

INVESTMENT BARRIERS AND STOCK MARKET PERFORMANCE An Evidence from Emerging Markets

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Abstract. Investment barriers restrict the capital market integration across boundaries. Emerging stock markets started to integrate with the world market after relaxing all the financial restrictions. The correlation in stock price indices as well as correlation in stock returns among emerging markets and with the US market has increased after financial reforms. But, at the same time, the correlation in stock returns among these markets as well as with the US market is very low, so capital market segmentation exists.

I. INTRODUCTION

The role of financial markets, especially capital markets, is very crucial in the development of the national economy. They operate through engaging in the process of intermediation by mobilizing savings from a large pool of small savers and channeling these funds into productive investments by a generally much smaller number of borrowers. The key to success in intermediation rests on the ability to pool together and thereby reduce the risk associated with individual investments.

Capital markets are integrated if assets with perfectly correlated rates of returns have the same price regardless of the location in which they are traded. Alternatively, capital market segmentation implies that financial assets traded in different markets “with identical risk characteristics” have different returns due to different investment restrictions. Segmentation may be due to government restrictions to capital investments or due to individuals’ attitudes or irrationality.

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Emerging stock markets are ideal for investment due to its high returns. Portfolio investment in these markets increased in early 1990s after the financial reforms. International investment was restricted in emerging stock markets up to 1989, when financial and exchange rate restrictions were started to relax. This process was slowly and steadily continued up to 1992 when almost all restrictions¹ to international investment were abolished. These investment barriers in emerging markets discouraged investment and lead to *de facto* segmentation. For our study purpose, we give label to the period of restrictions as Pre-Financial reforms period and to the period after the financial reforms as Post-Financial reforms period.²

The objective of the study is to highlight the extent of emerging stock markets' integration/segmentation with the global capital market and whether the investment barriers in these markets have any effect on their integration/segmentation? The study is planned as follows. Section II provides analytical framework and data, while Section III and Section IV give results and analysis of correlation of stock price indices and stock returns. Finally, Section V concludes the study.

II. DATA AND METHODOLOGY

For the analysis of capital market, we selected a sample of nineteen emerging stock markets and USA stock market (used as a proxy for the world market). Since data for Pakistan are available from January 1989, therefore, we picked those markets whose data set was similar to the data of Pakistan market. Indonesia, China and other emerging markets are excluded due to this fact. The sample countries are split into four groups as:

<i>Group</i>	<i>Markets</i>
Latin America	Argentina, Brazil, Chile, Colombia, Mexico, Venezuela
East Asia	Korea, Philippines, Taiwan (China)
South Asia	India, Malaysia, Pakistan, Thailand
Europe/Mid-East/Africa	Greece, Jordan, Nigeria, Portugal, Turkey, Zimbabwe

¹Such restrictions were legal restrictions, *i.e.* restrictions on direct ownership of equity, exchange rate and capital controls, and indirect restrictions, *i.e.* differences in available information, accounting standards and investors protections.

²The pre-financial reforms period is from January 1989 to December 1991 and the post-financial period is from January 1992 to December 1998.

The analysis is based on monthly International Finance Corporation Global (IFCG) price indices. The data are taken from various issues of Emerging Stock Markets Fact Book, International Finance Corporation. All the price indices are given in US dollar for a sample of 120 monthly observations (January 1989 to December 1998). These indices are calculated with the base year of December 1984, whereas the base years for Portugal and Turkey are January 1986 and December 1998, respectively. So for an easy comparison all indices are converted to the common base of January 1989.

Stock returns for emerging markets and the US market are calculated by taking first log difference of the IFCG regional price indices. A very simple but useful procedure to analyze the behaviour of stock markets is to study the pattern of descriptive statistics based on the given sample with the help of means, standard deviations and the correlation coefficients.³ Following this convention, this study presents the pattern of stock price returns and simple correlation coefficients.

