The Portfolio Selection by Using Quadratic Programming Approach Case Study of Malaysia Stock Exchange

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Abstract— This paper uses the quadratic approach to select the optimum portfolio of the Malaysian stovk exchange. This framework deals with ten biggest firms posted on the stock exchange during 2014. The result shows that the optimum portfolio includes 22 % of Axiata Group shares, 11% of Genting shares, 30 % of Petronas Chemicals shares, 1% of Sime Darbi shares and 36 % of Tenaga Nasional shares.

Keyword- Portfolio Selection, Quadratic Programming, Covariance, Lagrangian Duality, Bursa Malaysia.

I. INTRODUCTION

The concept of investment refers to the process of funds allocation to hold assets for a future period. This sense had been developed to indicate the configauration mechanism of a portfolio including different financial assets . The invesment by this meaning focuses much on the hypothesis of the Porfolio Selection (Jones, 2000; Jong Shi Pang, 1980; Gordon Pye, 1967; Anthony S. Courakis, 1988).

Setting investment objectives begins with a thorough analysis of the investment objectives of the entity whose funds are being managed. These entities can be classified as individual investors and institutional investors. Within each of these broad classifications is a wide range of investment objectives. Institutional investors include: (Fabozzi & Markowitz, 2011)

- Pension funds.
- Depository institutions (commercial banks, savings and loan associations, and credit unions).
- Insurance companies (life companies, property and casualty companies, and health companies).
- Regulated investment companies (mutual funds and closed-end funds).
- Endowments and foundations.
- Treasury department of corporations, municipal governments, and government agencies.

There are two different kinds of the financial investment:

The Direct Investment: is figured out by the transactions (buy and sell) of the financial assets Mishkin F.S, 2004; Fama E. F, 1991). As a result of the operation, the investor holds shares and bonds from either a physical or incorporeal person (entity).

The Indirect Investment: This kind dnotes the indirect ownership of the financial assets through the Investment Funds and Trust Units in banks, Corporations of The Financial Investment. The common investment procedure stands for buying and selling shares in the Mutual Funds which involve financial portfolios managed by high expertise that looks for taking advantages and reducing risks.

The Portfolio Management attempts to build and develop portfolios in order to reach the targeted objectives and by respecting the investment conditions: the Asset Diversification and the Risk Management.

II. DESCRIPTION OF THE STUDY.

The Quadratic Porgramming is a kind of the linear programming in which the target function represented by a second order function aims at minimizing or maximizing in the presence of different constraints. Consequently, this programming constitutes the basis of the linear programming algorithms.

A . Model of the Quadratic Porgramming

The model of Quadratic Porgramming s represented by the form:

$$Minimize f(X) = cx + \frac{1}{2} x^T Qx$$
$$subject - to:$$
$$Ax \le b$$
$$x \ge 0$$

c denotes the coefficient of the target function with n dimension, Q is the symmetric matrix (n×n) which represents the coefficients of the quadratic coefficient. If the condition is constant and fufilled, then it will be dropped from the model as it is the case in the linear programming. The vertical variables of the decision are mentioned by x as the column vector of n dimension. Indeed, the constraints are identified by the matrix (n×m), b the vertical vector with m dimension and we suppose in this case that the solution is effectively possible within the conditions of the constraints.

The quadratic programming problem differs from the linear programming problem only in the case where the objective function includes xj^2 and xixj (i≠j) terms.

The problem is to find x so as to

$$Max\ f(x) = cx - \frac{1}{2}x^T\ Q_x$$

Subject to

$$Ax\ \leq b\ and\ x \geq 0$$

Where *c* is a row vector, x and b are column vectors, Q and A are matrices, and the superscript T denotes the transpose. The *qij* (elements of Q) are given constants such that *qij =qji* (which is the reason for the factor of $\frac{1}{2}$ in the objective function).

