STOCK MARKETS RETURNS AND VOLATILITIES: A GLOBAL COMPARISON

Chiaku Chukwuogor[1]
Eastern Connecticut State University, USA.
E-mail: nduc@easternct.edu.

ABSTRACT

This paper examines the general patterns of recent global stock market returns and the volatility of such returns using 40 global stock indexes of countries classified into developed and emerging markets as barometers for the period 1997-2004. This classification is based on the classification suggested by Standard and Poor's Credit Ratings Report by Hessel (2006). The paper, additionally, investigates the presence of the day-of-the-week return in these countries and the correlation of the returns of these global stock indexes to the US market. A set of parametric and non-parametric tests is used to test the significance of the standard deviations and further determine the correlation of the returns of these global stock indexes to the US market. Evidence suggests general high returns in emerging stock markets. Contrary to existing evidence, they were also very high returns in some developed stock markets. This evidence suggests that volatility of stock returns is a global phenomenon and not predominantly an emerging market issue as earlier findings indicate. The returns from the US markets are highly correlated to those of many countries in the sample. There is evidence of negative and low correlation of returns between the US stock markets and many global stock markets. These findings present interesting opportunities and dynamics for enhanced return through diversification in global portfolio investments.

[1] Other contact information: Associate Professor of Finance, Department of Business Administration, 83 Windham Road, Willimantic, CT 06226, Tel (860)465 5393, Fax (860)465 4469.

JEL Classification code:
G 14 – Information and Market Efficiency, Event Studies
G 15 – International Financial Markets

Key words: returns, volatility, standard deviation, emerging, developed

I. INTRODUCTION

It is important to understand the nature of global stock market returns, accompanying volatilities and shifts in these characteristic and the correlation of these returns to the US returns, for better management of global stock portfolios. First, an understanding of returns and volatility in stock markets' returns and correlation of such returns to the US returns will help investors and fund managers better manage their investment portfolios. The speed with which capital flight takes place in the event of any negative development has highlighted the fragile nature of stock markets, especially in emerging economies. The contagion effect, as experienced during the Asian financial crisis, and the impact of globalization on stock markets have combined to bring various stock markets all over the world to global focus.

This period 1997-2004 not only represents the period of the highest occurrence of financial crises in the world in recent times, it encompasses periods of booms and recessions, regional integration and transition economies. For example, in 1997 we witnessed the collapse of many Asian economies and their emerging financial markets; the Russian crisis in 1998; the Brazilian currency crisis in 1999; the catastrophic collapse of the Argentine financial system, currency and even government in 2001. African emerging markets are not immune to this trend. Whereas there has been no financial "crisis" to quote in Africa, the population of most countries in Africa has suffered continuous decline in economic well being. This period under study seems to represent a period of rebound for many African economies. The period 1997-2004 also encapsulates some of

the pre and post euro introduction period in Europe, highlighting the merits or disadvantages of regional economic and financial integration. Many countries and regions in the world experienced economic booms and recessions during this period.

In the face of globalization, it is important to constantly document developments in global stock markets. An accumulation of such information will also provide a platform for determining the integration of global stock markets or lack of it. Since the global markets encapsulate stock markets located in developed and emerging economies, it is of scholarly interest to find out if the pattern of returns and volatilities change over time or have a strong correlation to the development status of the countries where the stock markets are located. There exists a broad literature on the research done on stock market return, volatility and even integration in the stock markets all around the world. Most previous research has focused on national and regional equity markets. Some previous attempts to discuss global stock market returns, volatilities and correlation of returns did not have comprehensive data coverage as often they covered developed stock markets. Most studies on global do not include the African stock markets. To the best of our knowledge, there exists no study that addresses stock returns and volatilities from a global perspective as we attempt to do here. Therefore, the present study aims at filling this gap in the literature and to contribute to this area by examining the stock market returns' patterns, volatilities and correlation of returns from a very representative global perspective. This paper examines the daily returns and volatilities of such returns of 40 developed and emerging global stock markets namely: Argentina/MERV, Australia/AORD, Austria/ATX, Belgium/BEL 20 Index, Botswana/BDCI, Brazil/BVSP, Canada/S&P/TSX, China/SSEC, Czech Republic/DX 50, Denmark/KFX 20, Egypt/ECCSI, France/CAC 40, Germany/DAX, Ghana/GGSE, Hong Kong/H.S.I., India/BSE 50, Indonesia/JKSE, Italy/MBTEL, Japan/Nikkei 225, Malaysia/KLSE, Mexico/MXSE, Netherlands/AFX, New Zealand/NZSE 40, Nigeria/NLSE, Pakistan/Karachi 100, Philippines/PSE, Russia/ATM, Singapore/Strait Times, South

Africa/SJSE, Slovakia/SAX, South Korea/KSII, Spain/SMSI, Sri Lanka/CSE, Sweden/SXAXPI, Switzerland/SSMI, Taiwan/TWII, Thailand/SETI, Turkey/XU 100, United Kingdom/ FTSE 100 and United States/S&P 500. Henceforth, the name of the country may be used to represent the index studied.

The rest of the paper is organized as follows: Section II explains the data and methodology; the findings and analysis are presented in Section III; the paper is concluded in Section IV; and Section V contains the references.

II. DATA AND METHODOLOGY

We use the daily closing values of the 40 global markets indices from January 2nd, 1997 to December 31st 2004 to determine the daily returns and volatility of the stock returns and identify any incidence of the day–of-the-week effect. Data for this study was collected over a period of five years from various sources including: African Financial Markets, Morgan Stanley and Yahoo Finance.

