	7% (5%)
EONCAP Islamic Bank Berhad	50% (70%)	15% (20%)	34% (10%)	0
Hong Leong Islamic Bank	47% (54%)	6% (9%)	47% (37%)	0
Kuwait Finance House (KFH) Malaysia Berhad	35% (0%)	29% (0%)	33% (100%)	3% (0%)
RHB Islamic bank	25% (24%)	22% (22%)	50% (57%)	1% (-3%)
Average activity	29% (26%)	29% (16%)	40% (57%)	2% (1%)

() the share of assets allocated to the activity i .

3.2. Results for Optimal Portfolio Analysis

The results of the optimal portfolio analysis were mostly consistent with our analysis in the previous section (RAROC indexes).

Table 7
Optimal Composition of the Malaysian Islamic Banks Portfolio

Bank /Activities	Retail and Commercial Banking	Corporate and Investment banking	Treasury	Others	Total
Affin Islamic Bank	17%	11%	72%	0	100%
Al Rajhi banking and Investment Corporation Malaysia Berhad	12.3%	37.89%	50%	0	100%
BIMB	5.93%	93.82%	0	0.2%	100%
EONCAP Islamic Bank Berhad	68%	21%	16%	0	100%
Hong Leong Islamic Bank	77%	-22%	47%	0	100%
Kuwait Finance House (KFH) Malaysia Berhad	-20%	36%	88%	-4%	100%
RHB Islamic bank	137%	-19%	-22%	4%	100%

Table 7 provides the following results:

- First, Al Rajhi banking and Investment Corporation Malaysia Berhad should invest higher share of assets in treasury activity. Simultaneously, it should decrease its investment in retail and commercial activity and in corporate and investment activity. Our result is inconsistent with the actual decline of the share of the treasury activity in these banks in the recent years (from 89% in 2005 to 31% in 2008) and the increase of the share of assets allocated to retail and commercial activity (from 11% in 2005 to 18% in 2008) and to corporate and investment activity (from 0% in 2005 to 51% in 2008). Our results are also not consistent with our findings in the first part of the study. Indeed, despite the fact that treasury leads to a positive value of ROA (0.80%), all RAROC indices are negative.
- Second, BIMB should substantially increase its investment in corporate and investment activity and also boost the volume of other activities. However, a significant contraction of the retail and commercial banking must be done. These results are consistent with the movement of changes made in the bank, since the retail and commercial banking has decreased from 35% in 2004 to 31% in 2008, the commercial and investment activity increases from 65% to 69% while the other activities captured 0.01% in

2008. However, these results are not consistent with the previous findings about the RAROC indices. According to these indices, retail and commercial activity is the most profitable activity in this bank and even for the whole sample.

- Third, EONCAP Islamic Bank Berhad should make a real cutback of its treasury activity which captured at about 34 % of the bank's assets in 2008 and increase the assets allocated to retail and commercial activity. At the same time, the bank should invest more money in corporate and investment activity. These results join our previous findings and provide evidence that retail and commercial activity is the most profitable activity for this bank. Indeed, RAROCS, RAROCT and RAROCJ are positive and have higher values than in the other activities (ROA also has high value 1,49%). However, these results are not consistent with the current strategies of EONCAP in the sense that retail and commercial activity (tables 2 or 3) cut down from 70% in 2006 to 50% in 2008, while the optimal value of this activity according to MPT should be around 68%. Similarly, corporate and investment activity has decreased from 20% in 2006 to 15% in 2008, while the optimal investment in this activity should be around 21%. Finally, treasury should be diminished by 18 % in 2008 (decrease from 34% in 2008 to 16%).
- Finally, according to MPT calculations, Hong Leong Islamic Bank should assign more assets to the retail and commercial activity (77%). As shown in the first section, retail and commercial banking is the most profitable activity (RAROCS, RAROCT and RAROCJ are all negative for the other activities). Besides, the investment policy of this bank between 2006 and 2008 is based on the increase of assets allocated to retail and commercial activity and the decrease of the corporate and investment banking.