By performing the indicated vector and matrix multiplications, then the objective function

is expressed in terms of these *qij*, the *cj* (elements of c), and the variables as follows:

$$f(x) = cx - \frac{1}{2}x^T Q_x = \sum_{j=1}^{n} c_j x_j - \frac{1}{2}\sum_{j=1}^{n}\sum_{j=1}^{n} q_{ij}x_i x_j$$

For each term where $i = j$ in this double summation $x_i x_j = x_j^2$, so $-\frac{1}{2}q_{ij}$ is the coefficient of x_j^2. When i≠j, then $-\frac{1}{2}\left(q/_{ij}x_i x_j + q_{ij}x_j x_i\right) = -q_{ij}x_i x_j$, so $-q_{ij}$ is the total coefficient for the product of x_i and x_j (Hillier & Lieberman, 2001)

B. Lagrangian Duality

The concept of duality is very important in optimization. The objective by considering a dual problem is to get an alternative formulation of the optimization problem that is computationally more attractive or has some theoretical significance (Axehill, 2005).

As the quadratic programming models are difficult to solve, the Lagrange Multiplier and Duality techniques are adopted in order to find a formula which makes the solution easy by the method of Simplex. The function of the Langrage Quadratic Programming is written as follow: (Gass & Fu, 2013) (Axehill, 2005).

$$L(x, \lambda) = \frac{1}{2}\ Qx + \ \lambda^T\ (Ax - b)$$

Lagrange determines the dual function $g(\lambda)$ and is defined by:

$$g(\lambda) = \underset{x}{\mathrm{INF}}\, L(x, \lambda)$$

Then, the infimum is found by using the following equation:

$$\nabla_x\ L(x, \lambda) = 0$$

Hence, the Udality function is given by:

$$g(\lambda) = -\frac{1}{2}\ \lambda^T\ AQ^{-1}A^T\lambda - \ b^T\lambda$$

Then the Quadratic Programming Lagrange duality is represented by:

Maximize: $-\frac{1}{2}\lambda^T AQ^{-1}A^T\lambda - \ b^T\lambda$

Subject to: $\lambda \geq 0$

The issue is not only restricted by the Lagrange Duality but there are other dualities as Wolf Duality.

C. The Quadratic Programming and the Selection of the financial portfolio

Harry Markowitz stated that: " A good portfolio is more than a long list of good stocks and bonds. It is a balanced whole, providing the investor with protections and opportunities with respect to a wide range of contingencies" (Markowitz, 1959).

A portfolio consists of various amounts held in different assets. The number of possible assets can be quite large. the basic portfolio optimization problem is to decide how much of an investor's wealth should be optimally invested in each asset . (Best, 2010)

A major advantage of Markowitz' mean-variance analysis is the relative ease of computing optimal strategies and as such it is a practical technique. (MacLean & Ziemba, 2013)

The organizational decisions are generally conceived by a target function taking the form of quadratic equation and linear constraints. These decisions involve non negative variables. The resulted model is known by the Quadratic Programming Model and it is by then a special case of the non linear programming approaches as the Consumer Behavioral Model. The latter includes a quadratic utility function and a linear budget function. Another example of these models is the firm model when the demand quantity is figured out by a linear equation and the revenue function (the target function in this case) is also a quadratic function. The constraints of the firm model (constraints of production) are linear equations. The Portfolio models in which the target function includes two sets: the first represents the portfolio expected revenue taking the form of a linear equation and the other set shows the variance of the portfolio value of a quadratic form.

Alongside with this issue, the models of the resources allocation among projects on sectoral levels are widely adopted and the famous method adopted to resolve these models is the Wolf's Simplex Technique which is based on the Lagrange Multipliers and The Con Toker conditions in addition to the Simplex Method (Makhlof, 1995).

D. The Quadratic Programming Analysis of the Portfolio.

Meade and Salkin use quadratic programming to determine the optimal tracking portfolio weights. However, they use a preselected set of securities. As mentioned in Tabata and Takeda, index fund management requires:

• Minimization ofthe number of assets in the tracking portfolio.