The global stock markets consist of developed stock markets and emerging stock markets. The expression "emerging markets" is commonly used to describe the stock markets located in industrializing or emerging countries of the world. Such countries are considered to be in a transitional phase between developing and developed status, or are defined as economies with low-to-middle per capita income and are usually considered emerging because of their developments and reforms. As an emerging market, a country is at the same time embarking on an economic reform program that will lead it to stronger and more responsible economic performance levels, as well as transparency and efficiency in the capital market. In this study, the 40 countries whose stock indexes are examined were classified into developed and emerging markets based on the classification suggested by Standard and Poor's Credit Ratings Report by Hessel (2006) and used by Chukwuogor-Ndu and Feridun (2007). Table 1 contains the countries studied and their classification.

Table 1
Emerging and Developed Countries in Global Study

Developed Countries		Developing Countries	
Country	Index	Country	Index
Australia	AORD	Argentina	MERV
Austria	ATX	Botswana	BDCI
Belgium	BEL20 Index	Brazil	BVSP
Canada	S&P/TSX	China	SSEC
Denmark	KFX 20	Czech Republic	DX 50
France	CAC 40	Egypt	ECCSI
Germany	DAX	Ghana	GGSE
Italy	MBTEL	Hong Kong	H.S.I
Japan	Nikkei 225	India	BSE 50
Netherlands	AFX	Indonesia	JKSE
New Zealand	NZSE 40	Malaysia	KLSE
Spain	SMS	Mexico	MXSE
Sweden	SXAXPI	Nigeria	NLSE
Switzerland	SSMI	Pakistan	Karachi 100
United Kingdom	FTSE 100	Philippines	PSE
United States	S&P 500	Russia	ATM
		Singapore	STI
		South Africa	SJSE
		Slovakia	SAX
		South Korea	KSII
		Sri Lanka	CSE
		Taiwan	TWII
		Thailand	SETI
		Turkey	XU 100

The daily stock returns for these global stock indices are calculated as follows:

$$\ln (P_t/P_{t-1})*100 \qquad (1)$$

Where Pt is the stock index at date t. Except for the returns on Monday, any returns that are preceded by a holiday were excluded. This exclusion as was done in previous studies to avoid speculation that observed daily return or day-of-the-week-effect could be partially due to these non-trading days. To determine the nature of the volatility of returns, the distributions of daily returns are analyzed using such measures as variance, standard deviations, kurtosis, skewness and coefficient of variation. The results were

substantiated by parametric and non-parametric tests. The daily returns were tested for normality using the ***Shapiro-Wilk*** test. Since the result of the normality test indicates that the distributions of the returns are mostly non normal, we use the non-parametric test, the ***Kruskal-Wallis*** to check the results for equality of mean returns. The ***Kruskal-Wallis*** statistic is as follows:

$$\frac{12}{N(N+1)}\sum_{j=1}^{k}\frac{R_j^2}{n_j}-3(n+1) \qquad (2)$$

Where: k = number of samples; n_j = number of values in j^{th} sample; N = $\sum n_j$ =total number of values; R_j = sum of ranks in the sample when N values are ranked together (the statistic is approximately Chi-square distributed degrees of freedom equal to k-1). To test for the equality of variance across the days of the week, we employ the *Levene's* (1960) test is also employed to check the results on equality of variance. In measuring the variation within a class, *Levene's* test uses the average of the absolute deviations instead of the mean square of deviations. This avoidance of squaring makes the test criterion much less sensitive to non-normal distributions (Snedecor and Cochran, 1976). The *Levene's* statistic is as follows:

$$F=\left[\sum_{j=1}^{J}n_j\left(D_{.j}-D..\right)^2/\sum_{j=1}^{J}\sum_{i=1}^{n_j}\left(D_{ij}-D_{.j}\right)^2\right]x\left[\frac{(N-J)}{(J-1)}\right] \qquad (3)$$

Where $D_{ij}=\left|R_{ij}-M_{.j}\right|$, R_{ij} is the return for week I and weekday j for j =1, 2,…., J and J =5 if the last trading day of the week is a Friday.

To determine the correlation of the US stock market returns to the other global stock market returns, we use the Pearson Correlation statistic as shown below:

$$r_{xy}=\frac{n\sum x_i y_i-\sum x_i\sum y_i}{\sqrt{n\sum x_i^2-(\sum x_i)^2}\ \sqrt{n\sum y_i^2-(\sum y_i)^2}}. \qquad (4)$$

Where $\bar{x}$and $\bar{y}$are the sample means of X and Y, s_x and s_y are the sample standard deviations of X and Y and the sum is from i = 1 to n.

III. EMPIRICAL FINDINGS AND ANALYSIS

A. Daily Return Patterns

The results indicate that most stock markets in the world recorded positive returns on a daily basis. 50 percent of the stock indexes studied recorded positive returns on Monday, 68 percent had positive returns on Tuesday, 63 percent had positive returns on Wednesday, 73 percent had positive returns on Thursday and finally 88 percent had positive results on Friday. Egypt, Ghana, Pakistan, India, Sweden, Netherlands, Canada, Russia, South Africa, Germany and Mexico recorded highest returns on Monday. Apart from Russia, a different set of countries topped the list for highest returns on Tuesday and they are Brazil, Mexico, South Korea, Malaysia, Nigeria, Slovakia**,** Italy and New Zealand. Other countries apart from those already mentioned that had high returns in the rest of the days of the week are: Botswana, Pakistan, Thailand, Argentina, Spain, Belgium, Turkey, Indonesia, Singapore, Taiwan, and Sri Lanka. Most of these high performing stock markets are emerging stock markets in Africa, Asia, Europe and Latin America. Developed stock markets constitute 40 percent the sample but only 27 percent of the listed highest return achievers of each day of the week are developed economies namely: Spain, Belgium, Sweden, Netherlands, Canada, Germany, Italy and New Zealand.

