GLOBAL DIVERSIFICATION:
Developed and Emerging Economies

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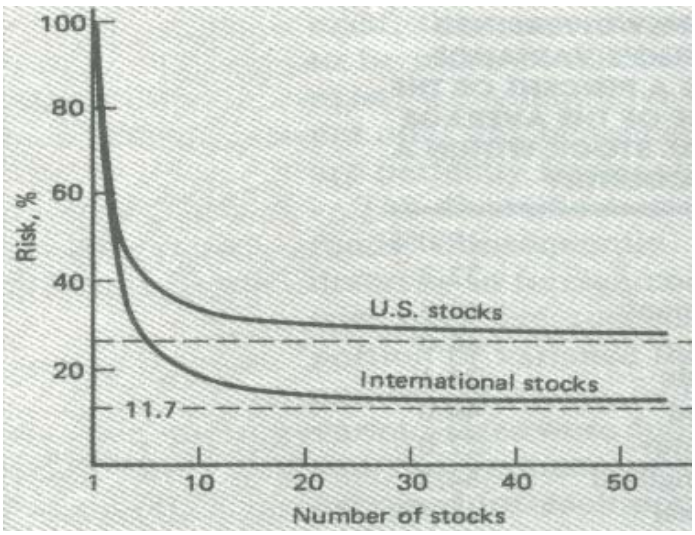
I. INTRODUCTION

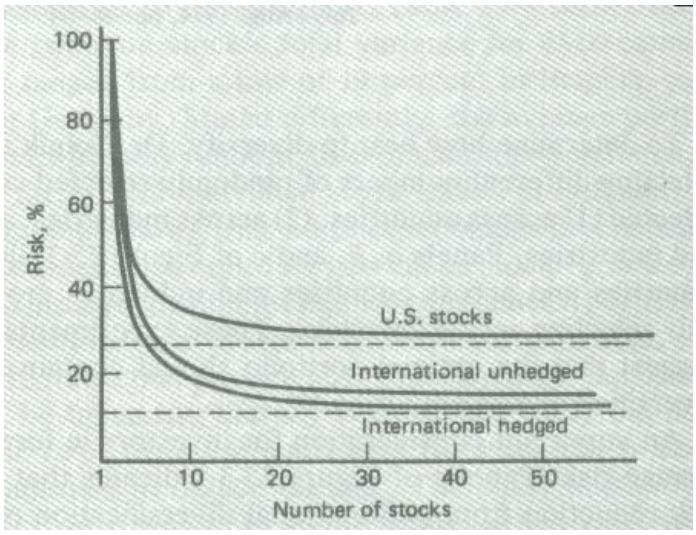
Diversification is the driver of portfolio selection, revision, and rebalancing of asset holdings. Since the classic works of Markowitz (1952), and Roy (1952), portfolio theory has become a fascinating area for examination, further insights and empirical studies for both academics and practitioners in view of risk, uncertainty and expectation. The research alluded to has the theoretical arguments for risk minimization at the core of the analytical examination or at the trade-off between return and risk of any portfolio. Markowitz mean-variance frontier brings out that trade-off structure. In yet another classic piece, Tobin (1958) derives the mean-variance locus with the additional insight on the choice of a risk-loving or risk-averting investor. The analysis of diversification highlighting the principle of safety first has initially been applied to domestic assets alone until Grubel (1968), Levy and Sarnat (1970, 1979), Solnik (1974), Losq (1979), Vaubel (1979), Friend and Losq (1979), among others, have brought diversification applied in the setting of international markets. Asset holdings in international capital markets certainly extend the efficiency envelope to the further benefits of investors. In all of the cited works and beyond, it is empirically established that international diversification reduces the risk.

Essentially extending the methodology of Evans and Archer (1968), Solnik (1974) presents the following exhibits (Figure 1: a, b) and illustrates the relationship between risk for diversified U.S. stock portfolios *vis-a-vis* internationally-diversified stock portfolios of different sizes.

Figure 1: Diversification Benefits



(a) International Diversification



(b) International hedging with and without exchange risk

In this study, Solnik provides the following computation (Table 1):

Table 1

Randomly diversified portfolio's variance measured as a percentage of the variance of the average individual stocks within a country

Belgium	19.0%
France	32.7
West Germany	43.8
Italy	38.0
Netherlands	24.1
Switzerland	44.0
United Kingdom	34.5
United States	27.0
International	**11.7**

Table 1 shows that the proportion of the average common stock's total variance for each developed country selected which was un-diversifiable ranges from 19 percent in Belgium to 43.8 percent in West Germany. In other words, the average portfolio of domestic stocks achieved with only random diversification in Belgium has 19.0 percent as much risk as the typical individual stock traded in Belgium. Internationally-diversified portfolio of randomly selected stock has only 11.7 percent as much variance as the typical individual stock. Here we see the effect of diversification as risk reducer, but the risk reduction is much higher in diversification across nations. In the work of Blume and Friend (1978) we observe that 66 percent of investors in NYSE with holding of one stock suffered loss compared to only 31 percent of the investors holding more than 20 securities. Lessard (1976) measures the following ratio of unsystematic risk to total risk (in percentage terms) in these domestic market portfolios after complete domestic diversification:

Table 2

	Proportion of unsystematic risk
Belgium	74%
France	90
West Germany	78
Italy	94
Norway	54
United Kingdom	83
United States	12

It is now evident that investors in United Kingdom can reduce 83 percent of risk by diversifying international, and Italy can eliminate 94 percent of its risk by the same method. Going further, Lessard

further presents the betas of different domestic portfolios with world market, and then, on the basis of the security market line, calculates the difference in expected returns per annum between each national market portfolio and the portfolio of the same dispersion but with full international diversification. The difference in expected return yields a recognizable measure of the losses due to incomplete diversification, and Table 3 provides the picture as follows:

Table 3

	Beta of domestic portfolio	Loss in expected return
Belgium	0.55	2.1
France	0.5	4.5
West Germany	0.86	3.9
Italy	0.5	6.1
Norway	0.94	1.8
United Kingdom	0.61	3.3
United States	1.1	0.31

Notice that diversification has measurable benefits in terms of risk reduction and return increase, and international diversification has the magnification effect. However, we must note now that all the discussions thus far are in the context of the computations in the developed economies. In this study we go beyond the developed economies and make the issue of global diversification by looking at some emerging economies and examine the potential gains and losses at length. Before we go into this examination, we must examine the theoretical underpinning on diversification. Section II is devoted to the analytical exposition of diversification. Section III brings out the empirical results on emerging and some developed economies, and Section IV concludes with some observations.