• Minimization ofa function of the tracking-error between portfolio and index. (Prigent, 2007)

If a specific sum F is shared among different investments n, each one has determined revenues, the portfolio issue will be to state the amount of funds directed to each investment by condition that the expected total revenue is bigger or equal the least accepted quatity of L and the total variance of the future payments will be lesser as possible.

Suppose $x_i\left(i = 1,2,..., n\right)$ is the amount of funds directed to investment i,

x_{ik} is the monetary revenue of the investment i,

k represents the time period (*k* = 1, 2, …, p),

If the previous payments repesent the investment performance of the monetary unit, the equation will take the form: (Bronson, 1982)

$$E_i = \frac{\sum_{k=1}^{p} x_{ik}}{p} \qquad \text{...............................(1)}$$

And the total expected revenue of all the investments is:

$$E = E_1 x_1 + E_2 x_2 + ... + E_n x_n \qquad \text{........................(2)}$$

And in case where the total variance of the future payments based on the previous revenue, the quantity i.e. the total revenue σ^2 is chosen:

$$z = \frac{\sum_{k=1}^{p} \left(x_{1k} x_1 + x_{2k} x_2 + ... + x_{nk} x_n - E\right)^2}{p} \qquad \text{…………. (3)}$$

This represents the arithmetic mean of the deviations squares of the previous period $(x_1 + x_2 + ... + x_n)$, and the total expected revenue is found by replacing the equation (2) in (3) and after rearrangement we get:

$$z = \frac{1}{p}\sum_{k=1}^{p}\left[(x_{1k} - E_1)x_1 + (x_{2k} - E_2)x_2 + ... + (x_{nk} - E_n)x_n\right]^2$$
$$= \frac{1}{p}\sum_{k=1}^{p}\sum_{i=1}^{n}\sum_{j=1}^{n}(x_{ik} - E_i)(x_{jk} - E_j)x_i x_j \qquad \text{………………… (4)}$$
$$= \sum_{i=1}^{n}\sum_{j=1}^{n}\sigma_{ij}^2 x_i x_j$$

And the common variance is denoted by:

$$\sigma_{ij}^2 = \frac{1}{p}\sum(x_{ik} - E_i)(x_{jk} - E_j) = \frac{1}{p}\sum_{k=1}^{p}x_{ik}x_{jk} - \frac{1}{p^2}\left(\sum_{k=1}^{p}x_{ik}\right)\left(\sum_{k=1}^{p}x_{jk}\right) \text{……………..(5)}$$

From equation (3) the total squares is negative for all the values $x_1, x_2, ...x_n$, this means that the identical matrix $C = [\sigma_{ij}^2]$ of the equation (4) wich is the the matrix of the common variance is evenly positive. Hence, we can build a model of a portfolio selection by using quadratic programming according to the following equation:

$$Min\ .....\ z = \sum_{i=1}^{n}\sum_{j=1}^{n}\sigma_{ij}^2 x_i x_j$$
$$x_1 + x_2 + ... + x_n = F \qquad \text{.........(6)}$$
$$E_1 x_1 + E_2 x_2 + ... + E_n x_n \geq L$$

All the variables are positive, so the equation (6) is impossible to solve when L is of high order. The model (6) can be simplified as:

$$M\text{in} \sum_{\text{i}=1}^{\text{n}}\sum_{\text{j}=1}^{\text{n}}\sigma^2{}_{\text{ij}} x_i x_j$$
$$ST$$
$$\begin{cases}\sum_{i=1}^{n} x_i = 1 \\ \sum_{i=1}^{n} E_i x_i \geq L\end{cases}$$
$$0 \leq x_i \leq p_i \ ,\ \text{i} = 1,\ ...,\ \text{n}$$

x_i is the amount of invested funds in the financial assets of the firm *i*

L The rate of revenue or the Growth Fator

pi The highest level of the relative investment allocated to the shares or the bonds of the firm *i*