The countries with the lowest returns are Brazil, South Korea**,** China, New Zealand, Indonesia, Malaysia, Slovakia, Thailand, Turkey, Singapore, Sri Lanka, Taiwan, Philippines, Pakistan, Belgium, Hong Kong, Netherlands, Germany**,** Czech Republic, Canada, Italy, Spain, Sweden, Russia**,** Austria, Argentina, Japan, Brazil, Egypt, Mexico, United States, Australia and India. Most of the countries whose stock indexes registered the lowest daily returns are again emerging economies. 31 percent of the indexes with very low returns belong to developed economies. Incidentally all the indexes that registered low returns during the period except for those of China, Philippines, Hong Kong, Czech Republic, Italy, Austria, Japan, US and Australia also registered high returns on some days. This is an indication of high volatility of returns among global stock markets. Even though focused research needs to be

done to establish the causation for these observations, a possible explanation is because there was global economic boom and recession during the period. Countries whose stocks returns may have been affected by these developments are New Zealand, Canada, Japan and United States. Another possible explanation is that many European countries benefited from the positive investment funds flows into Europe in the late 1990s as a result of the introduction of the euro and suffered the recession in the first few years of the 21st century. Some of those countries are Belgium, Spain, Sweden, Austria, Netherlands, Germany and Italy. In the case of Germany, it encountered serious economic problems in the 1990s as well after the unification of East and West Germany.

During the period many emerging countries experienced high GDP growth rates but were also involved in a financial crisis or suffered the contagion effect of other crises. Some of these countries achieved remarkable recovery during the period. Examples are Russia, Mexico, Brazil, South Korea, Malaysia, Thailand, Argentina, Turkey, Indonesia, Taiwan, Thailand and Philippines. Others are some African countries currently recovering from several decades of economic slump caused by various factors such as military dictatorships/lack of democratic rule, financial mismanagement and military conflicts. Examples are Botswana, Egypt, Ghana, South Africa and Nigeria. Yet others are countries still in transition to capitalism. Examples of these countries are China, Czech Republic, Russia and Slovakia. Table 2 contains the daily returns of the 40 market indexes in descending order of magnitude. Figures 1, 2, and 3 graphically illustrate these returns. The study records the return for Ghana GGSE for Monday, Wednesday and Friday because Ghana Stock Exchange currently trades only on these days.

Table 2
Global Stock Markets Returns for the Period 1997-2004 in Descending Order of Magnitude

	Monday		**Tuesday**		**Wednesday**		**Thursday**		**Friday**
Country	**Return**	**Country**	**Return**	**Country**	**Return**	**Country**	**Return**	**Country**	**Return**
Ghana	0.084	Russia	0.128	South Korea	0.1128	Spain	0.784	Turkey	0.2396
Pakistan	0.0774	Brazil	0.1112	Ghana	0.1047	Belgium	0.327	Thailand	0.1797
India	0.059	Mexico	0.0642	Botswana	0.1042	Turkey	0.2069	Brazil	0.1241

Sweden	0.0551	South Korea	0.0452	Mexico	0.0722	Russia	0.0721	Russia	0.1125
Netherlands	0.054	Malaysia	0.0384	Pakistan	0.063	Indonesia	0.0675	Sri Lanka	0.0944
Egypt	0.0476	Nigeria	0.0374	Taiwan	0.0579	Egypt	0.0428	Ghana	0.0908
Canada	0.043	Slovakia	0.0371	Thailand	0.0549	Botswana	0.0416	Hong Kong	0.0781
Russia	0.0428	Italy	0.036	Argentina	0.0518	Pakistan	0.0397	Indonesia	0.0561
South Africa	0.0418	New Zealand	0.0343	Malaysia	0.0502	Singapore	0.035	Singapore	0.0495
Germany	0.0395	US	0.0276	Brazil	0.0482	Slovakia	0.0313	Botswana	0.0466
Austria	0.0299	Germany	0.0253	Slovakia	0.048	Australia	0.0299	Argentina	0.0451
Philippines	0.0284	Argentina	0.0238	Sri Lanka	0.046	Italy	0.028	South Korea	0.0447
US	0.0163	Austria	0.0233	India	0.0432	France	0.0278	Sweden	0.0407
Australia	0.014	Australia	0.0232	Nigeria	0.0401	Mexico	0.0258	Nigeria	0.0393
Nigeria	0.0131	Indonesia	0.0231	China	0.0371	Switzerland	0.0245	Italy	0.0384
Botswana	0.00905	South Africa	0.0224	Egypt	0.0273	Czech Republic	0.0242	Canada	0.0382
Taiwan	0.0078	China	0.0222	New Zealand	0.0226	Thailand	0.0215	Switzerland	0.0357
Switzerland	0.0073	Hong Kong	0.0203	Denmark	0.0213	Malaysia	0.0196	Malaysia	0.0314
Denmark	0.0057	UK	0.02	Singapore	0.0205	Sweden	0.0177	UK	0.0313
Belgium	0.00356	Denmark	0.0185	Turkey	0.0122	Philippines	0.0158	Netherlands	0.0252
Czech Republic	-0.0059	Netherlands	0.0179	Switzerland	0.0121	Denmark	0.0153	Denmark	0.024
France	-0.012	France	0.0178	Austria	0.0118	UK	0.0141	Spain	0.022
Italy	-0.0137	Japan	0.0156	UK	0.00946	Sri Lanka	0.0122	Philippines	0.0199
Argentina	-0.0164	Czech Republic	0.0154	US	0.005	Germany	0.0104	South Africa	0.0183
UK	-0.0181	Sweden	0.0138	Belgium	0.0013	India	0.0081	China	0.0182
Japan	-0.0202	Switzerland	0.0132	Japan	-0.0014	US	0.0058	Czech Republic	0.0152
Hong Kong	-0.026	India	0.0014	Australia	-0.0034	Nigeria	0.0029	France	0.0139
Mexico	-0.0284	Egypt	-0.0035	South Africa	-0.0053	South Africa	0.00275	Belgium	0.0134
Sri Lanka	-0.0288	Botswana	-0.0059	France	-0.0094	Canada	0.0013	Germany	0.0125
Spain	-0.0303	Canada	-0.0092	Philippines	-0.0139	Netherlands	-0.001	Taiwan	0.0105
Brazil	-0.0336	Singapore	-0.017	Indonesia	-0.0171	New Zealand	-0.0132	Egypt	0.00634
South Korea	-0.04	Sri Lanka	-0.0215	Hong Kong	-0.0191	Taiwan	-0.0132	Mexico	0.0061
China	-0.0419	Thailand	-0.0221	Netherlands	-0.0194	Austria	-0.0157	Austria	0.0037
New Zealand	-0.0522	Turkey	-0.0329	Germany	-0.0196	China	-0.0167	Slovakia	0.0035
Indonesia	-0.0595	Pakistan	-0.0421	Canada	-0.0219	Argentina	-0.0272	New Zealand	0.0009
Malaysia	-0.0896	Philippines	-0.0935	Czech Republic	-0.0229	Japan	-0.0314	US	-0.0025
Slovakia	-0.1101	Taiwan	-0.1096	Italy	-0.0286	Hong Kong	-0.0324	Japan	-0.019
Thailand	-0.1678	Belgium	-0.3	Spain	-0.0532	South Korea	-0.0527	Pakistan	-0.0229
Turkey	-0.173	Spain	-0.717	Sweden	-0.0527	Brazil	-0.0997	Australia	-0.031
Singapore	-0.697	Ghana	-	Russia	-0.0997	Ghana	-	India	-0.0722