Table 8
The Current Value of HHI (%)

Bank /Activities	Retail and Commercial Banking	Corporate and Investment Banking	Treasury	HHI Assets
Affin Islamic Bank	0,0169 (0,0289)	0,0225 (0,0121)	0,4356 (0,5184)	0,475 (0,5594)
Al Rajhi banking & Investment Corporation Malaysia Berhad	0.0162 (0.0151)	0.3696 (0.1436)	0.2182 (0.2500)	0.604 (0.4087)
BIMB	0.1681 (0.0035)	0.36 (0.8802)	0.0000 (0.0000)	0.5281 (0.8837)
EONCAP Islamic Bank Berhad	0.3481 (0.4624)	0.0324 (0.0441)	0.0529 (0.0256)	0.4334 (0.5321)
Hong Leong Islamic Bank	0.2601 (0.5929)	0.0064 (0.0484)	0.1681 (0.2209)	0.4346 (0.8622)
Kuwait Finance House (KFH) Malaysia Berhad	0,1225 (-0,04)	0,0841 (0,1296)	0,1089 (0,7744)	0,3164 (0,8624)
RHB Islamic bank	0,0625 (1,37)	0,0484 (-0,19)	0,25 (-0,22)	0,361 (1,00)

() the optimal value of HHI in %.

Table 8 shows that the eight banks choose diversification and invest almost in all business lines but their portfolios are not optimal. There are many measures of market concentration, like for example four-concentration ratio (CR_4), eight-concentration ratio (CR_8)⁹, the Hannah-Kay ratio and the Herfindahl index (HHI). However, only the HHI index developed by Orris C. Herfindahl and Albert O. Hirschman, is suitable for bank diversification analysis and the data we have. HHI is calculated by taking the squared value of the market share of each firm competing in a market, and then adding the values to result to the market data, summing the resulting numbers. According to the HHI, some banks should diversify the allocation of their assets while others should be concentrated. We obtain the following findings:

- The current HHI value for Al Rajhi banking and Investment Corporation Malaysia Berhad is higher than what it should be. Despite that this bank

⁹ CR_4 and CR_8 are used to measure the share market of firms operating in an oligopolistic market under specific conditions.

invests all most in the four banking activities, its investment policy is not optimal. We highlight on one hand a problem of overinvestment in both retail and commercial banking, corporate and investment banking and on the other hand, there is an underinvestment problem in treasury activity.

- The current value of HHI in BIMB is largely inferior to its optimal value (0.88). As mentioned before, it does not invest in treasury which is optimal. It should focus only on retail and commercial banking and corporate and investment banking. In fact, fewer assets should be assigned to retail and commercial banking in contrast with corporate and investment banking.
- For EONCAP Islamic Bank Berhad, policy investment as a whole is not too far from what it should be (optimal HHI is equal to 0.53 while its current value is 0.43). In contrast with the previous ones, it is facing an overinvestment (respectively underinvestment) problem in treasury (respectively retail and corporate activities)
- Finally, for the Hong Leong Islamic Bank, the optimal HHI is equal to 0.86 while the actual value of this index is 0.43. This comes from an underinvestment problem in all activities. Accordingly, the bank should diversify more its investments.

Hereafter, we define the efficient frontier (in terms of ROA and standard deviation) for these banks and compare them to the current position of these banks. It is another way of measuring performance: we compare the current and the optimal portfolios across banks and also over time. Hereafter, we present two figures (the rest are in the annex) showing the efficient frontiers of two banks and their current positions. We run calculations for efficient frontier for the other banks and found similar results. The analysis can be generalized to all banks in our sample.

Our results show that the current BIMB's portfolio is not efficient: it is above the efficiency frontier in the negative side. One explanation is that the current portfolio of BIMB has a negative return. The EONCAP Islamic Bank Berhad, Al Rajhi banking and investment Corporation Malaysia Berhad, KFH Malaysia Berhad and RHB Islamic Bank are also no efficient; their portfolios are below the efficient frontier. So, for a given level of risk, these banks have reached a positive rate of return (ROA) which is inferior to the optimal value. Thus none of this bank falls on the efficient frontier. They are not able to overcome their inefficiency despite the fact that they improved their performance between 2004 and 2008.

4. Conclusion

This paper investigates the issue of diversification among activities in Malaysian Islamic banks and analyzes the effect of diversification on their performance and efficiency. We use HHI to measure activity concentration of Malaysian Islamic banks. To analyze the bank performance, we estimate ROA and RAROC. Finally, we determine the efficient frontier according to MPT.

Despite the small sample size, this study brings some interesting results. First, we found that these banks invest almost in the four activities but their investments are not optimal. Unlike BIMB, they all have to assign assets to treasury banking. They face problems of over and under-investment.

Moreover, they are not efficient and cannot get around their inefficiency despite the fact that their performance was increasing over the period 2004-2008. One explanation is that these banks are growing but facing many challenges and more risks than their conventional counterparts, like for example legal and competitive risks.