II. THEORETICAL STRUCTURE OF DIVERSIFICATION

Consider a rational investor who has \$M and he decides to invest on n assets with the expected returns on these assets being $r_1, r_2, r_3, ..., r_n$, and variance of returns on these assets are $\Phi^2_1, \Phi^2_2, \Phi^2_3, ..., \Phi^2_n$, respectively. The investor's expected portfolio return (R_P) is then as follows:

$$R_P = \sum_{i=1}^{n} w_i r_i \tag{1}$$

where w_i is the proportion of investible funds put in asset i (alternatively called, weight for i = 1, 2, 3,...., n), and

$$\sum_{i=1}^{n} w_i = 1. \tag{2}$$

His portfolio risk, measured by variance (Φ^2_P) is:

$$\Phi^2_P = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i\, w_j \sigma_i \sigma_j \rho_{ij} \;=\; \sum_{i=1}^{n}\sum_{j=1}^{n} w_i\, w_j \sigma_{ij} \tag{3}$$

Here ρ_{ij} is the correlation coefficient and σ_{ij} is the covariance between the returns of i-th asset and j-th asset. In this n-asset portfolio there are n terms involving variances of n assets, each multiplied by the squared value its weight *plus* nC2 (= n(n-1)/2) terms involving covariance terms (or correlation coefficient terms). In other words, expression (3) is as follows:

$$\Phi^2_P = \sum_{i=1}^{n} {w_i}^2 \sigma_i^2 + \sum_{i=1}^{n}\sum_{i\neq j}^{n} w_i w_j \sigma_i \sigma_j \rho_{ij} = \sum_{i=1}^{n} {w_i}^2 \sigma_i^2 + \sum_{i=1}^{n}\sum_{i\neq j}^{n} w_i w_i \sigma_{ij} \tag{3A}$$

or

$$\Phi^2_P = [\, w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2 + ... + w_n^2\sigma_n^2\,]$$

$$+ \{2\; w_1 w_2 \sigma_1 \sigma_2 \rho_{12} + 2\, w_1 w_3 \sigma_1 \sigma_3 \rho_{13} + 2\; w_1 w_4 \sigma_1 \sigma_4 \rho_{14} + ...+ 2\; w_m w_n \sigma_m \sigma_n \rho_{mn}\,\} \tag{3B}$$

Note that the terms within the square bracket ([ ]) in the first part on the right-hand side of the (3B) is the non-removable component of the portfolio risk. But if many of the ρ_{ij}'s in the second part of (3B) in the second bracket ({ }) are negative, negative terms are added to the first component of portfolio risk, total portfolio risk gets smaller in value. This is what diversification is and why it is meaningful. In a special case of two-asset portfolio total portfolio risk is:

$$\Phi^2_P = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2\rho_{12} \tag{4}$$

where $w_1 + w_2 = 1$ (5)

Combining (5) and (4), one gets:

$$\Phi^2_P = w_1^2\sigma_1^2 + (1-w_1)^2\sigma_2^2 + 2w_1(1-w_1)\sigma_1\sigma_2\rho_{12} \tag{6}$$

Differentiating Φ^2_P partially with respect to w_1 and setting that to zero, - that is, by:

$$\frac{\partial\sigma_P^2}{\partial w_1} = 0,$$

one can obtain the following risk-minimizing proportions of funds that should be invested in asset 1 and asset 2:

$$\hat{w}_1 = \frac{\sigma_2^2 - \sigma_1\sigma_2\rho_{12}}{\sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2\rho_{12}} = \frac{\sigma_2^2 - \sigma_{12}}{\sigma_1^2 + \sigma_2^2 - 2\sigma_{12}} \tag{7}$$

and

$$\hat{w}_2 = 1 - \hat{w}_1 \tag{8}$$

Now, taking note of the expected portfolio return:

$$R_P = w_1r_1 + w_2r_2 = w_1r_1 + (1-w_1)r_2 \tag{9}$$

The investor's utility maximization is as follows:

$$\max_{w_1} U(R_P) = w_1 r_1 + (1 - w_1) r_2 \; - \frac{1}{2} A [\, w_1^2 \sigma_1^2 + (1 - w_1)^2 \sigma_2^2 + 2 w_1 (1 - w_1) \sigma_1 \sigma_2 \rho_{12} \,] \tag{10}$$

where $\frac{1}{2} A \equiv - \frac{\frac{\partial U}{\partial \sigma_P^2}}{\frac{\partial U}{\partial R_P}} = \frac{dR_P}{d\sigma_P^2}$.

Here A determines the additional expected return the investor requires to be willing to take for additional amount of portfolio risk. This maximization yields the following optimal proportions:

$$\hat{w}_1 = \frac{\sigma_2^2 - \sigma_1 \sigma_2 \rho_{12}}{\sigma_1^2 + \sigma_2^2 - 2\sigma_1 \sigma_2 \rho_{12}} + \frac{r_1 - r_2}{A(\sigma_1^2 + \sigma_2^2 - 2\sigma_1 \sigma_2 \rho_{12})} \tag{11}$$

In the n-asset portfolio case, the maximizaion problem is as follows:

$$\max_{w_1} U(R_P) = w' r - \frac{1}{2} A w' \Omega \tag{12}$$

where w and r are n-tuple column vectors of weights (proportions) and asset returns, and Ω is an n×n variance-covariance matrix. That is,

$$w \equiv \begin{pmatrix} w_1 \\ w_2 \\ w_3 \\ . \\ . \\ . \\ w_n \end{pmatrix}, \qquad r \equiv \begin{pmatrix} r_1 \\ r_2 \\ r_3 \\ . \\ . \\ . \\ r_n \end{pmatrix}, \text{ and}$$

$$\Omega \equiv \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} & \cdots\cdots & \sigma_{1n} \\ \sigma_{21} & \sigma_2^2 & \sigma_{23} & \cdots\cdots & \sigma_{2n} \\ \sigma_{31} & \sigma_{32} & \sigma_3^2 & \cdots\cdots & \sigma_{3n} \\ . & . & . & \cdots\cdots & . \\ . & . & . & \cdots\cdots & . \\ . & . & . & \cdots\cdots & . \\ \sigma_{n1} & \sigma_{n2} & \sigma_{n3} & \cdots\cdots & \sigma_n^2 \end{pmatrix}$$

and the optimal weight structure is given by:

$$\hat{w} = (e'\Omega^{-1}e)^{-1}\Omega^{-1}e + \frac{1}{A}[\Omega^{-1}r - (e'\Omega^{-1}e)^{-1}e'\Omega^{-1}r\Omega^{-1}e] \tag{13}$$

where e is an n-element column vector. The first part in (13), as in (11), shows the weights on minimum-variance portfolio, which can be construed as the hedging demand for the set of risky assets since it is independent of A which measures the degree of risk aversion. The second component, which involves *A*, is the investor's speculative demand for risky assets as *A* measures the investor's trade off between expected return and risk.