E_i The revenue of the financial asset of the period studied

$\sigma^2{}_{\text{ij}}$ The common variance of the revenue of the financial asset *i* with financial asset *j*

$\sum_{i=1}^{n} x_i = 1$ The total funds invested is supposed to equal 1 monetary unit

III.EMPIRICAL EVIDENCE

A. Descriptive Statistics of Data:

The model of the portfolio selection is based on the data of the biggest ten Malaysian firms according to the list Forbes posted on the Bursa Malaysia:

TABLE 1. Top 10 large Malaysian companies (2014) (Forbes)

Rank	National Rank	Company	Sales	Profits	Assets	Market Value
326	1	**Maybank**	$9.7 B	$2.1 B	$171.1 B	$26.3 B
443	2	**Tenaga Nasional**	$12 B	$1.6 B	$31.3 B	$20.7 B
460	3	**CIMB Group Holdings**	$6.8 B	$1.4 B	$113.2 B	$18.1 B
585	4	**Public Bank**	$4.6 B	$1.3 B	$93.3 B	$20.6 B
598	5	**Sime Darby**	$14.4 B	$1.1 B	$15.2 B	$17.1 B
861	6	**Axiata Group**	$5.8 B	$0.8 B	$13.3 B	$17.7 B
915	7	**Genting**	$5.6 B	$0.6 B	$21.8 B	$11.4 B
1052	8	**RHB Capital**	$3 B	$0.6 B	$58.3 B	$6.6 B
1062	9	**Petronas Chemicals**	$4.8 B	$1 B	$8.5 B	$16.7 B
1121	10	**AmBank Group**	$2.6 B	$0.5 B	$40 B	$6.6 B

The objective of the model is to reduce the variance of the revenues and the risks by supposing that tha investor looks for:

Realizing a future revenue no lesser than 5.5 % of his investments i.e. that the growth factor or the growth rate will be 10.55

The investments in ones asset does not exceed 5 %

Supposing that there is no place for short selling

B. The Portfolio selection model.

The results of the covariance matrix of the returns are shown by the following table:

TABLE 2. The covariance matrix of the returns

	AMBANK	AXIATA GROUP	CIMB	GENTING	MAYBANK	PETRONAS CHEMICALS	PUBLIC BANK	RHB CAPITAL	SIME DARBY	TENAGA NASIONAL
AMBANK	0.00047	5.0213e-05	0.0003	0.0004	0.00019	0.00027	0.00029	0.000331	2.46706e-05	-2.2774e-06
AXIATA GROUP		0.000286	0.00029	-1.61716e-05	0.00018	8.23187e-06	-2.65897e-05	6.81306e-05	0.000273	-6.38902e-05
CIMB			0.002314	0.0006385	0.0010223	0.0002926	0.000105	0.0012487	0.0008932	-0.0001386
GENTING				0.001146	0.0004521	0.0001183	0.000463	0.0007758	0.000129	0.000109
MAYBANK					0.000780	0.0002068	0.0002287	0.0009436	0.000467	-2.80666e-05
PETRONASCH EMICALS						0.000709	0.0004673	0.0007399	-9.742652e-05	-0.00041
PUBLIC BANK							0.000717	0.0006285	2.76875e-06	-0.00016
RHB CAPITAL								0.001971	0.00045	-0.000167
SIME DARBY									0.000774	0.00015
TENAGA NASIONAL										0.0006662

The shares of Ambank are denoted by X, Axiata Group by Y, Cimb by Z, Genting by D, May Bank by S, Petronaas Chemicals by G, Public Bank by R, RHBCapital by U, Sime Darby by M and K.