Figure 1 Monday Returns 1997-2004

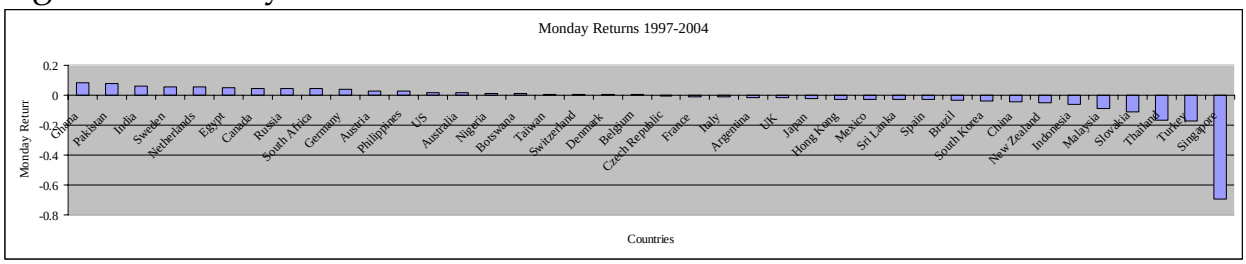


Figure 2 Tuesday Returns 1997-2004

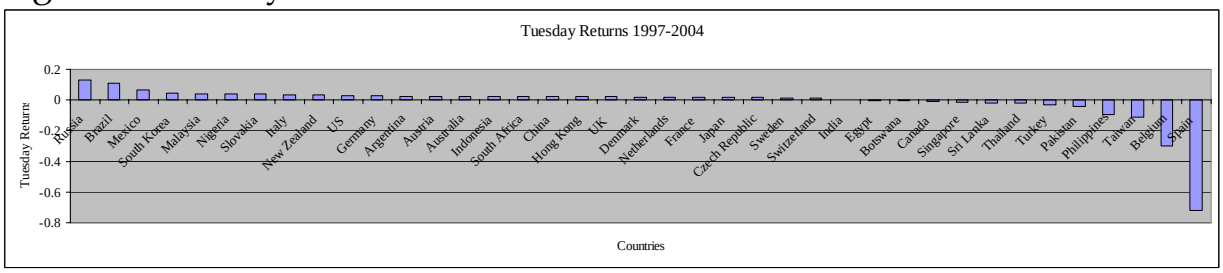


Figure 3 Wednesday Returns 1997-2004

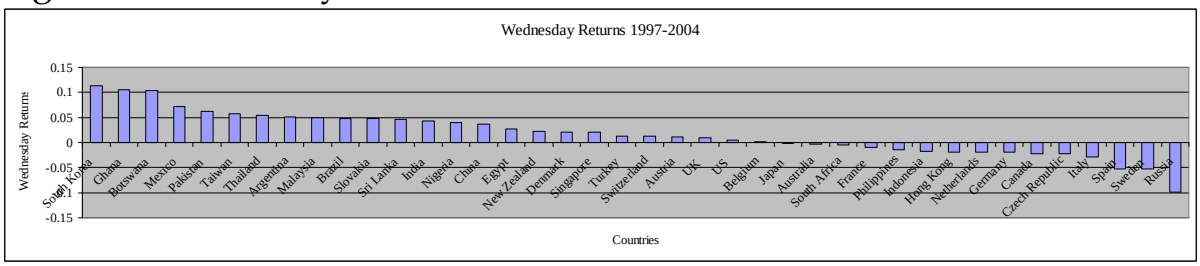


Figure 4 Thursday Returns 1997-2004

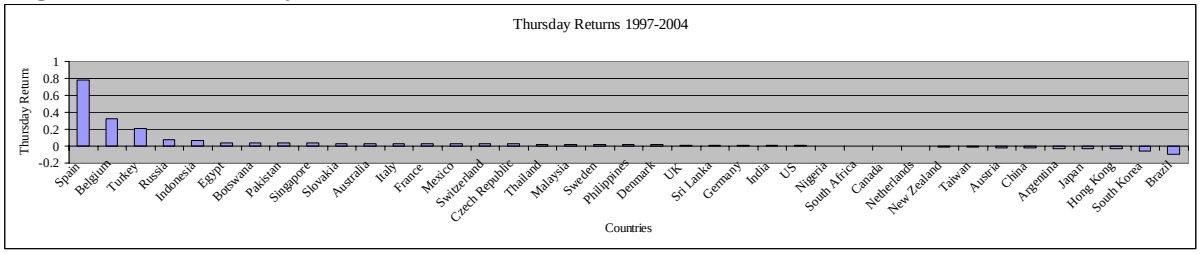
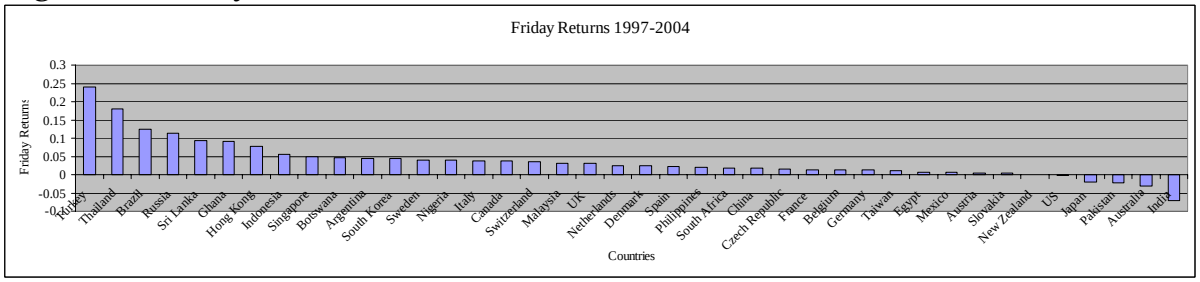


Figure 5 Friday Returns 1997-2004



B. Volatility of Returns

Using the standard deviation of returns as an indication of volatility and hence risk, the results indicate that most of the countries that show very high standard deviations in their daily stock returns are emerging economies with a few exceptions. Spain shows the highest standard deviation of 12.135 and 12.093 on Thursday. Other developed economies that show high standard deviations in their daily returns are Japan, Sweden, Germany and the Netherlands.

It is interesting to note that some emerging stock markets, in particular, those of Sri Lanka, Nigeria, Egypt, Ghana, Pakistan and Botswana experienced very low daily standard deviations of returns during the period Table 3 contains the daily standard deviations arranged in descending order of magnitude.

Table 3
Global Stock Markets' Standard Deviations of Daily Returns in Descending Order

	Monday		**Tuesday**		**Wednesday**		**Thursday**		**Friday**
Country	**Return**	**Country**	**Return**	**Country**	**Return**	**Country**	**Return**	**Country**	**Return**
Russia	1.94	Spain	12.135	Russia	1.6474	Spain	12.093	Turkey	1.3447
