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HOW MANY SECURITIES MAKE A DIVERSIFIED PORTFOLIO IN KLSE STOCKS?

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ABSTRACT

The paper examines the relationship between the portfolio risk and the number of stocks in a portfolio for a given portfolio return across portfolios of the Malaysian stocks during the period September 1988 through June 1997 to determine the optimum size for a portfolio of stocks. A sample of 213 stocks traded on the Kuala Lumpur Stock Exchange (KLSE) are considered to form sets of portfolios using the Random Diversification Approach based on the Statman (1987) technique. The study has incorporated an additional statistical test to supplement the Statman's approach. On average, a well-diversified portfolio of the Malaysian stocks is found to contain at least 27 randomly chosen securities. The study is extended to determine the diversified portfolio's size for each of the lending and borrowing investors based on the Statman (1987) methodology. A portfolio of 30 securities is found to give a well diversified portfolio for the borrowing investors and of 50 securities for the lending investors.

INTRODUCTION

After the pioneering work of Markowitz (1952) and the simplification of its methodology by Sharpe (1985), a number of studies have been conducted to analyse the relationship between the portfolio risk and the number of stocks in a well-diversified portfolio, especially for the matured markets like the New York Stock Exchange (NYSE). It has become almost universal to say that approximately 10 to 15 securities will provide a diversified portfolio (Evans and Archer 1968). However, Statman (1987), employing the Elton and Gruber (1977) approach and using the average annual standard deviations for the equally weighted portfolios that contained the different numbers of randomly selected NYSE securities for the period 1979 to 1985, found that 30 stocks in a randomly selected portfolio gives a diversified portfolio. Only a limited amount of research in this area has been carried out in the developing countries like Singapore and Malaysia.

Return from the portfolio is of utmost significance to all investors. However, the number of securities to invest, the combination of securities in the portfolio, and the risk involved are also the important considerations for all investors. The shareholders holding up to 10,000 shares, which represents the largest group of investors, accounting for 91.8% of the total investors on the Kaula Lumpur Stock Exchange (KLSE) (3.3313 million), among others, would be exposed to the lesser risk if they select the stocks for their portfolios knowledgeably.

The paper examines the size of a well -diversified portfolio for a developing country, namely Malaysia, employing the random approach. It is hoped that this paper will help us to understand the size of an optimum portfolio in a developing country vis-à-vis that in a developed economy.

LITERATURE REVIEW

The fundamental goal of the portfolio theory is to optimally allocate investments among different assets. The mean-variance optimisation approach is a quantitative tool, which assists such an allocation by considering the trade- off between return and risk.

Return and risk are the two key features of any investment. The other two factors, viz. control and liquidity have lost their significance due to the multiplicity of the share-holders and the developments in capital markets. It is important to know the sources of return and risk. The major factors contributing to each must be identified and evaluated. This is the primary task of the security analysis, and the results are crucial ingredients for portfolio construction, revision, and evaluation, as well as for setting the long-range investment strategy/policy (Sharpe, 1985).

There are two types of risks, viz. systematic and unsystematic risks. Lee (1998) used 50 stocks listed on the KLSE for the period during 1989 to 1997, and found that the average systematic risk of the sample stocks is much higher than the unsystematic risk, at 74% and 26% respectively. Gupta and Yong (1995) analysed 27 selected KLSE stocks for the period 1984 through 1993 and found the share of the systematic risk in the total risk to be at 55%. As per the definition, the systematic risk is invariant over the size of the portfolio, while the unsystematic risk falls as the portfolio size increases.

The principle that marginal costs should be compared to marginal benefits in determining the optimal levels of production or consumption is fundamental to economic theory. Diversification should be expanded as long as the marginal benefit exceeds the marginal cost. The benefits of diversification are in risk reduction. The costs are transaction costs.

The principle of diversification tells us that the spreading of an investment across a number of assets will eliminate some but not all the risk (Ross, Westerfield and

Jordan, 1993). Unsystematic risk is essentially eliminated by diversification, so a relatively large portfolio has almost no unsystematic risk. Ong (1982) mentions that diversification can reduce the overall portfolio risk. However, the possibility for the risk reduction depends on the correlation coefficient and the proportion of the total funds invested in each share.

For Singapore, Tsui, Low and Kwok (1983) employed monthly data of 40 common stocks listed on the Stock Exchange of Singapore (SES) for the period June 1973 to December 1981 to analyse the systematic and unsystematic risk. They find that 40 randomly selected securities in a portfolio gives a well-diversified portfolio.