The resomution of this model requires the transformation into a first linear equation, for this purpose the dual variables and Lagrange Multiplier are used for each constraint and twelve (12) dual variables are proposed:

Unity (1), Return,

Dual variable for X $\rightarrow$ XFRAC

Dual variable for Y $\rightarrow$ YFRAC

Dual variable for D $\rightarrow$ DFRAC

Dual variable for S $\rightarrow$ SFRAC

Dual variable for G $\rightarrow$ GFRAC

Dual variable for U $\rightarrow$ UFRAC

Dual variable for R $\rightarrow$ RFRAC

Dual variable for M $\rightarrow$ MFRAC

Dual variable for K $\rightarrow$ KFRAC

FRAC is tha abbreviation of fraction

Hence, the mathematical model of Lagrange Multiplier is the following:

C. Lagrange Multiplier

TABLE 3. Portfolio program by Using Quadratic Programming model

Min 0,000472582 X^2 + 0,00028677 Y^2 + 0,0023144 Z^2 + 0,00114616 D^2 + 0,00078058 S^2 + 0,00070955 G^2 + 0,00071714 R^2 + 0,0019712 U^2 + 0,00077471 M^2 + 0,0006662 K^2 + 0,000100427 XY + 0,000616988 XZ + 0,000872222 XD + 0,000393365 XS + 0,000542281 XG + 0,000590334 XR + 0,000663942 XU + 0,000049341 XM - 0,000004555 XK

+ 0,000595631 YZ - 0,000032343 YD + 0,000362022 YS + 0,000016464 YG - 0,000053180 YR + 0,000136261 YU + 0,000547649 YM - 0,000127780 YK

+ 0,001277165 ZD + 0,002044777 ZS + 0,000585336 ZG + 0,000210216 ZR + 0,002497419 ZU + 0,001786475 ZM - 0,000277348 ZK

+ 0,000904382 DS + 0,000236777 DG + 0,000927197 DR + 0,001551750 DU + 0,000258510 DM + 0,000218703 DK

+ 0,000413783 SG + 0,000457567 SR + 0,001887290 SU + 0,000935882 SM - 0,000056133 SK

+ 0,000934790 GR + 0,001479905 GU - 0,000194853 GM - 0,000821449 GK

+ 0,001257038 RU + 0,000005538 RM- 0,000321180 RK

+ 0,000904985 UM - 0,000334666 UK

+ 0,000300172 MK

+ (X + Y + Z + D + S + G + R + U + M + K-1) UNITY

+ ((1.055-(1.0972 X + 1.0087 Y + 1.0354 Z + 1.1420 D + 1.0426 S + 1.0409 G + 1.0622 R + 1.0340 U + 1.0634 M + 1.0695 K)) RETURN

+(X-0.5) + (Y-0.5) +(Z-0.5) + (D-0.5) + (S-0.5) + (G-0.5) + (R-0.5) + (U-0.5) + (M-0.5) +(K-0.5)

And the dual model of the financial portfolio after modification by using the Lagrang Multiplier is resolves as the following:

Min X + Y + Z + D + S + G + R + U + M + K + UNITY + RETURN + XFRAC + YFRAC + ZFRAC + DFRAC + SFRAC + GFRAC + RFRAC + UFRAC + MFRAC + KFRAC

Subjet to

0.000945165 X + 0.000100427 Y + 0.000616988 Z + 0.000872222 D + 0.000393365 S + 0.000542281 G + 0.000590334 R + 0.000663942 U + 0.000049341 M - 0.000004555 K + UNITY – 1.0972 RETURN + XFRAC > 0

0.000100427 X + 0.000573540 Y + 0.000595631 Z - 0.000032343 D + 0.000362022 S + 0.000016464 G - 0.000053180 R + 0.000136261 U + 0.000547649 M -0.000127780 K + UNITY – 1.0087 RETURN + YFRAC > 0

0.000616988 X + 0.000595631 Y + 0.004628802 Z + 0.001277165 D + 0.002044777 S + 0.000585336 G + 0.000210216 R + 0.002497419 U + 0.001786475 M -0.000277348 K + UNITY – 1.0354 RETURN + ZFRAC > 0