Turkey	1.6655	Russia	1.956	Turkey	1.5652	Turkey	1.5373	Russia	1.2608
Argentina	1.1959	Turkey	1.4435	South Korea	1.2372	Russia	1.4394	Brazil	1.1285
South Korea	1.1948	Botswana	1.4178	Botswana	1.1978	Argentina	1.1776	Argentina	1.0187
Brazil	1.0975	Malaysia	1.0848	Argentina	0.9825	Brazil	1.1733	South Korea	1.0055
Hong Kong	0.9722	South Korea	1.0134	Brazil	0.9817	South Korea	0.9766	Nigeria	0.938
Philippines	0.9451	Brazil	0.9932	Thailand	0.9019	Indonesia	0.8508	Indonesia	0.9302
Malaysia	0.9386	Argentina	0.9766	Pakistan	0.8608	Thailand	0.824	Thailand	0.8892
Singapore	0.9035	Taiwan	0.8971	Hong Kong	0.845	Mexico	0.7706	Pakistan	0.8221
Thailand	0.8969	Indonesia	0.8528	Indonesia	0.8387	Hong Kong	0.7637	Hong Kong	0.7848
India	0.8812	Thailand	0.7706	Taiwan	0.7995	Slovakia	0.74797	Taiwan	0.7576
Indonesia	0.8465	Pakistan	0.7535	Malaysia	0.7735	Pakistan	0.7337	Malaysia	0.74
Taiwan	0.7973	Mexico	0.7169	Slovakia	0.7478	Taiwan	0.7263	India	0.7399
Slovakia	0.7741	India	0.671	Singapore	0.7278	India	0.698	Philippines	0.7003
China	0.7541	Japan	0.6272	Mexico	0.7272	Japan	0.6898	Ghana	0.6703
Japan	0.7537	Hong Kong	0.622	Philippines	0.709	Sweden	0.6866	Mexico	0.6577
Italy	0.7413	Italy	0.6131	Nigeria	0.6969	Philippines	0.6831	Singapore	0.6554
Mexico	0.7344	Singapore	0.6094	Japan	0.6941	Singapore	0.6736	Slovakia	0.6462
Germany	0.7341	Germany	0.6045	India	0.6881	Nigeria	0.6614	Japan	0.6442
Netherlands	0.7106	China	0.601	Sweden	0.6563	China	0.6522	Germany	0.6276
Sweden	0.7099	Philippines	0.598	Austria	0.6238	Germany	0.6483	Netherlands	0.6055

