THE IMPACT OF INTERNATIONAL PORTFOLIO DIVERSIFICATION IN A FULLY FUNDED PENSION SYSTEM: THE CASE OF THE MALAYSIAN EMPLOYEE PROVIDENT FUND

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DECLARATION

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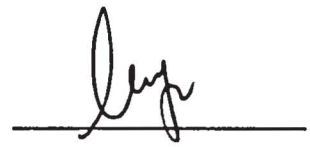

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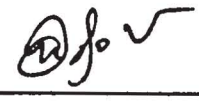

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ABSTRACT

Academics and practitioner have a common thought that an internationally diversified portfolio always offers promising risk-return performance. While handling a big pension fund, diversifying to maximize profit and minimize risk is a challenging issue. In recent four years, the main fully funded pension system in Malaysia has been adjusting or increasing the diversification portion in the international stock markets in recent four years. However, modern portfolio theory holds that linkages among financial markets may have significant effect on the benefits of international diversification. Relationship between financial markets may lead to significant differences in decision making by investors. Accordingly, in this study, we revisit the relationship between stock markets and its bearing on the international diversification benefits in the long-run and in the short-run by using nonlinear methods. Then, an empirical study had been carried out to verify the validity of the decision that increasing the diversification portion in international stock markets. Investment in long-run horizons may not be beneficial from a diversification perspective across highly cointegrated countries since the risk is considerably higher than investing in other unrelated countries.

ABSTRAK

KESAN DIVERSIFICASI PORTFOLIO ANTARABANGSA DALAM SISTEM PENCEN CARUMAN PENUH: KES BAGI KUMPULAN WANG SIMPANAN PEKERJA MALAYSIA

Ahli-ahli akademik dan para pengamal memegang persepsi konvensional bahawa portfolio yang didiversifikasi secara antarabangsa dapat menawarkan prestasi risiko-pulangan yang lebih baik. Sementara mengendalikan kumpulan wang pencen yang besar, diversifikasi pelaburan adalah suatu isu yang amat mencabar untuk memaksimumkan keuntungan dan meminimumkan risiko para palabur. Dana pencen utama yang dibiayai sepenuhnya (KWSP) di Malaysia telah menyesuaikan strategi pelaburan dengan meningkatkan kadar diversifikasi dalam pasaran saham antarabangsa dalam empat tahun kebelakangan ini. Walau bagaimanapun, teori portfolio moden telah menunjukkan bahawa hubungan antara pasaran saham boleh mengurangkan manfaat diversifikasi secara antarabangsa. Hubungan antara pasaran saham boleh membawa perbezaan yang signifikan dalam proses membuat keputusan oleh pelabur. Sehubungan itu, dalam kajian ini, hubungan kointegrasi antara pasaran saham dan tanggungannya mengenai manfaat diversifkasi secara antarabangsa dalam jangka masa panjang telah dikaji semula dengan menggunakan kaedah linear dan nonlinear. Kemudian, kajian empirikal telah dijalankan untuk mengesahkan kesahihan keputusan yang meningkatkan kadar diversifikasi dalam pasaran saham antarabangsa. Pelaburan secara jangka masa yang panjang mungkin tidak dapat bermanfaat dari perspektif diversifikasi di pasaran saham bagi negara yang mempunyai hubungan berkointegrasi yang tinggi kerana risiko yang ditanggung jauh lebih tinggi daripada melabur di negara-negara lain yang tidak berkaitan.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

1.1.1 Fully funded pension scheme

Pension systems are designed to provide livelihood to those individuals who lost their earnings capacity due to the old age, disability or death of breadwinner in the family. These systems are designed to ease the burden of these groups of people by insuring them from losing earning capacity. Modernization allows people to move away from their communities resulting in the weakening of community and family ties. This leaves the elderly and disabled without support and protection. In Singapore and China, laws are enacted to prevent grown-up children from neglecting their parents psychologically and financially.