0.000872222 X - 0.000032343 Y + 0.001277165 Z + 0.002292330 D + 0.000904382 S + 0.000236777 G + 0.000927197 R + 0.001551750 U + 0.000258510 M + 0.000218703 K + UNITY – 1.1420 RETURN + DFRAC > 0

0.000393365 X + 0.000362022 Y + 0.002044777 Z + 0.000904382 D + 0.001561167 S + 0.000413783 G + 0.000457567 R + 0.001887290 U + 0.000935882 M -0.000056133 K + UNITY – 1.0426 RETURN + SFRAC > 0

0.000542281 X + 0.000016464 Y + 0.000585336 Z + 0.000236777 D + 0.000413783 S + 0.001419118 G +

0.000934790 R + 0.001479905 U - 0.000194853 M -0.000821449 K + UNITY – 1.0409 RETURN + GFRAC > 0
0.000590334 X - 0.000053180 Y + 0.000210216 Z + 0.000927197 D + 0.000457567 S + 0.000934790 G + 0.001434287 R + 0.001257038 U + 0.000005538 M -0.000321180 K + UNITY – 1.0622 RETURN + RFRAC > 0
0.000663942 X + 0.000136261 Y + 0.002497419 Z + 0.001551750 D + 0.001887290 S + 0.001479905 G + 0.001257038 R + 0.003942402 U + 0.000904985 M -0.000334666 K + UNITY – 1.0340 RETURN + UFRAC > 0
0.000049341 X + 0.000547649 Y + 0.001786475 Z + 0.000258510 D + 0.000935882 S - 0.000194853 G + 0.000005538 R + 0.000904985 U + 0.001549426 M + 0.000300172 K + UNITY – 1.0634 RETURN + MFRAC > 0
- 0.000004555 X - 0.000127780 Y - 0.000277348 Z + 0.000218703 D - 0.000056133 S - 0.000821449 G - 0.000321180 R - 0.000334666 U + 0.000300172 M + 0.001332548 K + UNITY – 1.0695 RETURN + KFRAC > 0
X + Y + Z + D + S + G + R + U + M + K = 1
1.0972 X + 1.0087 Y + 1.0354 Z + 1.1420 D + 1.0426 S + 1.0409 G + 1.0622 R + 1.0340 U + 1.0634 M + 1.0695 K > 1.055
X < 0.5
Y < 0.5
Z < 0.5
D < 0.5
S < 0.5
G < 0.5
R < 0.5
U < 0.5
M < 0.5
K < 0.5
END
QCP 12

And the results are:

QP OPTIMUM FOUND AT STEP 12

Objective function value

1) 0.9690199E-04

TABLE 4. The Results

VARIABLE	VALUE	REDUCED COST
X	0.000000	-0.000011
Y	0.223439	0.000000
Z	0.000000	0.000215
D	0.107309	0.000000
S	0.000000	0.000126
G	0.302074	0.000000
R	0.000000	0.000000
U	0.000000	0.000386
M	0.009106	0.000000
UNITY	0.002197	0.000000
RETURN	0.002266	0.000000
XFRAC	0.000000	0.500000
YFRAC	0.000000	0.276561
ZFRAC	0.000000	0.500000
DFRAC	0.000000	0.392691
SFRAC	0.000000	0.500000
GFRAC	0.000000	0.197926
RFRAC	0.000000	0.500000
UFRAC	0.000000	0.500000
MFRAC	0.000000	0.490894
KFRAC	0.000000	0.141927

ROW	SLACK OR SURPLUS	DUAL PRICES
2	-0.000011	0.000000
3	0.000000	-0.223439
4	0.000215	0.000000
5	0.000000	-0.107309
6	0.000126	0.000000
7	0.000000	-0.302074
8	0.000045	0.000000
9	0.000386	0.000000
10	0.000000	-0.009106
11	0.000000	-0.358073
12	0.000000	0.002197
13	0.000000	-0.002266
14	0.500000	0.000000
15	0.276561	0.000000
16	0.500000	0.000000
17	0.392691	0.000000
18	0.500000	0.000000
19	0.197926	0.000000
20	0.500000	0.000000
21	0.500000	0.000000
22	0.490894	0.000000
23	0.141927	0.000000