III. STOCK PRICE INDICES CORRELATION

Table 1 simply reports means, standard deviations and correlation coefficients of the stock price indices of emerging markets and the US market. The means and standard deviations indicate that Latin American markets have higher means with high volatility followed by Europe/Mid-East/Africa (EMEA) and Asian markets. It also shows that Asian markets are likely to be more stable than Latin American and EMEA markets. In Latin American markets, Argentina is the most volatile, in EMEA the most volatile market is Portugal and in Asia, Taiwan is the most volatile market, while the most stable market in all emerging markets is Jordan.

The correlation matrix for emerging markets and the US market price indices over the period January 1989 to December 1991 is formed to check the co-movement of these markets. Most of the correlation coefficients were found to be positive and significant at different levels of significance. In Asian markets, 61% markets are correlated with each other, 46% are negatively correlated, while 54% are positively correlated.

In the Latin American markets, 73% markets are correlated, 90% have positive correlation, while 10% have negative correlation. The negative correlation of Brazil-Venezuela is quite evident. On the other hand, 60% of

³Errunza and Losq (1985), Harvey (1995), Solink (1974) and Tesar and Werner (1995) had followed this conventional method.

the Europe/Mid-East/African (EMEA) markets have positive and/or negative correlation with each other, 78% positive while 22% negative correlation. Most of the markets have positive link with each other, while Nigeria-Portugal pair displays negative correlation.

The correlation between emerging markets and the US market implies that 68% of the emerging markets show correlation with the US stock index, 85% have positive correlation, while 15% are negatively correlated with the US market. Malaysia, Pakistan, Argentina, Chile, Colombia, Mexico, Venezuela and Nigeria display positive while Korea and Portugal report negative correlation with the US market.

Cross region correlation is also evident from the correlation coefficients, 69% of the Latin American markets and 76% of the Europe/Mid-East/African markets have positive and/or negative correlation with the Asian markets. Similarly, 58% of the Europe/Mid-East/African markets are found to be correlated positive and/or negative with the Latin American markets.

In sum, the correlation coefficients seem to be high in Latin American markets followed by Asian and EMEA markets. The cross-region correlation is high in EMEA-Asia, while emerging markets and the US stock indices also show some considerable co-movements.

The financial and other structural reforms in emerging markets did affect their stock markets. Table 2 presents the effect of these reforms on means, volatility and correlation of these markets stock indices with each other as well as with the US market. All the stock index means have raised up with upward volatility except for Taiwan and Greece, where means as well as volatility declined. Asian markets are more stable followed by EMEA markets, while Latin markets are the most volatile. Jordan is found to be more stable, while Turkey is the more volatile market.

After financial reforms, only the inter markets correlation has increased but cross-region correlation has declined. All the Asian markets show positive correlation to each other. Among these markets, 80% have quite clear positive correlation with each other. Among Latin American markets, although there are some cases of negative correlation, but these are not considerable. There are 66% cases of positive correlation. In Europe/Mid-East/African markets positive correlations are dominant.

Although correlation among emerging markets has increased after financial reforms, but correlation of these markets with the US market has

declined. There are 47% cases of negative and 53% cases of positive correlation which are somewhat considerable.

The cross-region correlation of stock market indices has decreased for Asia-Latin America, from 69% in 1989-91 to 54% in 1992-98, for Asia-EMEA from 76% in 1989-91 to 55% in 1992-98 and for Latin America-EMEA from 58% in 1989-91 to 47% in 1992-98. This may be due to the fact that these markets are now a part of the matured markets and they have their own stable path.

After financial reforms, the inter-market correlation increased sharply. The correlation among EMEA markets raised comparatively more than Asian and Latin American markets. On the other hand, the correlation of emerging markets and the US as well as the cross-region correlation has declined. This may be due to the increasing maturity of emerging markets, *i.e.* in the recent period (1992-1998) there is evidence of integration of the emerging stock markets within their own region. The evidence in favour of integration of cross-region is lacking or weak (for US stock market used as a proxy for the world market). It is also implied that regional stock markets may be exerting greater influence on one another than the more distant markets.