An alternative way to look at the problem of allocation of the investor's investible funds in terms of different assets is as follows: assume that at the initial point the investor finds the normalized prices of all assets as 1, and he expects the prices to be $p_1, p_2, p_3, \ldots\ldots, p_n$ with the standard deviations of $\Phi_1, \Phi_2, \Phi_3, \ldots\ldots\ldots, \Phi_n$. If $s_1, s_2, s_3, \ldots\ldots\ldots\ldots, s_n$ are the units of assets 1, 2, 3, .., n,

then:

$$\sum_{i=1}^{n} p_i s_i = M \tag{14}$$

$$\sum_{i=1}^{n}\sum_{j=1}^{n} s_i s_j \sigma_i \sigma_j \rho_{ij} = \sigma_P^2 \tag{15}$$

and $$\sum_{i=1}^{n} s_i = \mathrm{Z} \tag{16}$$

With an appeal to Wong-Viner theorem one can easily derive Markowitz-Roy envelope of efficient frontier when the following holds:

$$\left(M - Z\frac{\theta'\Gamma^{-1}\zeta}{\zeta'\Gamma^{-1}\zeta}\right)^2 = \left(\sigma_P^2 - \frac{Z^2}{\zeta'\Gamma^{-1}\zeta}\right)\left\{\frac{(\theta'\Gamma^{-1}\theta)(\zeta'\Gamma^{-1}\zeta) - (\theta'\Gamma^{-1}\zeta)^2}{\zeta'\Gamma^{-1}\zeta}\right\} \tag{17}$$

Here $\Gamma \equiv (\rho_{ij})_{n\times n}$ is the correlation matrix, $\theta \equiv (p_i/\sigma_i, 1 \le i \le n)$, and $\zeta \equiv (1/\sigma_i, 1 \le i \le n)$ are n-element column vectors. Upon routine exercise we can find the optimal allocation of investible funds is given by the following:

$$\hat{s}_i = \frac{\eta}{\sigma_i}\sum_{j=1}^{n}\frac{(p_j - \chi/Z)}{\sigma_j}\frac{\Gamma_{ij}}{|\Gamma|}, \qquad 1 \le i \le n \tag{18}$$

where η is chosen so that $\sum_{i=1}^{n} s_i$ = Z is satisfied. χ is the floor of the probable value of the return, and Γ_{ij} is the cofactor of ρ_{ij} in the matrix Γ.

Now, it is time to indicate that optimal weights or asset holdings in the risk-return framework in these theoretical paradigms hold for any domestic economy since everything is expressed in the single currency terms. When the holdings are in different country assets, foreign exchange rates come into pictures, and additional risks surface in the calculation of risk and returns. In our discussion thus far,

$$ri = \left(\frac{p_t - p_0}{p_0}\right) \text{ and } w_1 = \left(\frac{e_i M_i}{M}\right) \quad \text{i = 1. 2, 3, ..., n} \tag{17}$$

where M_i ($\equiv p_i s_i$) is the total investment in the i-th country asset denominated in the i-th currency, and e_i is the exchange rate of the i-th currency in terms of the domestic currency (say, U.S. dollar), and e_i=1 obviously for U.S. dollar. Note that for an infinitesimally small change, expressions in (17) can be written as follows:

$$r_i = \frac{dp_i}{p_i} \equiv p_i^* \tag{17A}$$

$$w_i^* = e_i^* + M_i^* - M^* \equiv e_i^* + p_i^* + s_i^* - M^* \tag{17B}$$

For an investment in the domestic economy, rate of return on i-th asset is measured by (17A), but for investment abroad, rate of return must equal to $e_i^* + p_i^*$ (assuming that the American investors holds s_i and M constant). On a more discrete situation of change, the rate on return on foreign investment (r_i^f) is given by the following Fisher relation:

$$1 + r_i^f = \left((1 + r_i^d)(1 + \frac{e_t - e_{t-1}}{e_{t-1}}) \right) \tag{18}$$

whence:

$$r_i^f = r_i^d + \frac{e_t - e_{t-1}}{e_{t-1}} + r_i^d (\frac{e_t - e_{t-1}}{e_{t-1}}) \tag{19}$$

and

$$\text{Variance } (r_i^f) = \text{Variance } (r_i^d) + \text{Variance } ((\frac{e_t - e_{t-1}}{e_{t-1}}) + 2 \text{ Covariance } (r_i^d, (\frac{e_t - e_{t-1}}{e_{t-1}})) \tag{20}$$

From (20) it is evident now that if the variance of exchange rate movement is very low (close to zero), and covariance between the domestic rate of returns and exchange rate changes are negative, investment in foreign investment is Markowitz-efficient risk-reducer. If the emerging markets are not integrated with the developed markets, or, in other words, emerging and developed economies are segmented, covariance terms become zero, and in case, those markets are negatively correlated, variances of foreign returns become smaller than the variance of domestic return. Solnik (1974), and Levy and Sarnat (1970) corroborate this reality. Let us look at the return side in terms of percentage change now. From equation (1), we derive:

$$R_P^* = \lambda_1\{2(e_1^* + r_1^*)\} + \lambda_2\{2(e_2^* + r_2^*)\} + \lambda_3\{2(e_3^* + r_3^*)\} + \ldots\ldots + \lambda_n\{2(e_n^* + r_n^*)\} \quad (21)$$

or alternatively,

$$R_P^* = \lambda_1\{2(e_1^* + p_1^*)\} + \lambda_2\{2(e_2^* + p_2^*)\} + \lambda_3\{2(e_3^* + p_3^*)\} + \ldots\ldots + \lambda_n\{2(e_n^* + p_n^*)\} \quad (22)$$

Here $\lambda_i \equiv \frac{w_i r_i}{R_P}$, i = 1, 2, 3, ..., n is the i-th country's share of return in the total portfolio return in percentage measure. In most of 1980 through 1995, Asian emerging asset markets have exhibited very high asset appreciations compared to the returns in the developed countries, and exchange rates of the Asian currencies remained either pegged or stable, and some cases have shown appreciations in terms of U.S dollars. The picture, however, has changed in 1997 – the first 6-month period of the Asian crisis - as the following tables (table 4 and Table 5) indicate:

Table 4

Changes in exchange rates and stock prices: 1997

	Exchange rate			***Stock price index***		
	Asian currency per U.S. dollar		Change(%)	Index		Change(%)
	End of June	December 1		End of June	December 1	
Singapore	1.4305	1.5965	-10.40	1987.95	1665.47	-16.22
Hong Kong	7.7470	7.7380	0.21	15196.79	10750.88	-29.26
Taiwan ROC	24.8120	32.2200	-13.39	9030.28	7400.64	-18.05
South Korea	888.0000	1185.0000	-25.06	745.50	393.16	-47.26
Thailand	24.7000	40.8500	-39.53	527.28	389.33	-26.16
Philippines	26.3760	35.0000	-24.64	2809.21	1777.04	-36.74
Malaysia	2.5245	3.5360	-28.61	1077.30	531.46	-5067

Source: **The Central Bank of China**, 1997

Table 5

Changes in exchange rates: 1997

	July 1997	December, 15, 1997	Change (%)
South Korea	880	1564	-43.7
Thailand	22.88	47.95	-46.0
Philippines	26.38	38.85	-32.1
Malaysia	2.504	3.92	-36.3
Indonesia	2650	5750	-53.9

Source: **Bank of Thailand**, 1997

III. EMPIRICAL EVIDENCE

It is now time to examine the data from Morgan Stanley Capital Index (MSCI) and ascertain effects of global diversification. Since $\sigma_{ij} = \sigma_i \sigma_j \rho_{ij}$ (that is, covariance between i-th asset returns and j-th asset returns is equal to the product of standard deviation of i-th returns, standard deviation of j-th returns, and the correlation coefficient of i-th asset returns and j-th asset returns), we may take a close look at the correlation matrix (Tables 6A and 6B) below:

Table 6A

TIME BLOCK 1 (1988-1996) **CORRELATION AMONG ANNUAL INDEX RETURNS**											
	FR	*DE*	*GB*	*US*	*IDF*	*KR*	*MYF*	*PHF*	*TW*	*THF*	*EMF*
FR	1										
DE	0.8	1									
GB	0.49	0.7	1								
US	0.62	0.5	0.6	1							
IDF	0.68	0.5	0.1	-0.02	1						
KR	0.44	0.3	-0.3	-0.18	0.8	1					
MYF	0.57	0.7	0.5	0.12	0.51	0.242	1				
PHF	0.62	0.6	0.3	0.26	0.3	0.281	0.79	1			
TW	0.83	0.8	0.3	0.16	0.78	0.669	0.62	0.63	1		
THF	0.61	0.7	0.2	0.15	0.5	0.445	0.79	0.78	0.6	1	
EMF	0.69	0.7	0.4	0.3	0.4	0.309	0.76	0.94	0.7	0.85	1

TIME BLOCK 2 (1997-1999) CORRELATION AMONG ANNUAL INDEX RETURNS											
	FR	*DE*	*GB*	*US*	*IDF*	*KR*	*MYF*	*PHF*	*TW*	*THF*	*EMF*
FR	1										
DE	0.42	1									
GB	-0.55	0.5	1								
US	-0.36	0.7	1	1							
IDF	0.34	-0.7	-1	-1	1						
KR	0.98	0.2	-0.7	-0.54	0.52	1					
MYF	0.29	-0.7	-1	-1	1	0.473	1				
PHF	0.96	0.1	-0.8	-0.62	0.6	0.995	0.56	1			
TW	-0.08	-0.9	-0.8	-0.9	0.91	0.111	0.93	0.21	1		
THF	0.76	-0.3	-1	-0.88	0.87	0.872	0.84	0.92	0.6	1	
EMF	-0.04	-0.9	-0.8	-0.92	0.92	0.156	0.94	0.25	1	0.62	1

MSCI Country Codes:

FR : France
DE : Germany
GB : United Kingdom
US : USA
IDF : Indonesia
KR : Korea
MYF : Malaysia
PHF : Philippines
TW : Taiwan
THF : Thailand
EMF : Emerging Market Free Float Index

Table 6B

(1988-2003) CORRELATION AMONG MONTHLY INDEX RETURNS											
	FR	*DE*	*GB*	*US*	*IDF*	*KR*	*MYF*	*PHF*	*TW*	*THF*	*EMF*
FR	1										
DE	0.82	1									
GB	0.67	0.64	1								
US	0.6	0.58	0.6	1							
IDF	0.19	0.18	0.1	0.2	1						
KR	0.21	0.2	0.3	0.3	0.3	1					
MYF	0.28	0.32	0.3	0.3	0.4	0.28	1				
PHF	0.26	0.27	0.3	0.4	0.5	0.26	0.54	1			
TW	0.24	0.27	0.1	0.3	0.1	0.27	0.39	0.41	1		
THF	0.26	0.31	0.3	0.4	0.4	0.49	0.54	0.64	0.4	1	
EMF	0.45	0.46	0.4	0.6	0.4	0.4	0.58	0.56	0.47	0.6	1

TIME BLOCK 1 (1997- 1999) CORRELATION AMONG MONTHLY INDEX RETURNS											
	FR	*DE*	*GB*	*US*	*IDF*	*KR*	*MYF*	*PHF*	*TW*	*THF*	*EMF*
FR	1.00										
DE	0.84	1.00									
GB	0.67	0.64	1.00								
US	0.60	0.65	0.64	1.00							
IDF	0.46	0.34	0.37	0.47	1.00						
KR	0.23	0.15	0.29	0.28	0.37	1.00					
MYF	0.43	0.37	0.46	0.45	0.65	0.32	1.00				
PHF	0.52	0.43	0.45	0.58	0.66	0.35	0.71	1.00			
TW	0.34	0.38	0.37	0.55	0.45	0.25	0.60	0.58	1.00		
THF	0.39	0.43	0.50	0.56	0.55	0.64	0.60	0.72	0.58	1.00	
EMF	0.57	0.56	0.59	0.73	0.63	0.37	0.67	0.70	0.76	0.67	1.00

TIME BLOCK 2 (2000- 2003) CORRELATION AMONG MONTHLY INDEX RETURNS											
	FR	*DE*	*GB*	*US*	*IDF*	*KR*	*MYF*	*PHF*	*TW*	*THF*	*EMF*
FR	1										
DE	0.93	1									
GB	0.85	0.81	1								
US	0.77	0.77	0.8	1							
IDF	0.14	0.2	0.3	0.2	1						
KR	0.5	0.54	0.5	0.7	0.3	1					
MYF	0.23	0.36	0.1	0.2	0.3	0.27	1				
PHF	0.1	0.19	0.2	0.3	0.5	0.49	0.14	1			
TW	0.37	0.45	0.3	0.4	0.1	0.66	0.62	0.35	1		
THF	0.25	0.29	0.4	0.5	0.5	0.62	0.28	0.67	0.51	1	
EMF	0.72	0.77	0.7	0.8	0.4	0.84	0.44	0.47	0.75	0.6	1

Table 6A exhibits the annual correlation coefficients and Figure 6B shows the monthly correlation coefficients. Take a close look, and note that in 1997- 1999 the correlation coefficients between Malaysia and U.S, and Malaysia and Germany has been -1 and between Malaysia and Great Britain is -0.7. Similar correlation coefficients exist between Indonesia and the other three developed countries. For a much longer time range (from 1988 – 2003), those coefficients are not negative, but very low (around 0.3) while those coefficients between developed countries (between Germany and U.S., Germany and France, and so on) are 0.6 or over. On monthly basis, similar patterns emerge.