There are also studies that investigate industry diversification. However, they find that the benefits of industry classification are limited. King (1966) analysed 60 stocks during the period 1927 through 1960. He observed that, on average, over 50 percent of the variation in a typical stock's price could be attributed to market factors. Roughly an additional 13 percent could be attributed to industry factors. Fisher and Lorie (1970) calculated standard deviations for portfolios of 1, 2, 8, 16, 32 and 128 stocks, and found that diversification across industries did indeed work, but on average, it is not better or worse than the pure random diversification . Hui and Kwan (1987) suggests that in order to benefit more from industry diversification, it seems logical to look at the covariation between the different sectors before the final selection of stocks is made. They employed six industry indices of the Stock Exchange of Singapore from July 1975 to June 1985 and ran a factor analysis on them. Their finding suggests that one need only to invest in just three rather than in all the sectors for deriving the benefits of diversification. Ta and Teo (1985) used the Sharpe (1966) measure, also known as the reward-to-variability ratio, to compare the industry performance across industry indices from the Singapore Stock Exchange. Their study covered a period of 10 years from 1975 to 1984, and found that the returns of different industry sectors tend to be highly correlated with each other. This implies that the benefits of industry diversification may be limited. Although the correlations between the industry sectors are high, they do not remain stable over time. Thus, the authors suggest that the domestic industry diversification could be implemented only as a strategy supplementary to others, such as the international diversification suggested by Hui and Farragher (1985).

DATA AND METHODOLOGY

The month- end KLSE data was obtained from the Pusat Komputer Professional (PKP), a company based in Pahang. The database contains daily closing prices, daily high and low, and the volume of transactions. Adjustments are made to take into account the stock splits, rights and dividends. The sample selection criterion was that only companies listed before September 1988 were taken, thereby excluding the Second Board companies altogether. All the companies meeting this criterion were selected. The sample included in this study comprises of the 213 companies whose data was available for every month of the period of the study, i.e. September 1988 through June 1997. Initially, the period of the study was planned for a 12-year period from September 1988 to August 2000. However, due to the Asian financial crisis, which began from July 1997, we decided to omit the data from the period July 1997 to August 2000 , especially due to negative returns.

The methodology followed is the random diversification approach based on Statman(1987) technique. It goes in three steps. One, mean and variance of the portfolios are obtained. Two, the randomly diversified portfolio's size is examined. Three, the lenders and borrowers' optimum portfolio sizes are derived.

Comparison of benefits and costs require a common measure. We use the return for the purpose. The risk reduction benefits of diversification, in units of expected return, can be determined through a simple comparison of any two portfolios. The rate of return of the security i is calculated as follows:

$$R_{it} = ln \frac{P_{it}}{P_{i(t-1)}} \quad (1)$$

where, R_{it} = rate of return of the security i at time t
P_{it} = closing price of security i at time t

Markowitz (1952) argues that by spreading the investment across a wide array of stocks, the investors could benefit from diversification. He shows that the return of a portfolio is the weighted average of the component stocks' returns :

$$E(R_p) = \sum_{i=1}^{n} X_i R_i \quad (2)$$

where R_p is the return on the portfolio, R_i is the return on stock i, and X_i is the weight attached to (proportion of total investment in) stock i. Further, he shows that the risk of a portfolio of securities is not simply the sum of the risks of those assets. Rather it is given by

$$\sigma_p^2 = \sum_{j=1}^{N} X_j^2 \sigma_j^2 + \sum_{j=1}^{N} \sum_{\substack{k=1 \\ k \neq j}}^{N} X_j X_k \sigma_{jk} \quad (3)$$

Further, if equal proportion of funds are invested in all securities ($X_1 = X_2 = X_3 = \ldots = X_N$,), the portfolio variance becomes

$$\sigma_p^2 = \frac{1}{N}\bar{\sigma}_j^2 + \frac{N-1}{N}\bar{\sigma}_{jk} \quad (4)$$

where σ 's are the corresponding variances and σ_{jk}'s are the corresponding co-variances.

Thus, in theory, for any given portfolio return, as the number of stocks increases, the portfolio risk decreases. But how long the risk of a portfolio does indeed decrease as more securities are included is perhaps an empirical matter that needs to be verified.