NO. ITERATIONS= 12

F) 0.9690199E-04

X = 0 Y = 0.22 Z = 0 D = 0.11 S = 0 G = 0.30

R = 0 U = 0 M = 0.01 K = 0.36

D. Analysis of the results.

According to the above results we find: X = 0%, Y = 22%, Z = 0%, D =11%, S = 0, G = 30 %, R = 0%, U = 0%, M = 1%, K = 36%. This means that the proposed portfolio includes 22 % of Axiata Group shares, 11% of Genting shares, 30 % of Petronas Chemicals shares, 1% of Sime Darbi shares and 36 % of Tenaga Nasional shares.

The objective function has a value of 0.9690199 × 10-4 which represents less dispersion of the values from the optimal values of the portfolio components. The Lagrange multiplier indicates that an increase in 1% of the portfolio return leads to increase the variance (risk) by 0.226 %

IV. CONCLUSION

The portolio selection by using the quantitative methods is an interesting issue for the good decision making process. The purpose of this is to help the investor to form the optimal financial portfolio and to know the share invested in each of the different parts of the portfolio, the fact that ensures the financial diversification.

The results presented by this study according to the model of Markowitz show that the deviations of the objective function are so small. This means that the variations of the financial assets prices are less dispersed to the values of the optimal portfolio (based on the quadratic programming approach results). The Lagrange Multiplier indicates that the increase in the portfolio return by 1% leads to increase the variance (risk) by 0.226%

APPENDIX

-Bursa malaysia

-Forbes.

-Bloomberg.

-Thomson Reuters.

Table 5. Historic monthly returns for ten selected shares over one year.

	01-14	02-14	03-14	04-14	05-14	06-14	07-14	08-14	09-14	10-14	11-14	12-14
Maybank	-0,0160	-0,0041	-0,0275	0,0126	0,0114	0,0082	0,0142	-0,0030	0,0090	-0,0457	0,0063	-0,0818
Tenaga Nasional	0,0455	0,0261	0,0169	-0,0217	0,0170	-0,0134	0,0441	0,0000	0,0163	0,0016	0,0751	0,0282
CIMB	-0,0792	-0,0113	0,0128	0,0085	0,0265	-0,0177	-0,0305	0,0071	0,0284	-0,1172	0,0016	-0,1045
Public Bank	0,0401	-0,0042	-0,0042	0,0525	0,0000	0,0369	0,0001	-0,0169	-0,0313	-0,0375	-0,0108	-0,0088
Sime Darby	-0,0460	-0,0120	0,0200	0,0109	0,0247	-0,0010	0,0137	-0,0166	-0,0116	-0,0224	0,0523	-0,0466
Axiata Group	-0,0134	-0,0211	0,0000	0,0108	0,0487	0,0015	0,0058	0,0014	0,0000	0,0115	0,0100	-0,0141
Genting	0,0186	-0,0091	-0,0484	0,0291	-0,0024	0,0024	0,0000	0,0447	-0,0203	-0,0851	0,0251	-0,0098
RHB Capital	0,0026	0,0115	0,0101	0,0551	0,0012	0,0166	0,0770	0,0238	-0,0317	-0,0798	-0,0273	-0,0794
Petronas Chemicals	-0,0118	-0,0030	-0,0104	0,0302	-0,0044	-0,0015	-0,0059	-0,0311	-0,0260	-0,0455	-0,0822	-0,0305
Ambank Group	-0,0054	-0,0082	-0,0412	0,0243	0,0140	-0,0096	-0,0014	-0,0251	0,0029	-0,0556	-0,0136	0,0092

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