IV. THE CORRELATION IN STOCK RETURNS

Table 3 presents the means, standard deviations of rates of return and the inter-market correlation coefficients of the rates of return over the period January 1989 to December 1991. Results imply that the Latin American markets have better rates of return but they are also more volatile than Asian and EMEA markets. In Latin America, Argentina has comparatively high rates of return as well as high volatility. On the other side, in Asian markets, Pakistan has better rates of return as well as comparatively less volatile than other Asian markets.

The inter-markets correlation coefficients show positive and/or negative correlation, but very few cases are significant. In Asian markets, 33% cases of inter-markets correlation are quite attractive. Out of 33% cases, 80% shows positive while 14% displays negative correlation. The remaining 67% of the markets have no or very low correlation. Malaysia-Philippines, Malaysia-Taiwan, Malaysia-Thailand, Philippines-Taiwan and Philippines-Thailand are some prominent cases of positive correlation in their rates of return, while India-Taiwan negative correlation is also considerable but it is very low.

TABLE 1
Means, Standard Deviations and Correlation Coefficients of the Price Indices of Emerging Markets
and US Market (January 1989 to December 1991)

	India	Korea	Malaysia	Pakistan	Philippines	Taiwan	Thailand	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	Czech	Jordan	Nigeria	Portugal	Turkey	Zimbabwe	USA	
Mean	113.1	81.84	118.1	112.31	118.69	112.98	136.48	288.37	131.87	174.46	130.08	120.86	222.73	274.65	89.428	154.81	304.22	316.51	151.04	118.41	
Std. Dev.	19.4	16.513	11.416	33.037	28.91	41.388	24.671	189.23	49.985	78.292	49.556	91.55	164.79	128.93	5.3899	35.641	16.853	189.37	44.038	10.62	
	1																				
India	1																				
Korea	-0.787*	1																			
Malaysia	-0.055	0.29***	1																		
Pakistan	0.412*	-0.36**	0.0065	1																	
Philippines	-0.703*	0.621*	0.344**	-0.163	1																
Taiwan	-0.851*	0.747*	0.2074	-0.33**	0.834*	1															
Thailand	-0.069	-0.225	0.798*	-0.250	0.346**	0.1997	1														
Argentina	0.452*	-0.399*	0.0712	0.812*	-0.071	-0.21***	0.156	1													
Brazil	-0.481*	0.616*	-0.068	0.0022	0.563*	0.583*	-0.197	-0.061	1												
Chile	0.580*	-0.657*	0.2399	0.680*	-0.36**	-0.51**	-0.121	0.706*	-0.184	1											
Colombia	0.532*	-0.503*	0.1203	0.915*	-0.27***	-0.459*	-0.051	0.735*	-0.196	0.647*	1										
Mexico	0.612*	-0.723*	0.341**	0.732*	-0.30***	-0.532*	0.068	0.829*	-0.258	0.947*	0.721*	1									
Venezuela	0.713*	-0.83*	0.0512	0.573*	-0.664*	-0.773*	0.124	0.931*	-0.488*	0.814*	0.661*	0.865*	1								
Greece	0.593*	-0.772*	0.423*	-0.044	-0.416*	-0.38*	0.622*	0.0251	-0.659*	0.2368	0.2372	0.341**	0.454*	1							
Jordan	-0.35**	0.0547	0.480*	-0.08	0.382*	0.34**	0.492*	-0.137	-0.115	-0.123	-0.04	-0.062	0.0994	0.0994	1						
Nigeria	0.758*	-0.878*	0.336**	0.567*	-0.474*	-0.647*	0.1955	0.669*	-0.339*	0.803*	0.898*	0.933*	0.855*	0.636*	-0.037	1					
Portugal	-0.853*	0.537*	0.27***	-0.482*	0.673*	0.632*	0.536*	-0.467*	0.2066	-0.641*	-0.456*	-0.571*	-0.710*	-0.029	0.30***	0.30***	1				
Turkey	0.0538	-0.151	0.443*	-0.414*	0.1011	0.133	0.733*	-0.4*	-0.29***	-0.416*	-0.188	-0.27***	-0.20***	0.604*	0.252	0.0709	0.608*	1			
Zimbabwe	0.556*	-0.721*	0.2216	-0.236	-0.623*	-0.6*	0.284**	-0.193	-0.633*	0.1953	-0.029	0.2437	0.527*	0.759*	-0.143	0.502*	-0.27***	0.363**	1		
USA	0.3***	-0.802*	0.533*	0.589*	0.0704	-0.248	0.28***	0.747*	-0.103	0.796*	0.581*	0.833*	0.605*	0.29***	0.1445	0.696*	-0.27***	-0.224	0.565	1	