In order to follow the random diversification approach, the first step is to take a random sample of just one stock thirty times (law of large numbers). The average return and the standard deviation of the thirty return data are then computed. Next, two stocks are taken at random, noting the average return for the sample. While the first stock is chosen randomly, the second is so selected that the average return from the portfolio of two stocks equals that of the one stock portfolio. The sample of two stocks is repeatedly taken thirty times. The average return and risk (standard deviation) are then computed. The third step is to take a sample of three stocks at random, noting the mean return and risk. Again, while the first two stocks are chosen randomly, the third is so chosen that the portfolio return of the three stocks equals that of the above one stock and two stock portfolios. This is also repeated thirty times. Thus, the above procedure is repeated for a sample of 4, 5, 6, ..., 100 stocks each time noting the mean and standard deviation of the portfolios. This procedure of taking repeated samples derives its motivation from the central limit theorem, which states that if, from a population with mean of μ and a standard deviation of σ, a random sample of size n is chosen repeatedly, then the distribution of the sample mean will have a mean exactly equal to μ and a standard deviation of $\sigma / \sqrt{n}$. The central limit theory therefore predicts that irrespective of the sample size, as long as the sampling is done at random and repeated many times, the mean of the samples would be approximately equal to the population mean.

Thus, by invoking on the central limit theorem, taking a portfolio of size two at random and performing this repeatedly (i.e. thirty times) would produce an average return approximately equal to the average for the population of stocks. The same is the case if we increase the sample from 2 to 3, 4, 5 ... etc. Thus, the central limit theorem would suggest that whatever the number of stocks in a portfolio, as long as the sample is drawn at random and repeated many times, the average would be the same as the population mean. In statistics, a sample of 30 or more is generally considered large. Therefore, we restrict our experiment to thirty, and we do not expect the results to differ significantly if the experiment was performed more than 30 times.

To test for the differences in the risks of portfolios, the mean risk (i.e. mean of the variance) is used to compute the appropriate t value. To test as to how many securities make a diversified portfolio, the independent t-test was employed. If there are two independent groups X, and Y, with mean $\bar{x}$, $\bar{y}$, and variances σ_x^2, σ_y^2 the formula for the computation of the t-statistic is given by:

$$t = \frac{\left(\bar{x} - \bar{y}\right)}{\sqrt{\frac{\sigma_x^2}{n_x} + \frac{\sigma_y^2}{n_y}}} \qquad (5)$$

where, n_x *and* n_y are the sample sizes for groups X and Y, respectively.

This was used to compare the two groups of portfolios: portfolios of N stocks each, and portfolios of more or less than N stocks. The test is required because for the diversified portfolio of N stocks to be accepted, two things must hold. First, the portfolios of N stocks should be no different from the portfolios of more than N stocks with respect to their average variance. Second, the portfolios of less than N stocks should have a significantly higher mean variance than either the portfolios of N stocks or the portfolios of more than N stocks.

The methodology used for deriving the optimum size for the lenders and borrower's diversified portfolios is now described. This also draws from Statman's (1987) work.

We used the 213 stock portfolio as the benchmark (P_{213}). As investor can borrow or lend to form portfolio of n stocks P(n) with the expected return of $E(P_n)$ as

$$E(R_{Pn}) = (R_f + \alpha) + \left\{ \frac{E(R_{P213}) - (R_f + \alpha)}{\sigma_{P213}} \right\} \sigma_{Pn} \qquad (6)$$

where,

Rf = risk free rate (Mean of the treasury bill rate in our sample).
α = excess of the borrowing rate over the lending or risk-free rate for the borrowing investor, and zero for a lending investor.
$E(R_{Pn})$ = expected return on the 213 stock portfolio.
σ_{Pn} = standard deviation of portfolio Pn.
σ_{P213} = standard deviation of the return on 213 stocks' portfolio .

Equation 6 defines what we will call the 213 stock line and all portfolios P(n) lie on it (vide Figure 2).

We use the average of the expected return of P_{213} less the average risk free rate (treasury bill rate) to estimate the risk premium $[E(R_{213}) - R_f]$. The parameter α denotes the difference between the call money rate and the treasury bill rate. The call money rate is proxied by the BLR plus spread. It provides a starting point for the estimation of the borrowing rate.