Let us now look at the asset returns (again computed from MSCI), and Table 7A and Table 7B exhibit the results:

Table 7A

TIME BLOCK COMPUTATIONS

TIME BLOCK 1 (1988-1996) ANNUAL INDEX RETURNS											
	FR	DE	GB	US	IDF	KR	MYF	PHF	TW	THF	EMF
Dec 30, 1988	0.36	0.2	0	0.12	2.28	0.94	0.24	0.4	1.2	0.42	0.3
Dec 29, 1989	0.34	0.4	0.2	0.27	0.77	0.004	0.53	0.63	0.8	1.06	0.6
Dec 31, 1990	-0.15	-0.1	0.1	-0.06	0.05	-0.285	-0.1	-0.5	-0.6	-0.3	-0.1
Dec 31, 1991	0.16	0.1	0.1	0.27	-0.5	-0.17	0.03	0.83	0.1	0.18	0.6
Dec 31, 1992	0.01	-0.1	-0.1	0.04	-0	5E-05	0.16	0.37	-0.2	0.3	0.1
Dec 31, 1993	0.19	0.3	0.2	0.07	1.02	0.291	1.07	1.21	0.8	0.98	0.7
Dec 30, 1994	-0.07	0	-0	-0.01	-0.3	0.221	-0.2	-0.1	0.2	-0.1	-0.1
Dec 29, 1995	0.12	0.1	0.2	0.35	0.07	-0.046	0.04	-0.1	-0.3	-0.1	-0.1
Dec 31, 1996	0.19	0.1	0.2	0.21	0.25	-0.384	0.25	0.17	0.4	-0.4	0

TIME BLOCK 2 (1997-1999) ANNUAL INDEX RETURNS											
	FR	DE	GB	US	IDF	KR	MYF	PHF	TW	THF	EMF
Dec 31, 1997	0.11	0.2	0.2	0.32	-0.7	-0.672	-0.7	-0.6	-0.1	-0.7	-0.1
Dec 31, 1998	0.4	0.3	0.1	0.29	-0.3	1.375	-0.3	0.13	-0.2	0.11	-0.3
Dec 31, 1999	0.28	0.2	0.1	0.21	0.92	0.902	1.12	0.02	0.5	0.47	0.6

TIME BLOCK 3 (2000-2003) ANNUAL INDEX RETURNS											
	FR	DE	GB	US	IDF	KR	MYF	PHF	TW	THF	EMF
Dec 29, 2000	-0.05	-0.2	-0.1	-0.14	-0.6	-0.50	-0.2	-0.5	-0.5	-0.6	-0.3
Dec 31, 2001	-0.23	-0.2	-0.2	-0.13	-0.1	0.46	0.02	-0.2	0.1	0.03	-0
Dec 31, 2002	-0.22	-0.3	-0.2	-0.24	0.38	0.074	-0	-0.3	-0.3	0.24	-0.1
Dec 31, 2003	0.38	0.6	0.3	0.27	0.7	0.326	0.23	0.39	0.4	1.34	0.5

COMPOSITE COMPUTATIONS

ANNUAL INDEX RETURNS (1988-2003)											
	FR	DE	GB	US	IDF	KR	MYF	PHF	TW	THF	EMF
Dec 30, 1988	0.36	0.2	0	0.12	2.28	0.94	0.24	0.4	1.2	0.42	0.3
Dec 29, 1989	0.34	0.4	0.2	0.27	0.77	0.004	0.53	0.63	0.8	1.06	0.6
Dec 31, 1990	-0.15	-0.1	0.1	-0.06	0.05	-0.285	-0.1	-0.5	-0.6	-0.3	-0.1
Dec 31, 1991	0.16	0.1	0.1	0.27	-0.5	-0.17	0.03	0.83	0.1	0.18	0.6
Dec 31, 1992	0.01	-0.1	-0.1	0.04	-0	5E-05	0.16	0.37	-0.2	0.3	0.1
Dec 31, 1993	0.19	0.3	0.2	0.07	1.02	0.291	1.07	1.21	0.8	0.98	0.7
Dec 30, 1994	-0.07	0	0	-0.01	-0.3	0.221	-0.2	-0.1	0.2	-0.1	-0.1
Dec 29, 1995	0.12	0.1	0.2	0.35	0.07	-0.046	0.04	-0.1	-0.3	-0.1	-0.1
Dec 31, 1996	0.19	0.1	0.2	0.21	0.25	-0.384	0.25	0.17	0.4	-0.4	0
Dec 31, 1997	0.11	0.2	0.2	0.32	-0.7	-0.672	-0.7	-0.6	-0.1	-0.7	-0.1
Dec 31, 1998	0.4	0.3	0.1	0.29	-0.3	1.375	-0.3	0.13	-0.2	0.11	-0.3
Dec 31, 1999	0.28	0.2	0.1	0.21	0.92	0.902	1.12	0.02	0.5	0.47	0.6
Dec 29, 2000	-0.05	-0.2	-0.1	-0.14	-0.6	-0.503	-0.2	-0.5	-0.5	-0.6	-0.3
Dec 31, 2001	-0.23	-0.2	-0.2	-0.13	-0.1	0.46	0.02	-0.2	0.1	0.03	-0
Dec 31, 2002	-0.22	-0.3	-0.2	-0.24	0.38	0.074	-0	-0.3	-0.3	0.24	-0.1
Dec 31, 2003	0.38	0.6	0.3	0.27	0.7	0.326	0.23	0.39	0.4	1.34	0.5

Note the asset returns in the developed economies: US (0.12, 0.27), GB (0, 0.2), DE (0.2, 0.4), FR (0.36, 0.34), and then note IDF (2.28, 0.77), KR (0.94, 0.004), MYF (0.24, 0.33), PHF (0.4, 0.63), TW (1.2, 0.8), and THF (0.42, 1.06) in year 1988 and year 1889, respectively. Take the last two years (2002 and 2003), and note the returns: US (-0.24, 0.27), GB (-0,2, 0.3), DE (-0.3, 0.6), FR (-0.22, 0.38), and then note IDF (0.38, 0.7), KR (0.074, 0.326), MYF (-0, 0.23), PHF (-0.3, 0.39), TW (-0.3, 0.4), and THF (0.24, 1.35). The Asian crisis beginning in the middle of 1997, and in that year returns are all negative in the emerging economies. Though the crisis plagued those countries till the end of 1998, return turned positive for Korea and Philippines, but Malaysia, Taiwan and Indonesia stayed in the negative territory. The developed economies had positive return in both 1997 and 1998.

It should be noted that these returns are in US dollars terms, - that is, we have here the returns equal to $(e_i^* + r_i^*)$, as noted in equation (21) and equation (22). We use the following Morgan Stanley Formula as follows:

Standard Index Calculation Formula by MSCI:

The MSCI Indices are calculated using the Laspeyres' concept of a weighted average, together with concept of chain linking. The general expression of the index is set forth below:

Index in US Dollar at time't' is equal to:

$$\text{Index Level}_{t-1} + \frac{\sum_{i=1}^{n} \text{Price (i)}_t \text{ x No. of shares (i)}_t \text{ x ADJ(i)}_t \text{ x } \frac{1}{\text{Exchnage rate (t)}}}{\sum_{i=1}^{n} \text{Price (i)}_{t-1} \text{ x No. of shares (i)}_{t-1} \frac{1}{\text{Exchnage rate (t-1)}}}$$

where,

t = Time of calculation

n = Number of securities in the index at time 't'

$$\text{ADJ}_t = \left(\frac{\text{Security Price before ex-date of corporate action}}{\text{Theoretical Price after ex-date of corporate action}} \right)$$

Exchange rate used is time-variant

Let us now bring out the standard treatments on the issue of diversification once again, and in that context CAPM framework has been quite extensively brought out. Roll and Ross (1994) note that CAPM may not correctly show the relationship between risk and return, and yet a vast crop of research by Stulz 1981a,b), Solnik (1983)' Campbell and Hamao (1992), Chan, Karlyi and Stulz (1992), Heston,Rouwenhorst and Wessels (1995), Beakart (1995), Harvey (1991,1995) and Beakert and Harvey (1996), Beakert, Erb, Harvey and Viskanta(1997). They examine the asset pricing theory based on two attributes: the beta of all countries index and conditional volatility. They found that in completely segmented markets, volatility is the correct version of risk because higher expected returns are associated with higher volatility and *vice versa*.