It would be interesting to conduct a comparative study on diversification with larger sample size of conventional and Islamic banks. In the current study, we focused on diversification only among activities but it would be more appealing to study diversification among sectors since Islamic banks can invest only in investments that are Shari'ah compliant. At a macroeconomic level, it would help to understand regional differences.

Figure 1
Efficient Frontier and Current Portfolio Al Rajhi Banking & Investment Corporation Malaysia Berhad

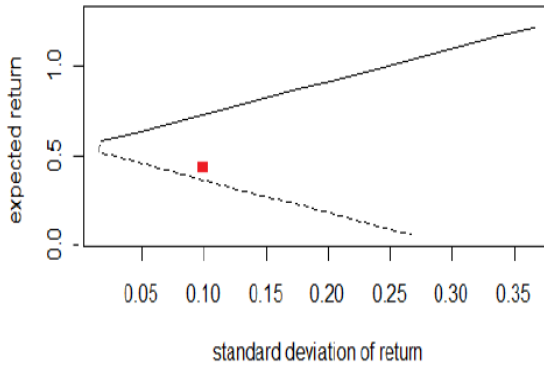


Figure 2
Efficient Frontier and Current Portfolio BIMB
Efficient Frontier and Current Portfolio

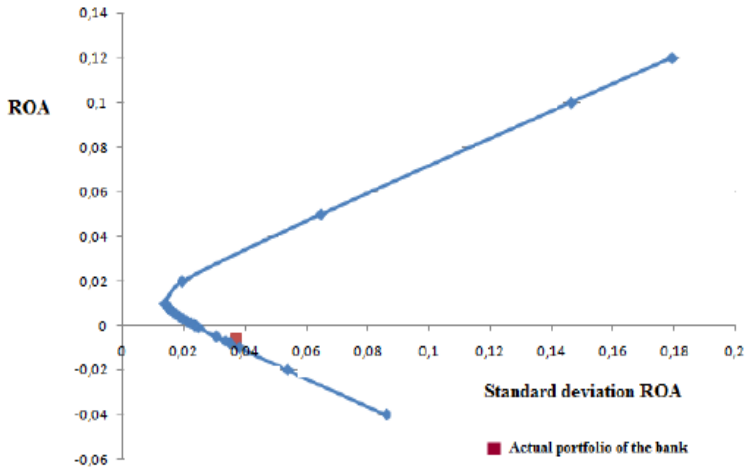


Figure 3
Efficient Frontier and Current Portfolio EONCAP

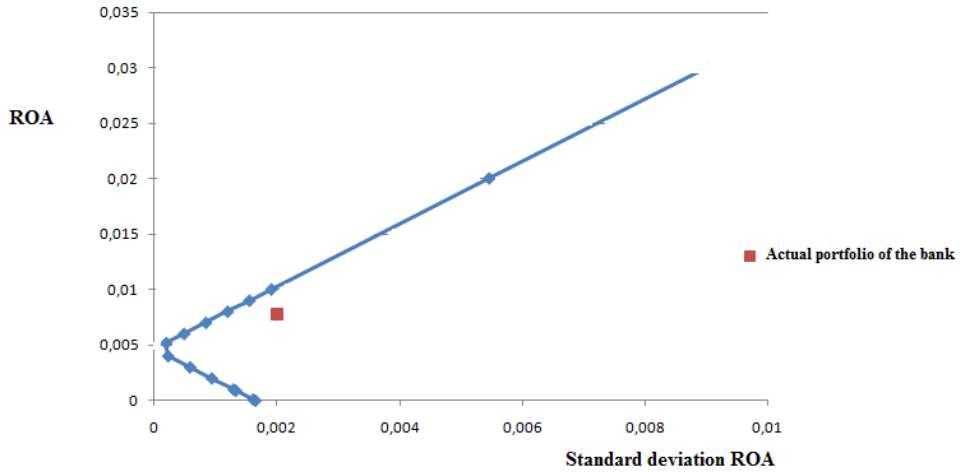


Figure 4
Efficient Frontier and Current Portfolio RHB Islamic Bank

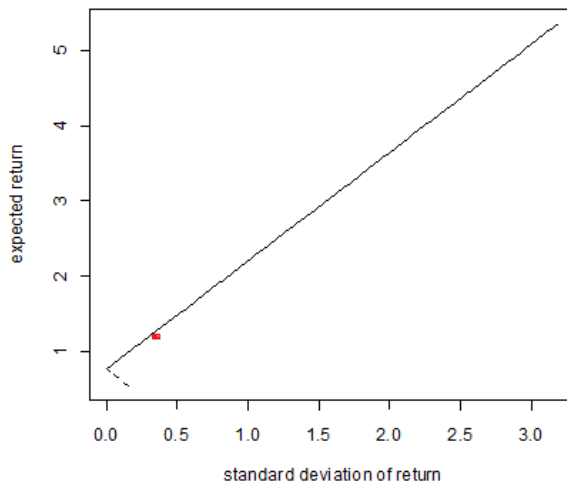
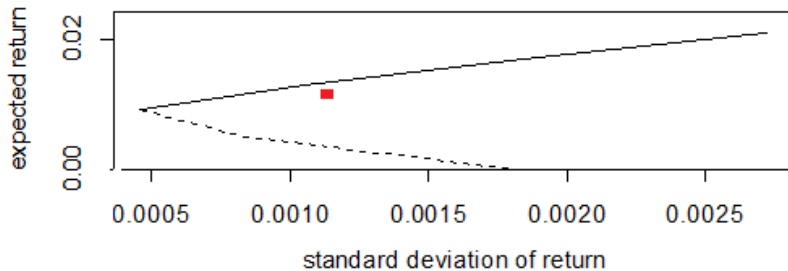


Figure 5
Efficient Frontier and Current Portfolio KFH Malaysia Berhad



Efficiency Frontier and Optimal Portfolio

To determine the efficient frontier and the optimal portfolio, we must resolve the following system:

$$\left\{ \begin{array}{l} \text{Min } \sigma_p = W'CW \\ s/c \quad W'\mu = \mu_p \\ \quad \quad W'e = 1 \end{array} \right.$$

Where W is the weight vector of assets weights, μ is the vector of assets returns, C is the covariance matrix of asset returns and $e = [1 \ 1 \ 1 \ \dots \ 1]$.

To solve this system, we determine the following Lagrangian:

$$L = W'CW + \lambda_1 (\mu_p - w'\mu) + \lambda_2 (1 - W'e)$$