Correlation Coefficients

*, **, *** indicates significance at 1%, 5% and 10%, respectively.

TABLE 2
Means, Standard Deviations and Correlation Coefficients of the Price Indices of Emerging Markets
and US Market (January 1992 to December 1998)

	India	Korea	Malaysia	Philippines	Taiwan	Thailand	Argentina	Israel	Chile	Colombia	Mexico	Yugoslavia	Greece	Jordan	Nigeria	Portugal	Turkey	Zimbabwe	USA	
Mean	169.34	85.017	207.89	217.08	95.193	277.17	868.03	372.86	513.87	641.33	482.78	313.85	217.06	141.69	276.53	162.44	603.25	107.67	216.87	
Std. Dev.	37.823	32.611	78.034	69.762	76.828	23.291	138.99	186.18	147.78	121.3	132.93	123.77	87.563	17.804	90.804	30.834	234.77	54.658	80.54	
	1																			
Korea	0.512*	1																		
Malaysia	0.30**	0.774*	1																	
Philippines	0.798*	0.746*	0.556*	1																
Taiwan	0.28**	0.725*	0.946*	0.525*	1															
Thailand	0.0676	0.02	0.349**	0.873	0.481*	1														
	0.470*	0.954*	0.811*	0.722*	0.789*	0.0019	1													
Argentina	0.0954	-0.30**	0.0221	0.203	0.1193	0.701*	-0.30**	1												
Brazil	-0.178	-0.194	0.157	-0.156	0.30**	0.851*	-0.19	0.758*	1											
Chile	0.1638	0.458*	0.604*	0.29**	0.731*	0.638*	0.463*	0.371**	0.675*	1										
Colombia	0.3*	0.401*	0.494*	0.391*	0.615*	0.674*	0.393*	0.419*	0.560*	0.725*	1									
Mexico	0.668*	0.1612	0.0855	0.812*	0.0395	0.0628	0.1418	0.364**	0.026	0.135	0.29**	1								
Venezuela	0.232	-0.12**	-0.24	0.5089	-0.344*	0.0786	-0.437*	0.360**	-0.20	-0.019	0.336**	0.336**	1							
Greece	-0.411*	-0.74*	-0.633*	-0.685*	-0.591*	0.1158	0.734*	0.391*	0.366**	-0.165	-0.226	-0.203	0.0417	1						
Jordan	-0.401*	-0.35**	-0.229	-0.36**	-0.126	0.2409	-0.20**	0.31**	0.512*	0.1275	0.1763	-0.033	-0.4*	0.547*	1					
Nigeria	-0.177	-0.229	0.1585	-0.168	0.29**	0.813*	-0.23*	0.855*	0.842*	0.30*	0.527*	0.065	0.1219	0.331**	0.291**	1				
Portugal	-0.476*	-0.73**	-0.554*	-0.646*	-0.37**	0.33**	-0.657*	0.497*	0.591*	0.0213	-0.018	-0.193	-0.061	0.891*	0.704*	0.481*	1			
Turkey	-0.802*	-0.531*	-0.203	-0.389*	-0.341	0.476*	-0.481*	0.634*	0.723*	0.2327	0.1793	-0.014	0.1492	0.572*	0.614*	0.490*	0.694*	1		
Zimbabwe	0.0923	0.1394	0.573*	0.1001	0.823*	0.801*	0.1204	0.811*	0.766*	0.741*	0.617*	-0.06	0.1456	0.0878	0.785*	0.089*	0.406*	0.406*	1	
USA	-0.629*	-0.731*	-0.45*	-0.724*	-0.29**	0.429*	-0.609*	0.53*	0.667*	0.1	-0.025	-0.28**	0.06	0.833*	0.699*	0.576*	0.733*	0.2753	0.2753	1