France	0.6751	France	0.5977	Czech Republic	0.6238	Netherlands	0.6446	Sweden	0.596
Spain	0.6115	Sweden	0.5863	Germany	0.6232	France	0.6369	France	0.5676
Czech Republic	0.5946	Netherlands	0.5847	China	0.5831	Malaysia	0.6308	Spain	0.5619
Switzerland	0.5944	Austria	0.5844	France	0.5745	Austria	0.611	Italy	0.5519
Denmark	0.5267	Czech Republic	0.5844	Netherlands	0.5724	Czech Republic	0.611	South Africa	0.5448
South Africa	0.5234	Slovakia	0.5756	Italy	0.5639	Italy	0.5889	Austria	0.5331
Belgium	0.5179	South Africa	0.57	South Africa	0.544	Switzerland	0.5406	Czech Republic	0.5331
U K	0.4983	Switzerland	0.501	Spain	0.544	Sri Lanka	0.5255	China	0.5065
Austria	0.4711	Belgium	0.4942	Sri Lanka	0.5101	South Africa	0.5115	Switzerland	0.4895
Sri Lanka	0.4581	Denmark	0.4942	Belgium	0.4942	Belgium	0.4811	Canada	0.4743
Canada	0.4547	Canada	0.4789	Denmark	0.4942	Denmark	0.4811	United Kingdom	0.4518
Nigeria	0.427	U K	0.4735	Ghana	0.4905	United Kingdom	0.4565	Sri Lanka	0.4481
Egypt	0.4083	Sri Lanka	0.4331	Canada	0.4903	Canada	0.4452	Belgium	0.4239
Ghana	0.3823	New Zealand	0.3603	Switzerland	0.4801	New Zealand	0.385	Denmark	0.4239
New Zealand	0.3801	Nigeria	0.3483	United Kingdom	0.4334	Australia	0.3226	New Zealand	0.3897
Australia	0.373	Australia	0.303	New Zealand	0.4249	Botswana	0.3193	Australia	0.3472
Pakistan	0.0752	Egypt	0.2652	Australia	0.3697	Egypt	0.2344	Botswana	0.2518
Botswana	0.0613	United States	0.0273	Egypt	0.2545	United States	0.0265	Egypt	0.1633
United States	0.0295	Ghana	-	United States	0.0252	Ghana	-	United States	0.0265

C. The day-of-the-week effect

The test of the Null and Alternate hypotheses for the day-of-the-week effect for each market using the *Kruskal-Wallis* test reveals the presence of the day-of-the-week-effect in most countries of the world.:

Ho: There is no difference in the returns across the days of the week

H_1: There is a difference in the returns across the days of the week.

Evidence from this study suggests the presence of the day-of-the-week effect in twenty-five stock markets belonging to the following countries: Australia, Brazil, Canada, China, Germany, Hong Kong, India, Indonesia, Italy, Japan, Mexico, New Zealand, Netherlands, Pakistan, Philippines, Russia, Singapore, Slovakia, South Korea, Spain, Sweden**,** Taiwan, Turkey and the United Kingdom. See Table 4 for the result of the *Kruskal-Wallis* test. There is a day-of-the-week effect in 63 percent of the countries studied. 44 percent of the developed countries and 56 percent of the emerging economies

studied experience the day-of-the-week effect. This is a surprising observation as stock exchanges in the developed economies are expected to be more efficient. According to the efficient market theory, the presence of the day-of-the-week effect suggests an anomaly indicating some degree of inefficiency in a stock. The presence of this anomaly suggests that investors are able to predict returns in stated stock markets. Some of these findings are at variance with past documented evidence and some are consistent earlier research findings.

For example, Cross (1973), French (1980) and Jaffe, Westerfield and Ma (1989), Gibbons and Hess (1981), Lakonishok and Levi (1982), Rogalski (1984), Keim and Stambaugh (1984), Harris (1986), Lakonishok and Smidt (1988) and Mehdian and Perry (2001), among others document the Monday effect or other daily anomalies in the US stock market. In this study, using the SP 500 Index, we find no such evidence for the period studied 1997-2004.

It is not surprising that among the Latin American countries studied, only Brazil experienced the day of the week effect during the period 1997-2004. This finding is consistent with earlier findings of Arbelaez and Urrutia (1998); de la Uz (2002); Neriz Jara (2000) and Zablotsky (2001) where they find evidence of semi-strong efficiency in the Latin American markets.

In the case of the African stock markets, the finding confirms and contradicts some earlier findings. For example, in they are consistent in the case of Nigeria and at variance in the case of Ghana. Ayadi, Dufrene and Chatterjee (1998) finds that the results of both the Kruskal-Wallis and Friedman tests suggest the absence of seasonality in stock returns on the Nigerian and Zimbabwean stock markets while the Friedman test confirms the presence of seasonality in stock returns for Ghana. The findings of Appiah-Kusi and Menyah, (2003) reject evidence in prior studies that the Nigerian stock market is weak-form efficient. Our results confirm that the Nigerian LSE is indeed weak form efficient. Earlier research findings indicate that the markets in Egypt, Kenya, and Zimbabwe are also weak form efficient. Our result confirms this finding as it relates to Egypt. The finding of Appiah-Kusi and Menyah, (2003)

further indicate that the stock markets of South Africa, Botswana, and Ghana are not weak-form efficient. Our findings indicate that they are.

