CHAPTER 4
RESEARCH METHODOLOGY

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4.1   DATA SELECTION

This empirical research focuses on common stocks and bonds listed on the KLSE, and bonds issued by the Malaysian Government. The study period spans from April 1996 to May 2001[16], comprising a total of 61 monthly observations. The monthly KLSE Composite Index is used as a surrogate for stock market returns. Similarly, RAM's monthly Listed Bonds Index and RAM-Quantshop MGS Bond Index are used to as a surrogate for bond market returns.

4.2   RESEARCH HYPOTHESES

As a first attempt to analyse the co-movements of stock and bond markets, we compare the stock market return vis-à-vis the bond market returns. In particular, we will test our *null hypothesis* that the stock market is a more viable investment alternative than the bond market. The *alternative hypothesis* will then be that the bond market is a more viable investment alternative than the stock market. In addition, we will investigate for a positive trend in the correlation between the rates of return for bonds and stocks, as do the studies done by Shiller and Beltratti (1992), and Campbell and Ammer (1993).

4.3   DATA DESCRIPTION

This study investigates the joint time series behavior of monthly stock returns and monthly bond market returns. It was noted that one of the major reasons bond market return volatility has not been examined is that we lack a well-specified

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[16] Data from June 2001 onwards is excluded because of anomaly detected in RAM's Listed Bond Index; as explained in limitations of the study under Chapter 1.

index for the bond market with adequate history. There was not a comprehensive bond market index that provided price and rate of return data until the RAM's Listed Bond Index. The history and characteristics of the three indices are elaborated below.

4.3.1 KLSE COMPOSITE INDEX (KLCI)

The KLCI is generally accepted as the local stock market barometer. It was introduced in 1986 after it was found that there was a need for a stock market index, which would serve as an accurate indicator of the performance of the Malaysian stock market and the economy. At that time, there was effectively no index, which represented the entire market. The KLCI satisfies stringent guidelines and was arrived at only after rigorous screening of the component companies that were eventually selected to compose the index. In 1995, the number of component companies was increased to 100 and will be limited to this number although the actual component companies may change from time to time. The KLCI calculates, electronically, all its indices on a minute-by-minute basis and these indices are made available immediately to stockbroking companies and other subscribers of real-time market information.

4.3.2 RAM-QUANTSHOP MGS BOND INDEX (MGSI)

The MGSI was introduced to market participants in February 1998. The index is a joint collaboration between RAM and Quant Shop Pty Ltd, an Australian consultancy company specialising in portfolio management tools. The index measures the changing value of MGS outstanding in the market, taking into account the capital appreciation, accrued interest and reinvestment of coupon payments. The index consists of MGS of above RM100 million on issue and with minimum maturity tenure of a year. The index focuses on government bonds

because they are the largest and generally the most liquid sector of the Malaysian bond market.

The MGSI is divided into four sub-indices, namely, the (i) All series (for maturity greater than 1 year); (ii) Short (1 year and less than 3 years); (iii) Medium (3 years and less than 7 years); and (iv) Long (7 years and greater). The indices are market-weighted, in which the weight of a security in the index is the market value of the security on issue divided by the total value of all securities on issue. New bond issues and re-issues of bonds are added to the index on the last day of the month in which those bonds were issued. Matured bonds will be deleted from the valuation on the last day of the month in which the changes occur. The index automatically re-balances when one of the above variable changes.

4.3.3   RAM'S LISTED BOND INDEX (RLBI)

The RLBI is published on a monthly basis in the RAM Bond Newsletter and can also be found on the RAM website. The index was first introduced in April 1996 and formulated to measure the overall performance of the corporate bonds market in Malaysia. All bonds and loan stocks listed on the KLSE with a term to maturity of greater than one year are included in the calculation of the index. The index is calculated using the closing prices of the bonds on the KLSE. Each bond in the index is weighted by its outstanding volume in the market. A new bond is included in the index on the day after its listing while a bond is excluded one year before its maturity. The index serves as a yardstick against which portfolio performances are compared and as a tool for asset allocation and risk control.

The collective monthly data for the three indices for the period from April 1996 to May 2001 are shown as *Exhibit 1* of Appendices.

4.4 DATA ANALYSIS

The nominal monthly returns from the stock market, in the period from month t to month $t+1$, denoted as R_{Stock}, equals the KLCI at $t+1$ minus KLCI at t divided by the KLCI at t. Similar computations are used to measure the monthly returns from the bond market, R_{Bond} for listed bonds and R_{MGS} for MGS.

- Return on Common Stock $\quad R_{Stock} = \dfrac{KLCI_{t+1} - KLCI_t}{KLCI_t}$ (1)

- Return on MGS $\quad R_{MGS} = \dfrac{MGSI_{t+1} - MGSI_t}{MGSI_t}$ (2)

- Return on Bond $\quad R_{Bond} = \dfrac{RLBI_{t+1} - RLBI_t}{RLBI_t}$ (3)

The above returns are computed using the respective indices for stocks, MGS and listed bonds at the end of the month t and $t+1$. Similar computations shall be observed for subsequent months $t+1$ and $t+2$, and thereafter. The returns are then compared over the duration of the study to ascertain which asset provides a better return.

We will also study the sample means and standard deviations of the three time-series of indices used in this research. This would provide us with the answer as to which market is more volatile during the duration of the study. In addition, the

t-test, which is a procedure to test for significance of differences in two means, will be conducted. The *t*-test determines whether at a certain confidence level, it is justified to conclude that the average return and market volatility is greater and lower respectively for the bond market during the period of study.

Our study is best motivated by the principle that the return from the stock market and the bond market should be closely linked. We express this as a simple linear equilibrium relationship between return on stocks, R_{Stock}, and return on bonds, $R_{Bond,}$ and returns on MGS, R_{MGS}.

- $R_{Stock} = \beta_0 + \beta_1 R_{Bond} + \beta_2 R_{MGS} + e$ \hfill (4)

The above multiple regression analysis allows for the simultaneous investigation of two independent variables, namely bond and MGS returns, on a single dependent variable, stock returns. The coefficients show the effects on the dependent variable of unit increases in any of the independent variables. In the above regression the coefficient of β_1 is defined as the partial regression coefficient for which the effect of the other independent variable is held constant. To test for statistical significance, an *F*-test, comparing the different sources of variation, is necessary. The *F*-test will show that there appears to be an association between the dependent and the independent variables other than random variation in the data.