To calculate the risk reduction benefits of diversification, let $P_{(10)}$ be the portfolio(of 10 stocks) from the 213 portfolio line and $G_{(10)}$ (of 10 stocks) be the randomly selected portfolio. Since stocks in $G_{(10)}$ are chosen randomly, each stock and every portfolio has an expected return (E $G_{(10)}$) of Rf + risk premium. This difference can be interpreted as the benefit that an investor derives from increasing the number of stocks in the portfolio from 10 to 213. In general, the benefits from increasing the number of stocks in a portfolio from n to 213 is given by

$$E(R_{P(n)}) - E(R_{G(n)}) = \{\frac{\sigma_{P(n)}}{\sigma_{P(213)}} - 1\}\{E(R_{G(n)} - (R_f + \alpha)\} \quad (7)$$

We then repeat the valuation of Equation 7 with different numbers of stocks for the borrowing and lending investors.

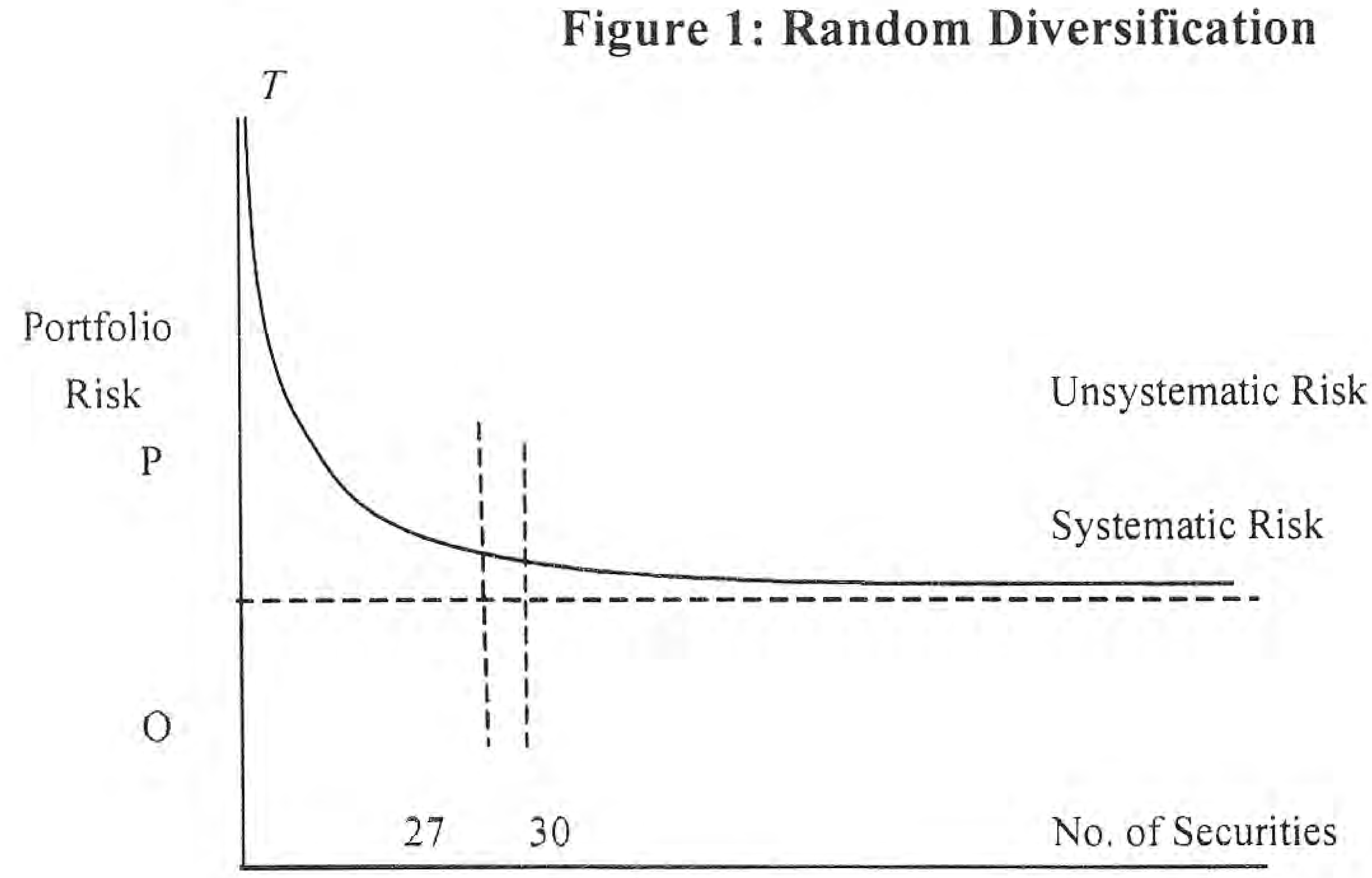
RESULTS

Figure 1and Table 1 provide the results from the random diversification.