In this study, we have drawn a sample of ten emerging markets from the countries that constitute the Emerging Markets Free index (EMF) of the *Morgan Stanley Capital International*

(MSCI)*. All the markets chosen for the study are from the South-East Asian region in order to keep the focus on a defined geographical territory for isolating region specific characteristics. Further motivation for such a sample selection has come from the work of Obaidullah (1994) who has made the case that in the internationalization of equity portfolios from the point of view of global investors some of the South Asian countries have made a strong case for inclusion in an international portfolio. Specifically, the results of his research pointed that the benefits of including countries like India followed by Thai and the Taiwanese markets were "too immense and clear cut to be ignored".

In order to have an insight into any potential diversification benefits amongst the sample countries, *correlation coefficients* have been computed between the monthly returns. The significance of the correlation coefficients was tested at 5% and 10% levels of significance.

As noted earlier, low and insignificant correlation coefficients would make a case for diversification between countries. The risk-return characteristics of the sample countries have been studied by their descriptive statistics: mean *returns and variance* of returns (total risk). The variance has been decomposed into *systematic and unsystematic components* as follows:

$Systematic\ Risk = R^2 \times \sigma_i^2$

where,

R^2 = coefficient of determination between the country's mean return and the return on the market index (EMF).

σ_i^2 = variance of country's return (total risk), and

$Unsystematic\ Risk\ (\sigma^2_{ei}) = \sigma_i^2 - Systematic\ Risk$

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* The **MSCI EMF (Emerging Markets Free) Index**^{SM} is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets. As of April 2002 the **MSCI EMF Index** consisted of the following 26 emerging market country indices: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey and Venezuela

The mean return is *correlated* with the measures of total risk, systematic risk and unsystematic risk to find out whether and in what manner the risk and return series are related to each other.

In order to determine any diversification benefits, the *Single Index Portfolio Optimization Model a la* Elton and Gruber (1994) has been used to rank the countries according to their 'excess return to Beta" ratio. This is done as follows:

Excess return to beta ratio = $\frac{\overline{R_i} - Rf}{\beta_i}$

where, R_i = the expected return of the country i.

R_F = the return on a risk less asset

B_i = the expected change in the rate of return on country I associated with a 1% change in the market return.

This ranking is done to represent the desirability of any country's inclusion in the portfolio. For deciding the number of countries that will formulate the portfolio, a unique cut-off rate (C^*) has been computed, where, all countries having $\frac{\overline{R_i} - Rf}{\beta_i}$ higher than C^* would be included and vice-versa. The cut-off rate was calculated as follows:

$$C_i = \frac{\sigma^2{}_m \sum_{j=1}^{i} (\overline{R}_j - R_f)\beta_j / \sigma^2{}_{ej}}{1 + \sigma^2{}_m \sum_{j=1}^{i} (\beta^2{}_j / \sigma^2{}_{ej})}$$

Once the countries to be included in the portfolio are finalized, the proportion of investment in each country is found out by computing the value of w_i as follows:

$$\omega_i = \frac{\psi_i}{\sum_{j=1}^{N} \psi_j} \text{ where, } \psi_i = \frac{\beta_i}{\sigma^2_{ei}} \left(\frac{\overline{R}_i - R_f}{\beta_i} - C^* \right)$$

A *Simple Linear Regression is* fitted between the country returns and the returns on the EMF index to find out the extent to which the market determines the returns of the countries. It has been followed up by a *stepwise regression* between the returns of the sample countries and the returns on the EMF index to reveal the sensitivity of countries' return amongst themselves and with the market. This has been done to determine whether the markets in the study region are segmented or otherwise and to detect any regional affinities amongst the sample countries. Low and/or insignificant (as indicated by the *t-statistic*) betas will indicate market segmentation, which can be used gainfully by an investor and *vice-versa*. The data are checked for any serial correlation and multicollinearity by using the *Durbin – Watson statistic* and the *Variance Inflation Factors,* respectively.

Table 8A presents the correlation matrix between the returns of emerging economies in the South-East Asian region. Three more countries; India (IN), Pakistan (PK) and Sri Lanka (SL) have been added to the analysis at this stage to give more coverage to the region.. For the purpose of consistency, all returns are in the U.S. currency. It can be observed that 38 out of a total of 55 coefficients are below 0.5 (69.09% cases). Also, the mean correlation is 0.056. Alhough the coefficients are statistically significant in about 32 cases (58%), only 6 of them (11%) are significant at 5% level of significance. This seems to point towards a more than average degree of segmentation in the markets, which can be used as a profit-making opportunity if investors can find a way to circumvent the segmentation.

Table 8A

* Correlation is significant at .05 level of significance

CORRELATION AMONG RETURNS OF EMERGING MARKETS											
	CNF	**IN**	**IDF**	**KR**	**MYF**	**PK**	**PHF**	**SL**	**TW**	**THF**	**EMF**
CNF	1										
IN	0.06	1									
IDF	0.34*	0.18	1								
KR	0.65**	0.36**	0.41**	1							
MYF	0.23	0.13	0.50**	0.31*	1						
PK	-0.125	0.41**	-0.01	0.12	0.02	1					
PHF	0.36**	0.13	0.56**	0.51**	0.31*	0	1				
SL	0	0.12	-0.02	0.13	-0.11	0.29*	-0.15	1			
TW	0.47*	0.31*	0.26	0.62**	0.55**	0.10	0.38**	-0.02	1		
THF	0.48**	0.17	0.61**	0.68**	0.50**	0.08	0.73**	-0.13	0.54**	1	
EMF	0.56**	0.51**	0.46**	0.82**	0.43**	0.27*	0.52**	0.12	0.75**	0.64**	1

** Correlation is significant at .10 level of significance.

Each sample country shows a significant correlation with the MSCI's EMF index, indicating that there is a relationship between the returns of the sample countries and the emerging markets across the globe, which is significant at 10% level of significance. However, except Korea, Taiwan and Thailand, none of the other countries exhibit any marked correlation above 0.5. A closer look at the correlations amongst individual sample countries reveals signs of some geographical affinity in their returns. The returns of countries from far-east show a relatively higher degree of correlation between themselves as compared to their correlation with countries form South West Asia. Similarly, returns of the countries from South Asia exhibit a better relationship amongst each other with the exceptions of Sri Lanka, whose returns are not significantly correlated with any of the sample countries, and India, whose returns show a significant correlation with Korea and Taiwan.

The initial analysis indicates that there may be a benefit in constructing a diversified portfolio containing the sample countries. The *Single Index Portfolio Optimization Model* has been applied to confirm this finding. The results of portfolio optimization are presented in Tables 8B through 8D

The countries were ranked as per their 'Excess Return to Beta' ratio and C_i for each country was found. The results are presented in Table 8B.