Even in a developed market economy which is considered as having financial stability, the government will support pension funds directly or make the involvements of employers and employees compulsory. This is because workers have a common perception that a pension fund is unnecessary since they are still young and healthy. It may be too late when they realize the need of pension funds. In addition, workers prefer to enjoy when they are young. Their savings might not be enough for the old age. Thus, governments have a role to play to secure finance support by mandating the participation in pension plan for those who can afford it and gives suitable financial aids only to the poor.

A pension system intends to reduce financial difficulties of the elderly and to ensure smooth transition from working years to retirement years. It also ensures that an individual will not suffer a lower living standard during his old age or due to his disabilities. To deal with reduction of financial difficulties, a government may finance through the general revenues. However, to maintain the living standard

upon retirement or disability, workers should make their contributions based on their incomes.

The common way to provide old-age support is through contributory pension systems. There are two financing methods; they are pay as you go (PAYG) system and the fully funded (FF) system. The PAYG system mandates workers to contribute based on their income; their contributions are immediately transferred to benefit current recipients. The contributors receive only a promise from the government that they will receive their benefits when they retired or eligible for pension. In contrast, in FF system, contributions from the workers will be invested. The investment earnings will be part of the benefits they will receive later.

There are two types of benefit mechanisms. The first one is defined benefits (DB) plan and second is defined contribution plan (DC). For the former, the pension received is normally in a form of income which is a percentage of income per year of contribution. If the contribution is running short, government will be responsible to supply the pension fund. However, for the later, the contribution is specified as a percentage of salaries in which the rates for employees and employers are fixed. The final pension fund to be given out is determined by the amount in an individual's pension account when he is eligible for in which includes his contributions during his entire working life and the investment returns. Under DC plan, there will be no guaranteed benefit. The pension received later is simply a return of contributions (Ippolito, 1985).

Most countries practice a mixture of the above approaches. Many of the schemes in the developed countries have generous benefits. However, the recent economic recession challenged these schemes resulting in a shift of focus from DB plan to DC plan. The social security reform is a continuous process as a respond to the changes in demographic and economic conditions.

A hybrid DB and DC plan was introduced in the last decade called a notional plan. Under this notional plan, the contributions are recorded and "notional" interest rates will be given. The combination of contributions and interest rates

earned will be the pension benefit later on. This plan is financed on a PAYG basis and it has no financial back-up, hence governments have to define the interest rate to be paid for the contribution. If the pension fund is running short, the governments have to cover the gap.

As for Malaysia, we have a mixed system of social security comprising state and private schemes, with statutory labour laws' obligatory requirements on the part of employers as well as state social assistance programs. Employees Provident Funds (EPF) is the DC plan while DB plan is run by the government pension department for public servants. The public pension scheme (PPS) offered by the pension department provides a lifelong pension and highly subsidized medical facilities even after retirement while the EPF scheme only give back the savings from the Funds.

This study will focus on the Employees Provident Fund (EPF). EPF is a compulsory saving scheme for employees in the private sector in Malaysia. It acts as a multi-purpose savings fund with withdrawal limitation. There are several withdrawal schemes that are allowed prior to one's retirement such as house purchasing, pursuing higher education for members and dependents, withdrawal at age of 50, medical expenses for critical illness for members and dependents, leaving country, death, mentally or physically incapability, and optional EPF investment scheme. The EPF plays an important role in social security by helping to protect one's living standard in old age.

1.2 An overview of EPF

Malaysia's Employees Provident Fund (EPF) started its operation in 1951, making it the oldest provident fund in the country. The ratio of EPF's assets to GDP is roughly about 50% making EPF as one of the largest asset management organization in the world. All employers are mandated by law to enroll their employees with EPF. Both employers and employees are required to contribute part of their income to the fund.