Table 1 : Return and Risk Under Random Approach

No. of Stocks in a Portfolio	Random Samples	Portfolio		Ratio of Portfolio Std. Dev. to Std. Dev. of Single Stock
		Mean Return (Monthly) (%)	Std. Dev. of Monthly Return	
1	**30**	**1.326**	**0.1434**	**1.00**
2	30	1.327	0.1156	0.80
4	30	1.326	0.0921	0.64
6	30	1.327	0.0902	0.62
8	30	1.326	0.0830	0.57
10	**30**	**1.325**	**0.0801**	**0.55**
12	30	1.326	0.0796	0.55
14	30	1.326	0.0753	0.53
16	30	1.326	0.0740	0.51
18	30	1.326	0.0710	0.50
20	30	1.326	0.0702	0.49
25	30	1.326	0.0697	0.48
30	**30**	**1.326**	**0.0679**	**0.47**
35	30	1.326	0.0679	0.47
40	30	1.326	0.0678	0.47
45	30	1.326	0.0675	0.47
50	30	1.326	0.0671	0.46
75	30	1.326	0.0655	0.45
100	30	1.326	0.0650	0.45
213	**1**	**1.326**	**0.0625**	**0.44**

Figure 1: Random Diversification



Meir Statman (1987) found that the ratio of portfolio standard deviation to the standard deviation of a single stock in his sample remained stable after 30 stocks, providing a clue to the number of stocks reached for diversification. However, his ratio kept on falling to 0.39 when it reached 200 stocks, it then remained constant until it hit an infinite number of stocks. Our results in Table 1 are in conformity with the Statman's results as the ratio keeps on falling indefinitely. This may suggest that even with 213 stocks, diversification benefits have not been fully reaped. But when the realities of stock trading in a developing market are taken into account, the diversification benefits suggested by the declining ratio are more apparent than real. This is because if the transaction cost is considered, it might out weigh the marginal benefit.

In Table 1, the ratio of the portfolio standard deviation to the standard deviation of a single stock in the sample remains stable after 30 stocks (0.47), and thus it is safe to conclude that a portfolio above 30 stocks is a diversified one. However, these results are not conclusive as they involve no statistical testing. They are only suggestive of a tendency for risk to decline as the size of the portfolio is increased. Thus, the results in the table cannot be used to test "how many securities make a diversified portfolio in the Malaysian stocks". For this purpose, the *t*-test is employed. Portfolios of N stocks are selected to compare with portfolios of N+1 stocks, portfolios of N+2 stocks, and diversified portfolios found in Table 1 as suggested by Statman's approach. We are using portfolios of 30, 35 and 40 stocks for our study. The comparisons are continued until we find portfolio of N stocks that is no different from the portfolios of more than N stocks with respect to the average variance. The results of the t-test are given in Table 2.