Correlation Coefficients

*, **, *** indicates significance at 1%, 5% and 10%, respectively.

TABLE 3
Means, Standard Deviations and Correlation Coefficients of the Rates of Return of Emerging Markets
and US Market (January 1989 to December 1991)

	India	Korea	Malaysia	Pakistan	Philippines	Taiwan	Thailand	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	Germany	Nigeria	Zimbabwe	Turkey	Zimbabwe	USA	
Mean	0.0288	-0.014	0.0056	0.0274	0.0029	-0.007	0.0077	0.0198	0.011	0.032	0.063	0.041	0.0475	0.0284	0.0238	-0.004	0.0113	-0.009	0.0097	
Std. Dev.	0.0483	0.0816	0.0091	0.0763	0.111	0.1596	0.0927	0.3353	0.2729	0.0733	0.0983	0.0739	0.1496	0.1482	0.0428	0.0763	0.1812	0.0810	0.0486	
Correlation Coefficients																				
India	1																			
Korea	-0.103	1																		
Malaysia	-0.908	0.334***	1																	
Pakistan	0.0626	0.6087	0.0338	1																
Philippines	-0.102	0.0295	0.551*	0.6488	1															
Taiwan	-0.23***	0.2431	0.447*	0.6257	0.405*	1														
Thailand	0.02	0.0911	0.606*	0.022	0.541*	0.228	1													
Argentina	0.23**	-0.129	-0.118	-0.012	-0.081	-0.11	0.033	1												
Brazil	-0.04	-0.14	0.2444	0.0157	0.255	0.213	0.0822	-0.219	1											
Chile	-0.1	0.0842	0.1525	0.176	0.1851	0.24***	0.9457	-0.005	0.328**	1										
Colombia	-0.07	-0.183	0.2137	0.01*	0.290	0.0588	0.1981	0.082	0.1459	-0.089	1									
Mexico	0.0151	0.27***	0.551*	0.0172	0.264	0.38**	0.337**	0.31**	-0.076	-0.177	-0.026	1								
Venezuela	0.27***	-0.165	-0.35**	-0.013	-0.341*	-0.405*	-0.262	0.1158	-0.32***	-0.77***	0.0268	-0.374	1							
Turkey	0.075	-0.238	0.0869	-0.148	0.283	-0.068	0.33***	0.0218	0.1092	0.045	0.1584	-0.04	-0.071	1						
Zimbabwe	-0.197	-0.084	0.2531	0.0118	0.31**	0.32***	0.231	-0.29***	0.062	-0.307	0.1732	0.0286	-0.154	0.1814	1					
USA	0.2225	-0.11	0.0114	-0.24	-0.064	-0.103	0.1213	0.2108	-0.174	-0.137	-0.016	0.0204	0.061	0.0099	0.3344	1				
India	0.1133	0.38***	0.38***	0.0878	0.31***	0.106	0.35**	0.093	0.31***	0.0989	0.0138	0.0808	0.137	0.636*	0.018	0.0845	1			
Pakistan	0.1838	-0.124	0.28***	0.0159	0.0188	0.1715	0.39**	0.068	0.1447	-0.1	0.1373	0.1193	-0.247	0.445*	-0.085	0.1269	0.325**	1		
Turkey	-0.142	-0.071	0.0774	-0.35**	-0.149	-0.118	-0.27***	-0.27***	0.0973	0.092	-0.228	-0.076	0.0439	0.008	-0.152	-0.18	-0.063	0.043	1	
Zimbabwe	-0.08	0.003*	0.33**	0.0851	0.408*	0.155	0.484*	0.0588	0.2351	0.292	0.171	0.461*	-0.166	0.1114	0.1905	0.088	0.398*	-0.174	-0.001	1