Table 1.1: Contribution rates of employees and employers from year 1952-2013

Year	Employee (%)	Employer (%)	Total (%)
1952 - Jun 1975	5	5	10
Jul 1975 - Nov 1980	6	7	13
Dec 1980 - Dec 1992	9	11	20
Jan 1993 - Dec 1995	10	12	22
Jan 1996 - Mar 2001	11	12	23
Apr 2001 - Mar 2002	9	12	21
Apr 2002 - May 2003	11	12	23
Jun 2003 - May 2004	9	12	21
Jun 2004 - Dec 2008	11	12	23
Jan 2009 - Dec 2010	8	12	20
Jan 2011 – Dec 2011	11	12	23
Jan 2012 – Till now			
Income RM5000 and below	11	13	24
Income more than RM5000	11	12	23

Notice that there is a recent adjustment on the contribution rate of the employees by three percent, from 11 % to 8%, during the announcement of 2009 Budget. This adjustment will help to increase its members' disposable income in the context of the current economic condition. The decision to reduce members' contribution rate was also taken in year 2001 and 2003 as a economic stimulus package. The reduction, however, is optional. Members were free to choose if they want to maintain the contribution rate at 11%. In early of 2012, the contribution rate of employers was readjusted according to the salary group to secure their saving.

The Employee Provident Fund (EPF) is also one of the ten largest fully funded social security funds in the World. There are challenges of handling such a big pension fund as any profit or deficit might have significant effect on Malaysia. The EPF investment panel decided to intensify its investments in global equity markets from previously 7% to 23%. In addition, they planned to achieve a 30%

investment in the international stock markets by 2017 to boost the returns. In other words, EPF is trying to increase the allocation in foreign market in achieving better international diversification benefits. EPF has been the major pre-retirement saving fund for most workers in private sectors in Malaysia. Such significant decision would affect most citizens.

Table 1.2: Rank of the top ten pension funds in the world

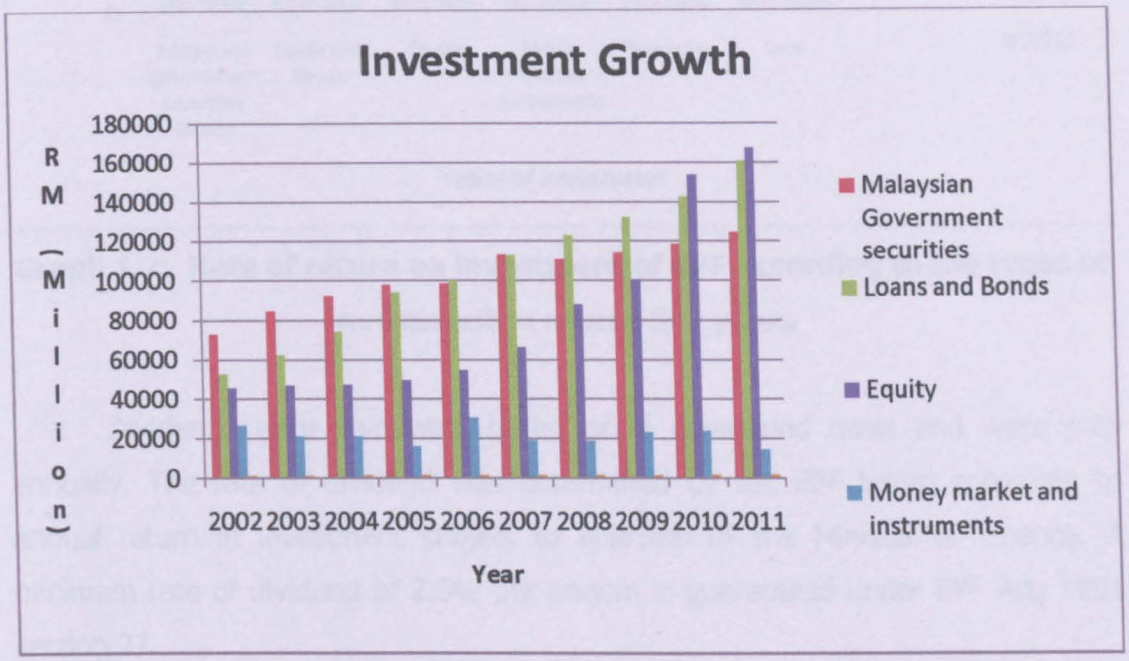
Rank	Country	Funds	Total Assets (billions USD)
1	Japan	Government Pension Investment Fund	1370
2	Norway	Government Pension Fund of Norway	573
3	Netherlands	Stichting Pensioenfonds ABP (ABP)	319
4	South Korea	National Pension Service (NPS)	270
5	United States (California)	California Public Employees' Retirement System	202
6	Canada (Quebec)	Caisse de depot et placement du Quebec (CDPQ)	199
7	Canada	Canada Pension Plan (CPP)	162
8	Netherlands	Stichting Pensioenfonds Zorg en Welzijn (PFZW)	143
9	Malaysia	Employees Provident Fund (EPF)	130
10	Canada (Ontario)	Ontario Teachers' Pension Plan	109