Table 4
Results of Tests of Normality, Equality of Mean Returns and Equality of SD across the days-of-the-week

Countries	Kruskal-Wallis		Levene Test		W Test for Normality	
	Chi-square	P Value	Statistic	P Value	StdDev	R
Argentina	0.99	0.912	1.820	0.122	1.0720	0.9680
Australia	5.25	0.263	2.251	0.062	0.3420	0.9838
Austria	2.49	0.647	2.770	0.026	0.4449	0.9780
Belgium	0.28	0.991	0.690	0.595	5.0560	0.1780
Botswana	0.86	0.931	0.870	0.483	0.9009	0.4400
Brazil	6.83	0.145	1.880	0.112	1.0790	0.9550
Canada	12.97	0.011	1.560	0.180	0.4694	0.9720
China	4.37	0.358	3.461	0.008	0.6290	0.9596
Czech Republic	1.85	0.763	0.270	0.987	0.5898	0.9940
Denmark	0.36	0.966	2.950	0.019	0.4813	0.9880
Egypt	4.84	0.308	14.32	0.000	0.9580	0.2954
France	1.46	0.838	3.100	0.015	0.6111	0.9870
Germany	4.82	0.306	3.810	0.004	0.6486	0.9790
Ghana	1.50	0.827	2.360	0.051	0.7650	0.5248
Hong Kong	2.93	0.57	5.493	0.001	0.7340	0.9836
India	5.00	0.287	4.509	0.001	0.7050	0.9889
Indonesia	3.59	0.464	0.509	0.669	0.784	0.9090
Italy	7.86	0.097	5.630	0.000	0.6154	0.9820
Japan	0.47	0.976	2.303	0.057	0.6920	0.9939
Malaysia	10.61	0.031	1.348	0.250	0.7820	0.8549
Mexico	3.17	0.530	1.170	0.323	0.7227	0.9660
Netherlands	10.53	0.032	3.290	0.011	0.6250	0.9700
New Zealand	4.54	0.338	0.628	0.643	0.3890	0.9862
Nigeria	2.40	0.662	0.400	0.812	0.6474	0.5230
Pakistan	9.09	0.059	5.233	0.001	0.7440	0.9798
Philippines	6.11	0.191	2.312	0.059	0.6950	0.9425
Russia	9.13	0.058	2.460	0.044	1.6690	0.9290
Singapore	7.98	0.092	3.893	0.004	0.6510	0.9827
Slovakia	10.38	0.034	2.750	0.027	0.6844	0.0570
South Africa	6.67	0.154	0.350	0.843	0.9520	0.5389
South Korea	3.13	0.536	3.554	0.007	1.0350	0.9903
Spain	7.09	0.131	0.730	0.573	7.7310	0.2000
Sri Lanka	13.82	0.008	1.143	0.335	0.4660	0.9511
Sweden	10.77	0.029	1.760	0.134	0.6493	0.9880
Switzerland	0.95	0.917	4.510	0.001	0.5221	0.9730
Thailand	28.86	0.001	1.608	0.170	0.7740	0.9849

Taiwan	5.88	0.208	1.374	0.241	0.7940	0.9922
Turkey	24.94	0.000	2.560	0.037	1.5210	0.9810
United Kingdom	6.77	0.149	2.120	0.076	0.4627	0.9740
United States	1.68	0.794	0.390	0.819	0.5403	0.9880

D. W Test for Normality

We tested the null and alternate hypotheses for normality of the daily returns using the ***"W" Test for Normality***

Ho: The sample is taken from a normal distribution.

H_1: The sample is not taken from a normal distribution.

The skewness and kurtosis statistics of the returns for each day for all the stock markets are generally well above zero and less than 3 respectively, except for Spain and Belgium. Normality of the returns is rejected for the other 38 countries. This is confirmed by the results of the W Test for normality shown on Table 4.

In testing the daily returns for the equality of variance the ***Levene's*** test was used as the non-normality of the distributions has been established. The results of the ***Levene's test***, contained in Table 4, are significant at the5 percent level for the stock markets of Egypt, Hong Kong, Italy, and Pakistan. The homoskedasticity hypothesis was rejected for these countries. We can not reject the homoskedasticity hypothesis for all the other countries at the 5 percent level. The countries with the least variation in the daily standard deviations of returns across the days of the week are Belgium, Botswana, Czech Republic**,** Indonesia, Nigeria, South Africa, Spain and the United States. The countries with high daily standard deviations of returns across the days of the week of above 3 standard deviations are China, France, Germany, Hong Kong, India, Italy, Netherlands, Pakistan, Singapore, South Korea, Switzerland. According to the proportion of the developed and emerging stock markets in the sample under analysis, the number of developed and emerging stock markets that tested significant at the 5 percent for the equality of variance the *Levene's* test, showed least and highest standard deviations of returns during the 1997-2004 seemed representative of each category in the sample. It can therefore be stated that according recent evidence, volatility of stock returns is global

phenomenon and not necessarily an en emerging market issue. This observation is at variance with some earlier findings. The earlier findings indicate that emerging stock markets have a higher degree of variation in standard deviations across the day-of-the-week than the developed markets Ho and Cheung (1994).