* ** indicates significance at 1%, 5% and 10%, respectively.

TABLE 4
Means, Standard Deviations and Correlation Coefficients of the Rates of Return of Emerging Markets and US Market (January 1992 to December 1998)

	India	Korea	Malaysia	Philippines	Taiwan	Thailand	Argentina	Brazil	Chile	Colombia	Mexico	Vietnam	Greece	Jordan	Nigeria	Peru	Turkey	Zimbabwe	USA
Mean	-0.007	-0.003	-0.004	-0.014	0.001	0.003	0.002	0.002	0.005	0.028	-0.002	-0.011	0.009	0.007	0.001	0.015	0.016	-0.012	0.029
Std. Dev.	0.108	0.139	0.121	0.110	0.099	0.146	0.104	0.125	0.097	0.076	0.106	0.155	0.083	0.04	0.185	0.062	0.238	0.122	0.136
Correlation Coefficients																			
India	1																		
Korea	0.1264	1																	
Malaysia	0.2274	0.22**	1																
Philippines	0.2347	0.0728	0.367**	1															
Taiwan	0.0793	0.28***	0.711*	0.207	1														
Thailand	0.2020	0.2595	0.466*	0.2599	0.518*	1													
Argentina	0.2711	0.385*	0.694*	0.79***	0.675*	0.410*	1												
Brazil	0.1798	0.1053	0.334**	0.1727	0.425*	0.386*	0.355**	1											
Chile	0.21**	0.1797	0.2666	0.2064	0.2626	0.27**	0.28***	0.592**	1										
Colombia	0.41**	0.1135	0.428*	0.17***	0.49*	0.51**	0.403*	0.572*	0.502*	1									
Mexico	0.1441	0.26	0.1147*	0.20**	0.1604	0.171	0.0951	0.1142	0.206	0.2727	1								
Vietnam	0.27***	0.2021	0.338**	0.1957	0.3491*	0.303**	0.333**	0.671*	0.521*	0.476**	0.4631	1							
Greece	0.1561	0.225	0.325**	0.16	0.28**	0.27***	0.2051	0.2396	0.31***	0.37***	0.351**	0.3173	1						
Jordan	0.2419	0.2428	0.2156	0.113	0.27***	0.189	0.2162	0.28***	0.133**	0.15**	0.13***	0.254	0.236**	1					
Nigeria	0.1349	0.1036	0.0284	0.178	-0.049	0.1289	0.1289	0.0782	0.1766	0.143	0.1887	0.0598	0.27***	0.2366	1				
Peru	-0.114	0.0271	-0.015	0.1281	0.0285	-0.009	0.0132	-0.141	0.135	0.0721	0.2602	0.0278	0.119	0.0476	0.0476	1			
Turkey	0.27***	0.27***	0.1621	0.0702	0.32**	0.221	0.32**	0.32***	0.457**	0.2804	0.2388	0.27***	0.2098	0.1133	-0.051	0.068*	1		
Zimbabwe	0.1563	0.141*	0.1591	0.0711	0.1887	0.2091	0.10**	0.1684	0.361**	0.1451	0.159**	0.2115	0.2642	0.2613	-0.06	0.406**	0.379**	1	
USA	0.0805	0.31***	0.324**	0.1313	0.359**	0.1499	0.2299	0.27***	0.2479	0.37***	0.1968	0.150**	0.1451	0.035	0.1128	0.349	0.0541	0.0541	1
USA	0.0937	0.1575	0.411*	0.1708	0.392*	0.29***	0.252**	0.33**	0.381*	0.41*	0.44	0.392	0.387**	0.0147	0.0012	0.342**	0.0728	0.121	1

*, **, *** indicates significance at 1%, 5% and 10%, respectively.