Source: P&I /TW300 analysis report from Towers Watson, 2012.

The contribution of each member of EPF is divided into two accounts with some specific withdrawal requirements. Seventy percent of the contribution is deposited into Account I which cannot be withdrawn till the age of 55. The remaining thirty percent of the contribution is deposited into Account II which permits withdrawals for purchasing house or payment of housing loans, critical medical condition, disability, leaving country, education, members' savings investment, death, and Haji.

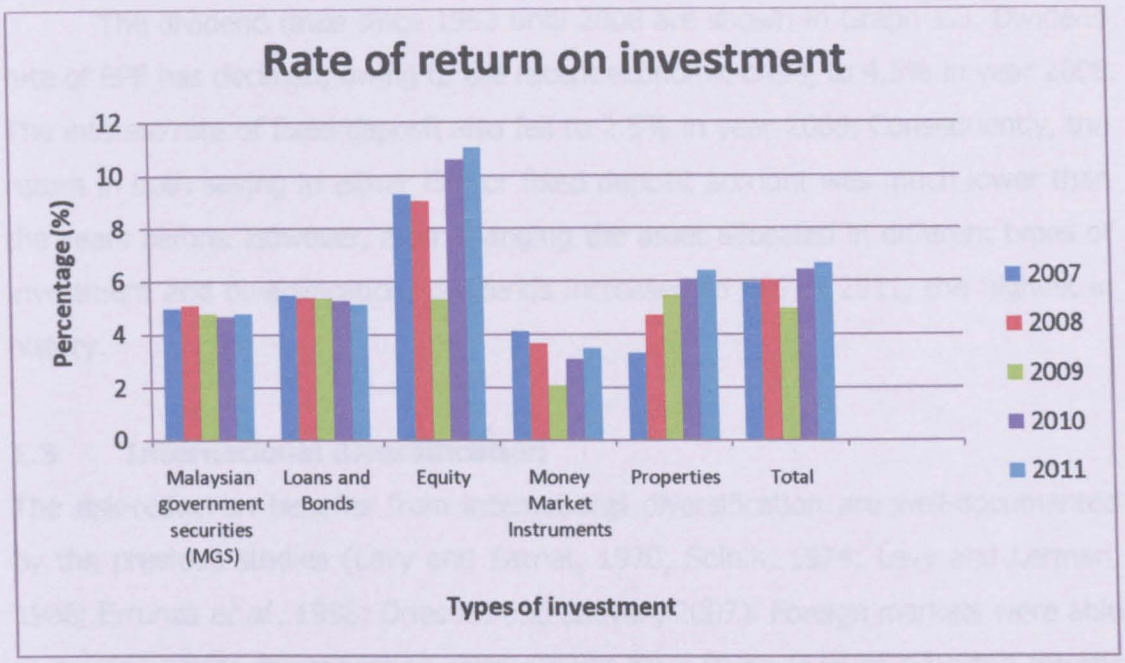
Monthly contributions of members are invested in a number of approved financial instruments to generate optimum income. The EPF ensures that a saving

will be secured and will be receiving reasonable dividends. It guarantees a minimum of 2.5% annual dividend. Under the 1991 Act, EPF can only invest in those approved investments, which include Malaysian Government Securities (MGS), debenture loan, money market instruments, equities and property. Investment strategies and allocations are determined by the Investment department and the Investment and Economic Research Department. The asset allocations of investment of from 2001 until 2010, are shown in Graph 1.1 below.