Table 2 : *T*-tests Results for Randomly Selected Portfolios

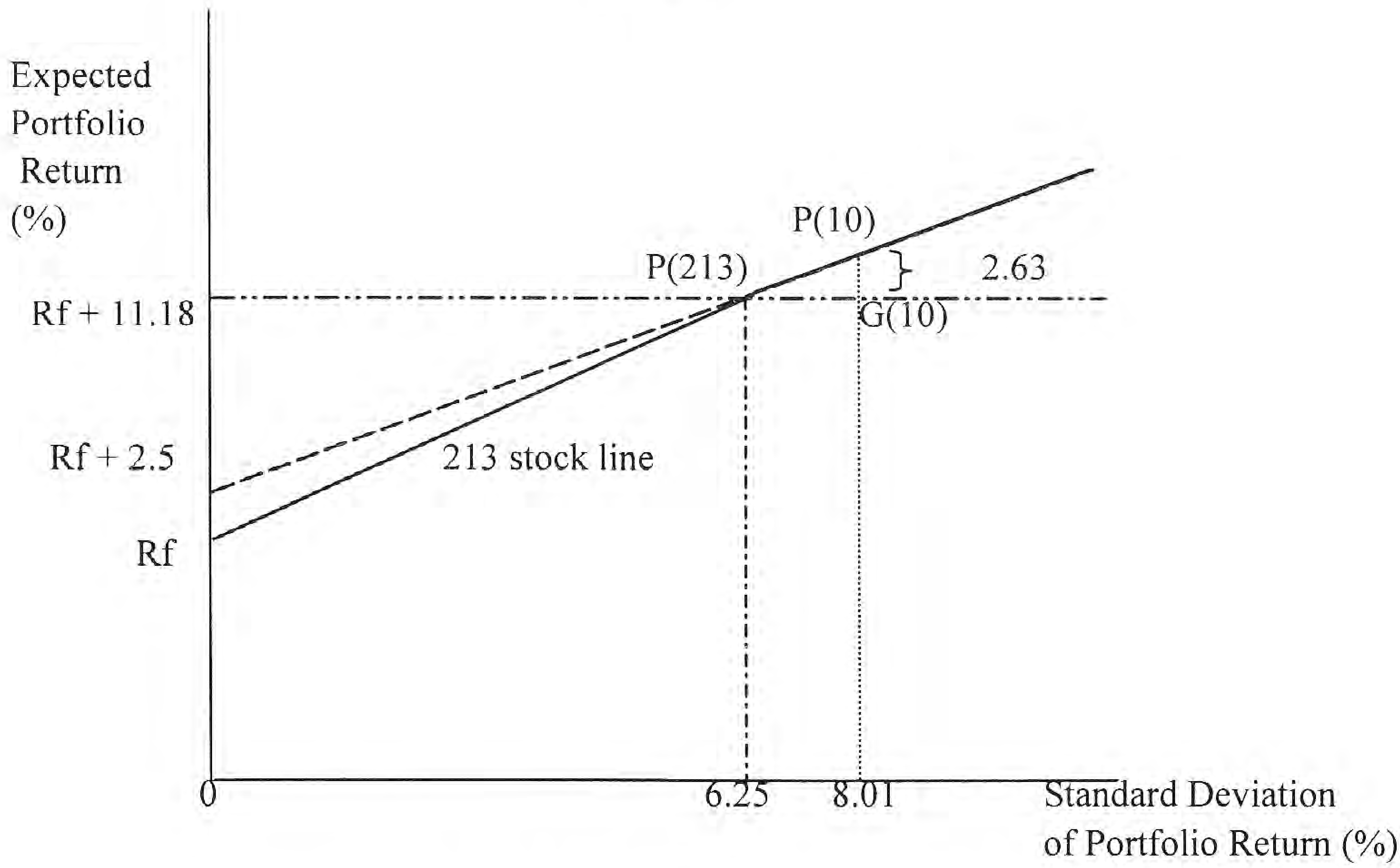
Portfolio of N Stocks	N + 1 Stocks		N + 2 Stocks		30 Stocks		35 Stocks		40 Stocks	
	t	Sig t	*t*	Sig t	*t*	Sig t	*t*	Sig t	*t*	Sig t
10	0.685	0.498	0.514	0.611	16.045	0.000	13.322	0.000	14.207	0.000
11	0.371	0.714	2.705	0.011	18.474	0.000	14.499	0.000	15.706	0.000
12	1.883	0.070	2.915	0.007	10.943	0.000	9.859	0.000	10.062	0.000
13	1.108	0.277	3.551	0.001	11.647	0.000	10.740	0.000	13.756	0.000
14	1.848	0.075	4.706	0.000	13.564	0.000	14.311	0.000	14.898	0.000
15	0.792	0.435	2.228	0.034	6.873	0.000	7.172	0.000	8.275	0.000
16	6.603	0.000	6.707	0.000	18.125	0.000	17.877	0.000	22.594	0.000
17	6.352	0.000	2.425	0.000	14.542	0.000	14.340	0.000	14.714	0.000
18	0.113	0.911	1.666	0.106	6.266	0.000	6.498	0.000	6.014	0.000
19	0.666	0.511	1.811	0.081	3.482	0.002	3.928	0.000	5.185	0.000
20	0.262	0.795	0.417	0.680	3.689	0.001	3.401	0.002	3.397	0.002
21	0.280	0.782	0.306	0.762	2.979	0.006	3.010	0.005	4.208	0.000
22	0.137	0.892	1.061	0.297	2.579	0.015	2.556	0.016	3.815	0.001
23	0.247	0.807	0.467	0.644	2.741	0.010	2.324	0.027	2.734	0.011
24	0.141	0.889	0.539	0.594	2.014	0.053	2.004	0.054	2.933	0.006
25	0.462	0.648	0.645	0.524	2.569	0.016	2.472	0.020	3.151	0.004
26	0.495	0.624	1.552	0.131	3.404	0.002	3.680	0.001	5.226	0.000
27	**0.781**	**0.441**	**1.014**	**0.319**	**1.369**	**0.181**	**1.425**	**0.165**	**1.571**	**0.127**
28	0.626	0.536	0.914	0.368	0.914	0.368	1.268	0.215	1.454	0.157
29	0.008	0.994			0.008	0.994	0.302	0.764	0.780	0.441
30							0.434	0.668	0.830	0.413
35									0.432	0.669