Table 8B

CUT-OFF RATE						
COUNTRY	$\frac{R_i - R_f}{\beta_i}$	$\frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\frac{\beta^2}{\sigma_{ei}^2}$	$\sum_{j=1}^{i} \frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\sum_{j=1}^{i} \frac{\beta^2}{\sigma_{ei}^2}$	**C_i**
SL	-11.12	-0.003	0.0003	-0.003	0.0003	-0.169
PHF	-7.13	-0.05	0.007	-0.06	0.008	-2.467
IN	-4.00	-0.03	0.007	-0.08	0.01	-3.536
CNF	-3.83	-0.03	0.009	-0.12	0.024	-4.811
IDF	-3.35	-0.018	0.005	-0.14	0.030	-5.441
TW	-2.67	-0.073	0.027	-0.21	0.057	-7.657
MYF	-2.59	-0.01	0.004	-0.23	0.062	-8.022
THF	-1.82	-0.027	0.014	-0.25	0.077	-8.613
PK	-1.75	-0.003	0.001	-0.26	0.078	-8.677
KR	-1.10	-0.04	0.04	-0.30	0.121	-8.881

The table shows that the 'Excess Return to Beta' ratio $\frac{R_i - R_f}{\beta_i}$ exceeds the cut off rate $\boldsymbol{C_i}$ for all countries form Korea through China. As such, the optimal portfolio must comprise of these countries. For India, Philippines and Sri Lanka $\frac{R_i - R_f}{\beta_i} < C_i$, and therefore these countries do not form a part of the portfolio and the unique cut-off rate $C^* = -4.811$, which is the C_i for China.

Table 8C shows the proportion of money (ω_i) that must be invested in each country for effective diversification results.

Table 8C

PROPORTION OF INVESTMENT PER COUNTRY		
COUNTRY	ψ_i	ω_i
CNF	-0.01	-0.18
IDF	-0.02	-0.46
TW	0.009	0.15
MYF	0.01	0.17
THF	0.007	0.13
PK	0.05	0.86
KR	0.01	0.31

Maximum percentage (86%) of investment goes to Pakistan followed by Korea (31%) and Malaysia (17%).For China and Indonesia, the stocks must be sold short to the extent of 18 percent and 46 percent, respectively.

The resultant portfolio return and risk are computed and compared with those if a plain portfolio comprising of all countries was held during the time frame of the study. The results are tabulated in Table 8D.

Table 8D

OPTIMAL AND PLAIN PORTFOLIO: A COMPARISON	
PORTFOLIO RETURN	**PLAIN RETURN***
2.847216989	0.428313005
PORTFOLIO VARIANCE	**PLAIN VARIANCE**
116.7752198	132.523
PORTFOLIO σ	**PLAIN σ**
10.80625836	11.51186345
PORTFOLIO β	**PLAIN β**
0.721549751	0.8345

* $PLAINRETURN = \sum_{i=1}^{n} 0.10 \overline{XR_i}$, where i = country

It can be observed that after optimizing the portfolio, the return has increased from 0.42 percent to 2.84 percentl - an increase of 2.42 percent. Also the risk measures show a substantial reduction with 116.77 as portfolio variance as compared to the plain variance of 132.52. The preliminary observation had revealed that there might be diversification benefits from the sample countries due to small correlations amongst them (Table 8). At the end of the optimization exercise, the prior finding gains strength.

For having further insight into the nature of return and risk among the sample countries, mean expected returns and variances of returns are computed for each country during the period of this work. Risk is further decomposed into systematic and unsystematic component to find out as to which part of the risk is related to return more. In other words, the attempt is to know whether the return ss related to a source of risk that is market-related or otherwise. Table 8E shows the country-wise mean return and variances of returns.

Table 8E

COUNTRY-WISE MEAN RETURNS AND VARIANCES OF RETURNS		
COUNTRY	**MEAN**	**VARIANCE**
CNF	-0.3746	120.764238
IN	0.35942	79.9723831
IDF	-0.3746	231.601298
KR	1.3859	154.891875
MYF	1.51271	85.7407492
PK	2.10167	162.974955
PHF	-1.7269	77.6804912
SL	0.71914	123.8191
TW	-0.0832	113.035082
THF	0.76359	174.783292
EMF	0.37314	48.3705262

Pakistan, Malaysia and Korea with a mean return of 2.10 percent, 1.51 percent, and 1.38 percent return, respectively emerge on the top, and Philippines comes out as the least-return country during the study period with a mean return of -1.7269 percent. The return on the market has been 0.37314 percent, which is just above the average of all countries' return of 0.4233 percent. Indonesia, Thailand and Pakistan appear as the countries with maximum variances in their returns, whereas the returns of Malaysia, India and Philippines are relatively most stable.

The results from Tables 8D and Table 8E seem to be somewhat in coherence with the recent general economic indicators of developing Asian nations.

Table 8F shows the decomposition of variance into its two sources, systematic and unsystematic.

Table 8F

COUNTRY WISE RISK DECOMPOSITION						
COUNTRY	**R^2**	**σ^2_i**	**β^2**	**σ^2_m**	**Systematic Risk $r^2x\sigma^2_i$ or, $\beta^2x\sigma^2_m$**	**Unsystematic Risk σ^2_{ei}**
CNF	0.31	120.76	0.77	.	37.44	83.32
IN	0.26	79.97	0.43	.	20.79	59.18
IDF	0.21	231.6	1.01	.	48.64	182.96
KR	0.67	154.89	2.15	.	103.78	51.11
MYF	0.19	85.74	0.32	.	16.29	69.45
PK	0.08	162.97	0.26	.	13.04	149.93
PHF	0.27	77.68	0.44	.	20.97	56.71
SL	0.02	123.81	0.04	.	2.48	121.33
TW	0.57	113.03	1.33	.	64.43	48.6
THF	0.42	174.78	1.5	.	73.41	101.37
EMF	.	.	.	48.37	.	.

An examination of the table reveals that Korea, Thailand and Taiwan are the top three economies where the risk is related mostly to market forces as is evident from the values of their systematic risk components of 103.78, 73.41 and 64.43, respectively. On the other hand, market has played a limited role in the risk for countries like Malaysia, Pakistan and Sri Lanka where the risk has been mostly due to non-market related forces, which may be related to operating inefficiencies in their business or the way they financed their businesses or simply because the beta computed by taking all emerging countries around the world as the definition of the market has not played a major role in deciding the equity returns of the countries.

On comparison of the risk components with corresponding mean returns (Table 8E), it appears as if either the market has not been very efficient in rewarding the systematic component of the risk or it values something more than just the beta measure. This appears consistent with what Douglas (1969) has found about the predictive power of beta. He indicates that unsystematic risk did seem to explain average returns, which is contrary to the predictions of the Capital Market theory. The Asian

Development Outlook Update 2002 also emphasizes the country specific factors as far as the performance in equity markets is concerned.

Similar results are obtained when the mean returns and risk (and its components) are put to a bi-variate correlation test to find out the direction and significance of relationship, if any. The results are furnished in Tables 8G.