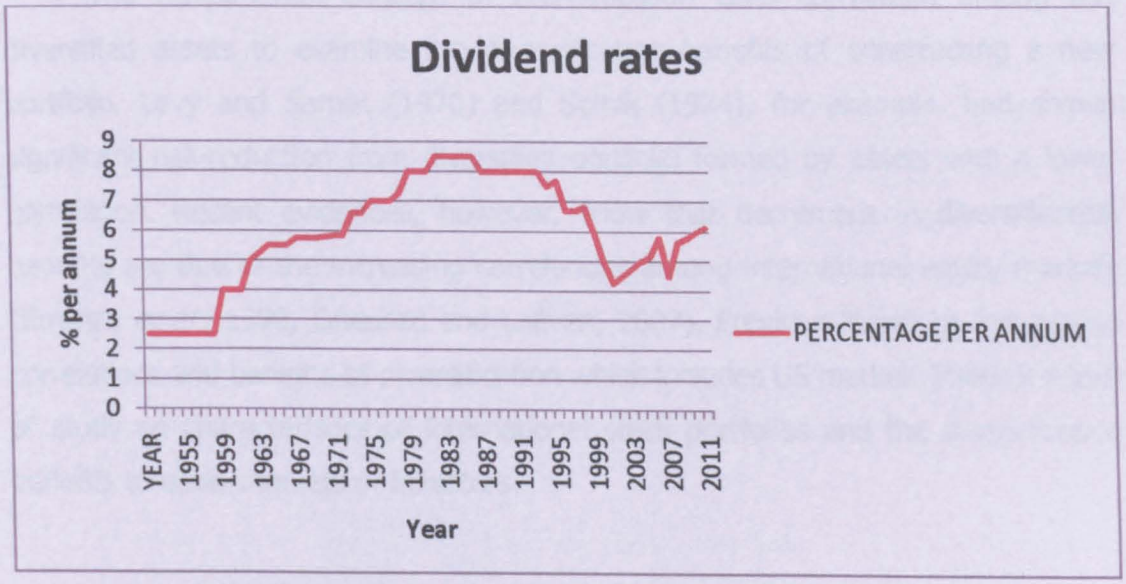
Graph 1.1: Asset allocation of investment decided by EPF panel

As shown in graph 1.1, the previous major investment in MGS had been reduced whereas Equity and Loans and Bonds have become the main investment. EPF investment panel had found that the equity market and loans and bonds had generated health earnings, despite its conservative risk profile, which contributed to the institution latest declared dividend, 6% in year 2011 which is the highest in EPF's history. Differences in asset allocation had contributed different rate of return. Significant increases in returns from the investment in equity markets are shown in the Graph 1.2.



Graph 1.2: Rate of return on investment of EPF according to the types of investment in recent five years

Dividends were calculated based on a compound basis and were paid annually. The rate of dividend was determined by the EPF board according to annual return in investment subject to approval of the Minister of Finance. A minimum rate of dividend of 2.5% per annum is guaranteed under EPF Act, 1951 section 27.



Graph 1.3: Dividend rates of investment by EPF

The dividend rates since 1952 until 2008 are shown in Graph 1.3. Dividend rate of EPF has declined, owing to the recent economic crisis, to 4.5% in year 2008. The interest rate of fixed deposit also fell to 2.5% in year 2009. Consequently, the return in both saving in either EPF or fixed deposit account was much lower than the years before. However, after changing the asset allocated in different types of investment and diversification, dividends increased to 6% in 2011, the highest in history.