First, portfolios of 10 stocks are selected to compare with portfolios of 11, 12, 30, 35 and 40 stocks. Portfolios of 10 stocks are selected because Evan and Archer (1968) suggested that the minimum number of stocks in a diversified portfolio is 10 stocks. The results show that there are no significant differences at 1% level between the portfolios of 10 stocks and portfolios of 11 and 12 stocks, but there are significant differences with the portfolios of 30, 35 and 40 stocks. The next step is to select portfolios of 11 stocks and compare these portfolios with portfolios of 12, 13, 30, 35 and 40 stocks. The comparisons are continued until we find a portfolio of N stocks that is not different from the portfolios of more than N stocks with respect to the average variance.

Portfolios of 23 stocks show no significant difference at 1% level from portfolios of 24, 25, 30, 35 and 40 stocks with respect to their average variance. However, we cannot conclude that portfolios of 23 stocks is a diversified portfolio, for the comparisons of portfolios of 24, 25 (both show significant difference with portfolios of 40 stocks) and 26 stocks (show significant difference with portfolios of 35 and 40 stocks) reveal significant differences with some portfolios of the other sizes. The next portfolio that meets the requirement is the portfolio of 27 stocks. First, the portfolio of 27 stocks shows no difference from the portfolios of more than 27 stocks with respect to the average variance. Second, portfolios of less than 27 stocks show a significantly higher mean variances than either the portfolio of 27 stocks or portfolios of more than 27 stocks. Based on the results in Table 2, we can thus conclude that the portfolios of 27 stocks make a diversified portfolio for the KLSE stocks.

The findings on the borrowing and lending optimum portfolios may now be taken up. The monthly expected rate of return $E\ (R_{213})$ is 1.326% (17.13% yearly). The yearly average Treasury Bill (TB) rate (R_f) is 5.95%. The mean of the risk premium rate $[E(R_{213}) - R_f]$ over the period September 1988 to June 1997 comes to 11.18%. The α rate (yearly average) is about 2.5%. The expected return from a randomly chosen portfolio $[E(RG_n)]$ is given by R_f + risk premium, which comes to 17.13%. The results are plotted in Figure 2.

Figure 2 : Benefit of increasing the number of securities in the portfolio from 10 to 213



An expected return of more than 2.63% over that of a 213 stock portfolio (P(213)), is necessary to offset the higher risk due to the limited diversification of the 10-stock portfolio (G(10)). A portfolio P(10) can be constructed by leveraging P(213) where the expected return P(10) is 2.63% higher than that of G(10), while the two have identical risk. Data on standard deviations of portfolio returns are from Table 1. An estimate of 2.5 percent was used for α, the excess of the borrowing rate over the lending rate. An estimate of 11.18 percent was used for the risk premium.

From the results in Table 1, we find that a portfolio of 30 securities is a diversified portfolio. Thus, the findings are in agreement with those of Statman who also found that a portfolio of 30 securities constitutes a diversified portfolio for the borrowing investors. The results in Table 3 derived through the formula in Equation 7 gives the inputs needed to infer the optimum size of the portfolio for the lending investors.

Table 3 Difference between Expected Yearly Return of a Portfolio of n Stocks, G(n), and Expected Yearly Return of a Portfolio P(n)

No of Stocks In a Portfolio	Lending E(RPn) (Alpha = 0%) %	Borrowing E(RPn) (Alpha = 2.5%) %	Lending Benefits E(RPn) – E(RGn) %	Borrowing Benefits E(RPn) - E(RGn) %
1	33.21	29.67	16.08	12.54
2	27.44	25.22	10.31	8.09
4	22.80	21.59	5.67	4.46
6	22.43	21.23	5.30	4.10
8	21.02	20.20	3.89	3.07
10	**20.45**	**19.76**	**3.32**	**2.63**
12	20.36	19.67	3.23	2.54
14	19.53	19.02	2.40	1.89
16	19.30	18.84	2.17	1.71
18	18.71	18.37	1.58	1.24
20	18.59	18.28	1.46	1.15
25	18.53	18.23	1.40	1.10
30	**18.23**	**17.99**	**1.10**	**0.86**
35	18.13	17.92	1.00	0.79
40	18.12	17.91	0.99	0.78
45	18.08	17.88	0.95	0.75
50	**17.99**	**17.81**	**0.86**	**0.68**
75	17.68	17.57	0.55	0.44
100	17.59	17.50	0.46	0.37
213	17.13	17.13	0.00	0.00