Table 8G

CORRELATION OF MEAN RETURN WITH RISK AND ITS COMPONENTS		
	R	**SIGNIFICANCE LEVEL**
σ^2_i (VARIANCE)	0.397	0.128
$R^2 x \sigma^2_i$(SYSTEMATIC RISK)	0.079	0.415
σ^2_{ei}(UNSYSTEMATIC RISK)	*0.368*	*0.148*

It can be seen from the table that though the correlation coefficients are not very significant but the relationship between return and risk is positive. Also, the relationship between return and unsystematic risk is more pronounced as compared to the relation between return and systematic risk. It is worth noting that not only the correlation between return and systematic risk is very meager, it also assumes significance at about 42 percent level of significance. It appears as if the market-related forces have little role in explaining the country returns and they are more segmented than integrated during the time frame of the study.

Driessen and Laeven (2002) have found that,"….there are substantial regional and global diversification benefits for domestic investors in both developed and developing countries, provided

that these investors can short sell local and foreign stock indices. Consistent with conventional wisdom, the benefits of international portfolio diversification are larger for developing countries relative to developed countries. This is consistent with the finding that developing countries on average are much less integrated in world financial markets".

The analysis of the Tables 9 and Table 9A just about confirms most of the above findings. Table 9 presents the results of the simple linear regression between the country returns and the returns on the index.

Table 9

SIMPLE LINEAR REGRESSION: COUNTRIES AND INDEX					
COUNTRY	**β_i**	**T- STAT (SIG.)**	**F VALUE (SIG.)**	**ADJUSTED R^2**	**DW**
CNF	0.88	4.74 (0.00)	22.54 (0.00)	0.297	1.91
IN	0.66	4.23 (0.00)	17.86 (0.00)	0.263	2.45
IDF	1.005	3.65 (0.001)	13.35 (0.001)	0.19	1.99
KR	1.467	10.11 (0.00)	102.31 (0.00)	0.665	2.04
MYF	0.57	3.38 (0.001)	11.42 (0.001)	0.17	2.27
PK	0.511	2.05 (0.45)	4.2 (0.45)	0.06	2.5
PHF	0.663	4.34 (0.00)	18.86 (0.00)	0.26	2.1
SL	0.205	0.913 (0.336)	0.833 (0.366)	-0.003	2.3
TW	1.15	8.14 (0.00)	66.18 (0.00)	0.561	2.7
THF	1.22	5.95 (0.00)	35.46 (0.00)	0.403	2.5

The regression results reveal that most of the beta values are highly significant at 5% level of significance with the exception of Sri Lanka, whose beta value assumes significance at 33% level of significance. Same is the case with the F-values, which are significant for all countries except Sri Lanka. The values of the Durbin-Watson statistic hover on and around 2 and 2.5 in all cases except

Taiwan, where it nearly has reached 3. This is indicative of a slightly negative correlation between the residuals but it is not pronounced enough to contaminate the inferences drawn from the least squares. As such, it appears that the EMF index should be useful in explaining the country returns. However, the relatively low value of coefficient of determination R^2 does not take the case for market integration very far and hints at the presence of more localized and country specific factors than the market which may be responsible for returns. These can range from exchange rate risk, legal barriers or high taxation rates to simply an inadequate transmission and/or interpretation of information.

Stepwise regression has been employed to find out the sensitivity of the country returns to the returns of their neighboring countries in the sample as well as to the market index returns. The stepwise criteria for a variable to enter the model are the probability of $F \leq 0.050$ and for the removal of variable, it are the probability of $F \geq 0.100$. The results are furnished below in Table 9A

Table 9A

STEPWISE REGRESSION: COUNTRIES AND INDEX RETURNS							
COUNTRY	**PREDICTORS**	**MODEL**	**BETAS**	**T- STAT**	**F**	**VIF**	**DW**

		R^2			VALUE		
CNF	KR, PK	0.45	0.60, -0.18	6.56, -2.03	22.26	1.017	2.07
IN	EMF,PK	0.34	0.55, 0.20	3.57, 2.43	12.75	1.084	2.53
IDF	PHF, MYF	0.41	0.77, 0.59	3.93, 3.19	18.76	1.11	1.9
KR	EMF,CNF, THF	0.74	0.96, 0.28, 0.20	5.35, 2.90, 2.31	49.8	1.98, 1.5, 1.77	2.17
MYF	TW, IDF	0.42	0.39, 0.23	4.08, 3.5	19.58	1.074	2.28
PK	IN	0.15	0.59	3.2	10.3	1	2.56
PHF	THF	0.52	0.48	7.52	56.57	1	1.93
SL	PK	0.07	0.26	2.19	4.77	1	2.16
TW	KR, MYF	0.51	0.43, 0.45	4.88, 3.85	27.94	1.108	2.27
THF	PHF, KR, MYF	0.69	0.69, 0.39, 0.34	4.96, 4.04, 2.87	39.29	1.42, 1.41, 1.15	2.32

The most eye-catching observation from the table is the geographical affinity amongst the countries in the region. Countries from Far East show a marked tendency to explain each other returns, whereas the South Asian nations seem to be more responsible returns amongst themselves. This tendency looks more pronounced in the far-eastern countries where the R^2 ranges from 41% to 74% than in the South Asian nations where it is very small (7% to 34%). Sri Lanka and Pakistan look particularly aloof in this matter with a R^2 of 7% and 15% respectively. However, the R^2 values are not high in any of the cases except where the EMF, China and Thailand account for 74% variation in the Korean market and in the case of Thai market whose return is taken care of by Philippines, Korea and Malaysia to the extent of 69%. It appears that the regional markets respond a bit to the immediate neigbourhood but when an integrated view is taken, it is observed that except India and Korea, the EMF does not play any role in return determination. The values of Variance inflation factors (below 10) and the Durbin Watson test (around 2) do not reveal any serious problems of multi-collinearity and residual correlation in the data set and as such the observations from the data seem credible which reconfirm the finding of Table 9 of primarily segmented markets with a definite potential diversification benefits (Table 8D)

VI. CONCLUDING OBSERVATIONS

The study has been undertaken with twin objectives of ascertaining the benefits of international diversification amongst the developed and the emerging countries of South-East Asia and to determine the degree of market integration (or otherwise) amongst these countries. The principal findings of the study are: f*irst*, the stock markets of the sample countries exhibit more segmentation than integration during the period of study; s*econd*, there exist sub-regional affinities amongst the markets. In spite of a lesser degree of integration, the returns of the far eastern stock markets respond to each other. Similarly, the South Asian nations behave as "good neighbours" amongst themselves; *third*, the investors seem to be at a less than optimum situation in terms of return-risk trade-off. The opportunities for risk reduction and return magnification exist by way of diversifying beyond local markets; *fourth*, non-market-related factors account for most of the returns amongst the sample countries. However, it should be noted that during the currency crisis period the benefits have been mostly negative partly because of currency depreciation beyond expectation and that itself pushing the asset returns to negative territory. With hardly any readily available currency hedging in the emerging economies, the financial distress has escalated beyond tolerable level.

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