The Latin American markets have very low inter-markets correlation. Only 27% markets rates of return are correlated with each other, half of the markets have positive while half of the markets have negative correlation in their rates of return. Argentina-Medico, Brazil-Chile appears as positively correlated while Brazil and Chile display negative correlation with Venezuela which is quite low. The rates of return in remaining 73% markets are independent of one another.

On the other hand, the rates of return in Europe/Mid-East/African markets do not depend on one another rates of return. Only 20% markets have positive inter-market correlation coefficients, out of which two cases show clear positive correlation. There are also negative inter-market correlation but they are not considerable.

The rates of return correlation of the US and emerging markets do not show some significant relation. It is evident from the inter-market correlation coefficients that only 32% emerging markets rates of return display positive correlation with the US market rates of return. The other 68% markets rates of return have no or very low correlation with the US stock return. It implies that investment barriers in emerging markets did affect the correlation of these markets with the US market or, in other words, emerging markets were isolated from the world financial market during the period of January 1989 to December 1991.

The cross-region correlation of rates of return is very low. Only 26% markets of Asia and Latin America are correlated positively and/or negatively, while there is 23% cross correlation between Asia and EMEA and only 8% between Latin American and EMEA markets. The cross-region positive correlations between Malaysia-Mexico, Pakistan-Columbia, while negative correlation of Taiwan-Venezuela are striking because there are no direct capital flows between these markets. This is may be due to the simultaneous opening of these markets for foreign investment during 1989-91. That is in early 1990s, Taiwan equity market broadly opened to foreign investors and foreign security holding limits increased to \$ 10 billion. In the same manner, in Venezuela all restrictions on foreign ownership were lifted. Due to this negative correlation, Taiwan and Venezuela has attracted a lot of foreign capital.

The correlation coefficients of rates of return imply that inter-market correlation is very low. The Asian markets have 33% correlation in their rates of return, which is high in all the emerging markets. The correlation between rates of return of emerging markets and the US as well as cross-region correlation is also low. This shows that emerging markets can help to

avoid investment risk. As stock market correlations provide a great deal of information to investors to diversify their portfolio, therefore, the size and direction of coefficients between the markets determine the degree by which risk can be reduced through diversification. For this purpose, a negative correlation is necessary and low correlation is also desirable. On the other hand, positive correlation indicates the worst situation from which investors have no advantages through diversification.

With the opening of emerging markets for foreign investment during 1989-91, these markets gained more tendency towards integration. The huge capital inflows in 1992 raised their returns, but during 1993 foreign investors realized the weaknesses of these markets,⁴ so their returns declined sharply. The reversal in rates of return, such as Pakistan's returns, may be due to prolonged recession in early 1990s which was due to the political uncertainty and economic mismanagement.

The average returns of EMEA markets remained stable across the two periods, *i.e.* before and financial reforms. The Asian and Latin American markets rates of return declined as evident from Table 4. This may be due to the increased integration of these markets among each other generally and with the world financial market particularly.

The inter-markets correlations are high in Latin American markets followed by the Asian markets, while the EMEA markets remained in the same situation as were in the pre-financial reforms period. In Asia, rates of return of Korea-Thailand, Malaysia-Philippine, Malaysia-Taiwan, Malaysia-Thailand, Philippines-Taiwan, Philippines-Thailand and Taiwan-Thailand are highly correlated with each other. This high correlation in rates of return implies higher tendency towards integration, but at the same time other Asian markets are in isolated position.