1.3 International diversification

The risk-reduction benefits from international diversification are well-documented by the previous studies (Levy and Sarnat, 1970; Solnik, 1974; Levy and Lerman, 1988; Errunza *et al.*, 1998; Driessen and Laeven, 2007). Foreign markets were able to provide better diversification opportunities for a given level of expected returns (Grubel, 1968; Levy and Sarnat, 1970 and Solnik, 1974). Modern portfolio theory (MPT) stated that international diversification is beneficial since it was able to reduce the overall risk of the portfolio formed by stocks of different markets. These stocks should have lower correlating relationship as compared to those in the same domestic market. If the stocks have tendency to move together in the long-run, the benefits of international diversification might be over-expected for investors with long term investment.

The fundamental concept of diversification uses correlation among the diversified assets to examine the diversification benefits of constructing a new portfolio. Levy and Sarnat (1970) and Solnik (1974), for example, had shown significant risk-reduction from diversified portfolio formed by assets with a lower correlation. Recent evidences, however, show that decrement in diversification benefits are due to the increasing correlations among international equity markets (Errunza *et al.*, 1999; Driessen and Laeven, 2007). Previous literature focused on correlations and benefits of diversification which includes US market. There is a lack of study on characteristics of international stock portfolios and the diversification benefits to other markets or investors.

The concept of integrated markets has a strong impact for international investors since the absence of international diversification benefits may be inferred from it (DeFusco *et al.*, 1996; Sharma and Wongbangpo, 2002; Click and Plummer, 2005; Phylaktis and Ravazzolo, 2005; and Lee *et al.*, 2009). When stock markets selected for diversification are found to be highly cointegrated in the long-run, therefore, the common trend among the markets will bring them to move together in the long time horizon. When markets are driven by common shocks, they will provide limited possibilities of gaining higher profits by diversifying investments portfolio. Hence, investors will have to look into the market correlation, cointegration and causality relationship prior to selecting the markets for diversification.

Recent works have shown that the benefits of international diversification were smaller than previously understood especially when markets' movement might have tendency to be related in the long-run. Kalra *et al.* (2004), Amadi and Bergin (2008), for instance, shows that the advantage of international diversification might diminish when transaction costs are incurred in international transactions. Moreover, in order to have a clear picture of the benefits of international diversification, transaction costs should be considered.

1.3.1 Correlation, cointegration and causality

The non-stationary properties of stock prices have led researchers to concentrate on the analysis of long-run relationships among stock markets by using either bivariate or multivariate cointegration methodology as defined by Engle and Granger (1987). Cointegration tests have the additional strength of being able to capture the long-run relationships between markets by taking the structural changes in the intercept and slope of the equilibrium equation into consideration (Mandaci *et al.*, 2011). If a common stochastic trend is found among a group of markets, then this means that they are highly cointegrated over the long period. This limits the returns from the international asset diversification.

The last two decades, many emerging markets started to open their economies to globalization and financial liberalization. Higher economic growth and

improved financial market development resulting from financial liberalization had created greater interest by international investors in these markets. Scholars have explored market linkages between emerging economies, including Asian markets. DeFusco *et al.* (1996), Sharma and Wongbangpo (2002), Click and Plummer (2005) and Phylaktis and Ravazzolo (2005), for instance, examined the cointegration relationship within ASEAN-5 (Malaysia, Singapore, Philippines, Indonesia and Thailand) markets. Their results, however, were mixed.

A common feature of these studies is that they used methods of cointegration that built on a linear framework. However, considerable evidence exists which shows that financial time series exhibit nonlinear dependencies (Scheinkman and LeBaron, 1989; Opong, *et al.* 1999; and Li, 2006), which has implications for international investment decisions. Bierens (1997) has shown that the standard Johansen cointegration framework was miss-specified if the adjustment process is nonlinear in nature and the speed of adjustment varies with the magnitude of disequilibrium. Accordingly, when stock markets exhibits nonlinear relationships, then the results derived from using the linear Johansen approach might be misleading.