E. Correlation of Returns

During the period 1997 to 2004, The US stock returns are highly correlated to those of Belgium, Brazil, Canada, China, Denmark, France, Germany, Hong Kong, Italy, Netherlands, Philippines, Singapore, Spain, Sweden, Switzerland, Taiwan and the UK. See Table 5 below. This was so even tested on a one day lag for the stock indexes located in the Asia Pacific region. There was evidence of some level of correlation of returns between the US and stock markets of the following countries: Argentina, Australia, Czech Republic, Egypt, India, Malaysia, Mexico, New Zealand, South Africa, South Korea, and Turkey. The evidence in this study seems to confirm some findings in earlier studies that suggest that stock market movements in one country can significantly affect stock market movements in another country via a transmission mechanism that exists because global markets are now more closely integrated as Kim and Rogers (1995); Bessler and Yang (2003) suggest. In particular, Kim and Rogers (1995); and Bessler and Yang (2003) suggest that a major stock market like that of the US, can affect smaller and less-developed markets like the Asian or Latin American markets. Evidence in this study suggests that the US stock returns are positively correlated to the stock returns of approximately 66 percent of the stock indexes from emerging economies. All the negative correlation on stock returns observed are between the US and stock indexes in emerging economies, except for Austria. It is possible that changes in US stock returns do indeed influence those of other market. It is equally possible that the markets in emerging markets of the world are responding to economic and political developments in their regions. For example, the African stock markets in the wake of improved political stability

in that region, may be responding to the new buoyant economies. However these results indicate further opportunities for global portfolio diversification

Table 5
Correlation of Global Stock Markets Daily Returns to US S& P 500 Daily Returns for the Period 1997-2004

Country	Pearson Correlation Coefficient	P-Value	Country	Pearson Correlation Coefficient	P-Value
Argentina	0.311	0.000	Mexico	0.334	0.000
Australia	0.406	0.000	Netherlands	0.880	0.000
Austria	-0.070	0.014	New Zealand	0.144	0.000
Belgium	0.760	0.000	Nigeria	-0.278	0.000
Botswana	-0.337	0.000	Pakistan	0.79	0.000
Brazil	0.607	0.000	Philippines	0.792	0.000
France	0.929	0.000	Russia	-0.396	0.000
China	.0678	0.000	Singapore	0.82	0.000
Czech Republic	0.135	0.000	South Africa	0.011	0.636
Denmark	0.824	0.000	Slovakia	-0.764	0.000
Egypt	0.360	0.000	South Korea	0.142	0.000
France	0.929	0.000	Spain	0.528	0.000
Germany	0.933	0.000	Sri Lanka	-0.554	0.000
Ghana	-0.239	0.000	Sweden	0.928	0.000
Hong Kong	0.917	0.000	Switzerland	0.910	0.000
India	0.425	0.000	Taiwan	0.731	0.000
Indonesia	0.149	0.000	Thailand	-0.373	0.000
Italy	0.941	0.000	Turkey	0.232	0.000
Japan	0.903	0.000	United Kingdom	0.935	0.000
Malaysia	0.414	0.000	United States	1	*

F. Discussion

A recent view is that the challenge in global portfolio diversification rests more on the standard deviation of returns as the 0.86 correlation of US returns with international stock seem high enough to eliminate the benefits of diversification Statman and Scheid (2005). There is need to exercise caution in the assumption that global portfolio diversification has become as simplified as stated above. The international equity is not representative of all global stock. Evidence from this research suggests there in spite of the advance of globalization, there still exists immense opportunities to maximize returns through global diversification of portfolios. Many emerging and developed stock markets registered high return,

emerging markets recorded higher returns in general. There was evidence of general volatility but returns from emerging economies were more volatile than returns from developed economies. Except for Austria, the returns of the US stock market were positively correlated to the returns of all the developed stock markets. In fact the correlation coefficient for the US return and French return is 0.929; US return and German return, 0.933; US return and Italian return, 0.941; US return and Japanese return, 0.903; US return and Dutch return, 0.880; US return and Swede return, 0.928; US return and Swiss return, 0.910; and US return and UK return is 0.935. According to the theory of portfolio diversification theory, these returns are almost perfectly positively correlated and therefore not much gain can be expected from diversification if an American global stock portfolio stock solely stock from the indexes representing these countries.. Other countries that were not categorized as developed economies but whose returns showed similar correlation with US returns are Hong Kong and Singapore with correlation coefficients of 0.917 and 0.82 respectively. Possible global portfolio diversification opportunities for the US investor exists more where there a negative or low correlation coefficient of returns the US return and the returns from those countries. Most notable possibilities are: Slovakia (r = -0.764); Sri Lanka (r =-0.554); Russia (r = -0.396); Botswana (r = -0.337); Nigeria (r= -0.278); Ghana (r = -0.239); Austria (r =-0.070); South Africa (r = -0.070); Czech Republic (r = 0.135; and New Zealand (r = 0.144). These global portfolio decisions will be made after considering the volatilities of these returns and other risk factors, for example, political stability.

IV. CONCLUSION

During the period 1997 to 2004, most global stock markets recorded positive returns on a daily basis. Most of the high performing stock markets are emerging stock markets in Africa, Asia, Europe and Latin America. Some of the stock markets that recorded high daily returns belong to developed economies. Stock markets in developed economies had generally lower daily returns but such a pattern of returns was not exclusive to them. The highest

returns were achieved mostly by stock markets in emerging economies.

As is to be expected many of the stock markets that recorded very high returns also showed high standard deviations. There was presence of the day-of-the-week effect in more than 62 percent of the countries studied. More stock markets in developed economies in relation to their proportion in the sample displayed the day-of-of-the-week effect. Only a few stock markets tested significant to the ***Levene's*** test of equality of variance of daily returns. According to the proportion of the developed and emerging stock markets in the sample under analysis, the number of developed and emerging stock markets that tested significant at the 5 percent for the equality of variance ***Levene's*** test, showed least and highest standard deviations of returns during the 1997-2004 seemed representative of each category in the sample.

Our findings indicate that despite the impact of globalization there still exists opportunities to maximize global portfolio returns through diversification.

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