where λ_1 and λ_2 are the multipliers of Lagrange. The optimality condition of the first order is written

$$\partial L / \partial W = 2CW - \lambda_1 \mu - \lambda_2 e = 0 \quad \iff W = \frac{\lambda_1 C^{-1} \mu}{2} + \frac{\lambda_2 C^{-1} e}{2} \quad (1)$$

where C^{-1} is the inverse of the matrix.

The two constraints in the bank's program can be written:

$$\left\{ \begin{array}{l} W' \mu = \mu_p \\ W' e = 1 \end{array} \right\} \iff \left\{ \begin{array}{l} \mu' W = \mu_p \\ e' W = 1 \end{array} \right\}$$

$$\left\{ \begin{array}{l} \lambda_1 \mu' C^{-1} \mu + \lambda_2 \mu' C^{-1} e = 2 \mu_p \\ \lambda_1 e' C^{-1} \mu + \lambda_2 e' C^{-1} e = 2 \end{array} \right.$$

We denote by A, B and C respectively the following expressions:

$$A = e' C^{-1} \mu = \mu' C^{-1} e; B = \mu' C^{-1} \mu \text{ and } C = e' C^{-1} e$$

The system to solve becomes:

$$\left\{ \begin{array}{l} \lambda_1 B + \lambda_2 A = 2 \mu_p \\ \lambda_1 A + \lambda_2 C = 2 \end{array} \right\} \iff \left\{ \begin{array}{l} \lambda_1 = \frac{2(C \mu_p - A)}{D} \\ \lambda_2 = \frac{2(B - A \mu_p)}{D} \end{array} \right.$$

where $D = BC - A^2$. Finally, we replace λ_1 and λ_2 by their expressions in equation (1) which give the weight of assets in the optimal portfolio:

$$W_p = g + h \cdot \mu_p$$

$$\text{where } g = \frac{(BC^{-1}e - AC^{-1}\mu)}{D} \quad \text{and} \quad h = \frac{(CC^{-1}\mu - AC^{-1}e)}{D}$$

Then, we can represent the efficient frontier (all the efficient portfolios) in the plane (μ_p, w_p) with

$$\sigma_p = \sqrt{w_p' C w_p} = \sqrt{\frac{C \mu_p^2 - 2A \mu_p + B}{D}}$$

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