Since a portfolio of 30 securities was reported earlier to be a diversified portfolio for the borrowing investors, it means that when Equation 7 is used, the optimal benefit for the borrowing investors is 0.86%. It is obvious from the results in Table 3 that for the lending investors, the optimal level of 0.86% is not attainable at a portfolio of 30. Only when a portfolio of 50 securities is taken, the optimal level could be attained by the lending investors.

COMPARISON OF FINDINGS

The results reported in this study appear to share some similarities and differences with those of he earlier studies. Take the case of the study by Evans and Archer (1968) as an example. Evans and Archer studied the New York Stock Exchange to examine how many stocks were needed for diversification benefits to be reaped. They found that for the maximum benefits from diversification to be obtained, only 10 to 15 stocks were needed, warning that investors should not be overzealous and spread their investment over too many stocks. The results reported in this study are not in agreement with those of Evans and Archer as there is no evidence in this study that a portfolio of size 15 or smaller number is a diversified portfolio. A number of reasons may be advanced for the differences between the findings of this study and those of Evans and Archer. Although Evans and Archer's study has the merit of being one of the path-breaking articles in this area of finance, it was bedevilled by the weakness that it did not employ the repeated sampling technique as is the case in this study or as done by Meir Statman.

The results reported in this study also do not agree with those of Stevenson and Jennings (1984) , and Gup (1983) , who found that when the number of securities is increased to nine, almost all the diversifiable risk is eliminated. The differences in the results reported in this study and those of Gup (1983) and Stevenson and Jennings (1984) may be attributed to the differences in the methodology. While our study employs the repeated sampling technique, the others did not incorporate this, hence the differences in the results.

Statman (1987) studied the New York Stock Exchange to examine how many stocks are needed for the diversification purposes. His results showed that "a well diversified stock portfolio must include, at the very least 30 stocks for a borrowing investor, and 40 stocks for a leading investor. This conclusion contradicts earlier results, that "the benefits of diversification for stock portfolios are exhausted when the number of stocks reaches 10 or 15" (p.362). The results of Statman are corroborated by the findings of this study.

What may have accounted for the similarities in the results of this study and those of Statman? A possible explanation is the striking similarity in the methodology employed by the two studies. However, this study has incorporated an additional statistical analysis that adds to its credibility.

Some studies conducted on some emerging markets appear to be similar with those reported here. For example, Tsu, Low and Kwok (1983) utilised monthly data of 40 common stocks listed on the Stock Exchange of Singapore for the period June 1973 to December 1981 to analyse the systematic and unsystematic risk. They found that 40 securities constituted a diversified portfolio. The important message of their finding is that they run counter to the finding of Evans and Archer which suggest that a portfolio of 10 to 15 stocks is a diversified portfolio. Although the studies on the Singapore market contradict those of Evans and Archer, the results reported in this study are not entirely in agreement with them.

This study found a portfolio of 27 stocks to be a diversified portfolio. What may account for the differences between these results and those conducted for Singapore? Tsu et al's findings, while furthering our understanding of the nature of the benefits from diversification for an emerging market, appear to be flawed in at least one important respect, viz. a rather small sample of 40 stocks. Given the fact that there is large number of stocks in any stock market, is it reasonable to make use of 40 stocks and draw inferences for the other huge number of stocks not represented in the small sample? What is more, Tsu et al do not explain the procedure by which their sample is drawn, making it even more difficult to assess the representativeness of their sample.

CONCLUSION

The benefits of diversification are well known ever since the knowledge of the proverb ,"do not put all your eggs in the same basket". However, it is only since the Markowitz's pioneering work (1952) that there is a scientific procedure to choose the optimum portfolio. This paper has not gone into the design of such a portfolio but has restricted itself to determine the size of this portfolio from amongst the KLSE stocks of over the last 10 years standings. Using the random approach, we find that diversification benefits are available up to about 27 securities. The size of the well-diversified portfolio for the borrowing investor is found to be 30 while that for the leading investor at 50 stocks. It may be noted that this paper does not consider the stocks on the Second Board and thus the findings hold good for the stocks of the large companies only.

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