Lee *et al.* (2009) made a significant contribution to the empirical literature on ASEAN-5 stock markets by comparing Johansen cointegration tests and Bierens nonparametric cointegration tests. They demonstrated the superiority of Bierens nonparametric test over the Johansen linear test at detecting cointegration when the data generating process is nonlinear. Lee *et al.* (2009) found that only one cointegrating vector exists among the ASEAN-5 markets. They concluded that all the ASEAN-5 markets belong to the cointegrating system through a test of restriction on each market. The Bierens test, however, is more complicated since it requires vector weights and extra terms to accommodate a nonlinear mean function (Breitung, 2002).

In my study, Breitung rank test was employed in which it does not require a weight function to be included as in the Bierens test. Haug and Basher (2011) have noted that the monotonic transformation is a desirable property in detecting

cointegration. Unlike the Bierens test, we do not be specific about the exact functional form of the cointegrating relationship when employing the Breitung approach. In addition, this approach does not require using lag and error correction term which are taken as the improvement from the bias of lag length selection and also the nonlinearity of error correction terms. The Breitung rank test thus has distinct advantages over the Bierens test.

1.4 Motivation of study

Research on EPF decision will draw great attention from all members or Malaysian as it affects their retirement saving. The decision to invest abroad is made based on thorough studies. However, there are questions about the selection of investment markets. Thus, in this study, there will be two distinct sets of sample which focus on rapidly growing markets in the same region as Malaysia which are Indonesia, Thailand, Singapore and the Philippines. The economies of ASEAN-5 countries are highly diverse in terms of size, resource endowments and level of economic development. These are the markets previously examined by literature on diversification.

The pioneers of diversification (Grubel ,1968; Levy and Sarnat , 1970; Solnik ,1973) studied mainly the benefits from a perspective of developed countries. They concluded that linkages among selected market significantly affect the gains from diversification. My study is taking a view of a developing market, in which the same concept is applied inversely in sample set II where Malaysian market is treated as home country which diversifies its investment in developed markets such as United States (US), United Kingdom (UK), Japan, Hong Kong (HK), and China. There is less studies which explores across these two sets of countries from the Malaysian viewpoint.

Furthermore, the developments of methodology for examining market linkages have expanded rapidly. Several studies (DeFusco *et al.*, 1996 ; Sharma and Wongbangpo, 2002; Click and Plummer, 2005; Phylaktis and Ravazzolo, 2005 and Lee *et al.*, 2009) closely examined the linkages among ASEAN-5 attentively. Their findings, however, are conflicting. Most of these studies used method of

cointegration which is built on a linear framework except Lee *et al.* (2009). One of key weaknesses of the linear approach is the untested assumption of linear relationship among variables. Cushman (2003) specified that the widely employed Johansen linear cointegration test is biased if the error correction term is nonlinear. The findings of various studies will be misleading if this is true.

This study attempts to fill the gap of previous literature. It focuses on the selection of investment markets based on market linkages by using nonparametric and nonlinear approaches. The diversification with periodic rebalancing and transaction costs are taken into account.

1.5 Research question

Managing huge retirement funds is a challenging task for any government. Their decisions affect all members of EPF and economy of the nation. In the past five years, EPF investment panel decided to increase the asset allocation in international investment especially in equity or stock market which contributed the most in the last decade. They even proposed to increase the percentage of diversification up to 30% by the year of 2017.

As a member of EPF, it is their interest to find out whether this decision is feasible. As a policy maker, they may be interested to find out alternative ways to justify their decision. That being the questions. Firstly, how to select the markets for international diversification? Secondly, what are the important factors to be considered when diversifying a portfolio? And, how then is the whole process works?

1.6 Scope of study

This study examined by using monthly stock market indexes of local currencies and in USD for Malaysia, Singapore, Thailand, Indonesia, the Philippines, United States of America (US), United Kingdom (UK), Hong Kong (HK), China and Japan over the period 2001-2010. The data was made available from Morgan Stanley Capital International (MSCI).

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