In the Latin American markets, rates of return of 60% markets are positively correlated with each other showing increased dependency on each other. Argentina-Brazil, Argentina-Chile, Argentina-Mexico, Brazil-Chile and Brazil-Mexico's positive correlation in rates of return shows their greater tendency to move together. In the EMEA markets, only Greece-Portugal paid displays some considerable positive co-movements, while other EMEA markets are independent of one another.

The correlation between rates of return of the US and the emerging markets has increased from 32% in 1989-91 to 47% in 1992-98. The rates of

⁴For this evidence, see Ahmad *et al.* (Forthcoming).

return of Malaysia, Philippines, Argentina, Brazil and Chile shows co-movements with the US rates of return. This implies that now emerging markets are on the way to move with the world financial market slowly and steadily. The rates of return of India, Korea, Pakistan, Colombia, Mexico, Venezuela, Jordan, Nigeria, Turkey and Zimbabwe are not responding to the US rates of return. It implies that these emerging markets have tendency of isolation from the world financial markets.

The cross-region correlation of rates of return has increased for Asia-Latin America from 26% in 1989-91 to 50% in 1992-98, for Latin America-EMEA from 8% in 1989-91 to 41% in 1992-98, while for Asia-EMEA no change has occurred. It shows that with financial reforms, not only inter-market correlation has increased but cross-region correlation has also increased.

The financial reforms in emerging markets played a very vital role in the integration of emerging markets with each other and with the world. Correlation coefficients imply high correlation in rates of return in all emerging markets as well as high cross-region correlation. Thus, we find empirical evidence that changes in world financial market for the period from January 1992 to December 1998 have affected most of the emerging stock markets. This finding is consistent with the finding of Eun and Shim (1989) and Hamao *et al.* (1990) in which their focus was on the international spillover effects.

V. CONCLUSION

The aim of this study was to highlight the extent of emerging stock markets' integration/segmentation among each other as well as with the global capital market and empirically investigate the effects of investment barriers on integration. This analysis was substantiated by correlation of stock market price indices and return indices of emerging markets among each other as well as with the global capital market.

The major result that emerges from our study is the low correlation between emerging stock markets and the US that is found by using correlation coefficients of stock price indices and rates of return. It also implied that fluctuations in the level of stock indices do not result in similar volatility in the rates of return. In other words, high stock price index does not necessarily give high returns.

The correlation in stock indices implied that Latin American markets are more correlated with each other than Asian and Europe/Mid-East/African markets. Among Asian markets negative correlation is comparatively more

than Latin American and Europe/Mid-East/African markets. The cross-region correlation is seemed to be high in Asia-Europe/Mid-East/African markets.

The inter-markets correlation coefficient of rates of return implied positive and/or negative correlation between emerging markets as well as with the US market. Asian markets have 33% correlation with each other. Latin American markets have 27% while Europe/Mid-East/African markets have only 20% correlation with each other. These results confirmed the low correlation of rates of return among emerging markets, *i.e.* rates of return of these markets are independent of one another. The correlation between emerging markets and the US rates of return as well as cross-region was also found very low. This low correlation in rates of return between emerging markets and the US markets implies capital market segmentation. Now assuming that emerging stock markets represent an efficient and diversified portfolio, then these results imply that international investors who have diversified portfolios comprising stocks of different emerging markets are subject to the same amount of risk as investors with portfolio of one emerging market (or may be other than emerging market).

The low or negative correlation in stock returns of emerging markets is helpful for investors with the aim of risk reduction. The results show that somewhat considerable negative correlations exist only between India-Taiwan and Brazil-Venezuela stock returns. Thus, risk averse investors could gain by having assets of these markets in their portfolio.

At last, emerging stock markets received a great stimulus from the 1990 financial reforms. This resulted in a dramatic upturn in stock prices and signaled a clear break from the past trends, that implying the maturity and stability of emerging stock markets.

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