Does the January Effect Still Exists?

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Abstract

The issue of the January Effect has attracted a lot of interest by both practitioners and researchers. The idea that stock returns in January are statistically bigger than in other months was first presented several decades ago. This study analyzes the issue of the January effect in a systematic and global way of studying the performance of 106 indexes in 86 countries and jurisdictions. It was observed that while this effect can still be appreciated in some markets it would appear that it is decreasing globally over time. It was also found that there appears to be an Inverted January Effect in several markets with the returns in January being lower than the returns in some other months. This analysis was performed with nonparametric tests. The hypothesis that the returns of the indexes do not follow in general a normal distribution was also confirmed with several tests.

Keywords: January effect, market anomalies, stock returns

1. Introduction

There are a large number of market abnormalities identified both in the academic literature as well as by practitioners. One of these abnormalities is the January effect. The January effect refers to the observation that returns in January appear to be higher than returns in other months. One of the firsts, if not the first, academic article describing the January Effect was (Watchel, 1942). Since then several authors, such as (Haugen, 1988), (Thaler, 1987), (Jones, 1989), (Moller, 2008), (He, 2011), have analyzedthis issue.The existence of a January effect, as many other market abnormalities, has been used as an argument supporting the idea that markets are not completely efficient. The idea behind this approach is that if such market abnormality exist and can be exploited for trading purposes then, at least in principle, it would be possible to outperform the market in a consistent way, which would contradict the market efficiency hypothesis. The scope of this article it is not to study the link between abnormal returns and market efficiencies but to analyze, in a global basis, what markets present this phenomenon.

The January effect has been observed in several countries for some specific time periods such as for instance the U.S. for some decades after World War I (Charles, 1989). The absence of a January effect before World War I was detected in other countries such as Germany (Taufiq, 2016). Interestingly, the results of (Taufiq, 2016) for the U.K. and the U.S. suggest that there was a January Effect in the pre-war period which seems to contradict several articles such as (Schultz, 1985). The majority of the literature available seems to support the hypothesis that there was no such effect for the period before the World War I, particularly in the U.S. Other countries where the January Effect has been detected are Japan (Li, 2015), Jordan, Morocco from 1988 to 2014 (Gharaibeh, 2017), Turkey (Guler, 2013), India (Kaur, 2017) and several countries in Western Europe (Asteriou, 2006) from 1991 to 2003. In some other markets, like Pakistan, an abnormal return in January has been identified (Hashmi, 2014) but the authors mentioned that the effect is small and no profitable strategy can be built after accounting for transaction costs. It is also interesting that the January effect seems to be changing over time with several articles, such as (Gu, 2013), (Mehdian, 2002), (Patel, 2016) pointing to a declining January effect in the U.S. market. In these articles the authors observed a decline in the effect in the U.S. market starting in the late eighties. The performance in January has been even treated as a precursor of the performance for the rest of the year (Cooper, 2006). There are also abundant articles defending the idea that there is no January effect in some markets such as New Zealand (Li, 2010), India (Mehta, 2009), (Pandeu, 2016) or Indonesia (Simbolon, 2015).The January Effect has been studied not only in equities but also in fixed income investments. For instance, (Starks, 2006) detected the presence of a January Effect on closed end municipal bond funds. Interestingly the authors detected the presence of a January effect on the funds but not on the bonds constituting these funds. The authors attribute these results to tax harvesting.

The idea that stock returns in one month could be higher than in another month could be supported by cyclical factors and human behavior. In principle there is no clear reason supporting the idea that stock performance should be stronger in January that in other months. Some of the frequently mentioned explanations are:

1.1 Tax rationale

One of the frequently mentioned potential explanations for this event in the U.S. is the federal income tax effect (Jones, 1989) with the existing academic literature supporting that there was no January effect before the introduction of federal income tax. It should be noted that there is less of an agreement of the existence of the January effect for some of the years just after the introduction of federal income taxes. Related to tax issues, other authors have found that there has been no obvious impact in the January Effect by some large tax reforms such as for instance the Reform Act in 1986 (Haug, 2006). Tax reasons (Honghui, 2004) are among the most frequently cited explanations for the January effect.The idea behind a tax argument is rather simple. Investors in order to minimize their annual tax bill sell some of the losing positions before year end to increase their losses. This is commonly known as tax harvesting. A byproduct of this tax harvesting is a larger cash pool in January that it is then reinvested pushing prices up. It should also be noted thecaveat mentioned by (Taufiq, 2016) that the German case cannot be used for analyzing the impact of taxes in the January effect as there were no applicable capital gain taxes in Germany during that period (Taufiq, 2016). The tax argument is however not universally accepted with articles such as (Gu, 2005) providing some empirical evidence against it in the Chinese market.

1.2 Psychological Rationale

Psychological factors are also frequently used in an attempt to explain the reasons behind the January effect (Anderson, 2007). Some authors, such as (Ciccone, 2011), have mentioned that the new year is a period of renewed optimism and that such optimism likely spreads also to the stock market. This is clearly an explanation not related to market fundamentals but to human behavior. (Ciccone, 2011) does provide some quantitative data. For instance, the authors mentioned that the University of Michigan Consumer Confidence Index tends to peak in January, which is used in this article as a proxy for investors optimism.

1.3 Window Dressing

Window dressing is one of the most popular explanations behind this effect (Haugen, 1988), (Klock, 2014). The idea is that fund managers will try to make their portfolios look as good as possible by the end of the year. In order to do that they will sell losing stocks during the end of the year, keeping those that have performed strongly. The funds that were obtained from those stock are then reinvested in January in more speculative stocks in an attempt to obtain strong performances. This inflow of funds in January will push prices up, causing the returns in the month of January to increase.

1.4 Gifts

Another explanation of the January effect, postulated by (Gamble, 1993), suggests that the January effect is caused by gifts, typically to younger investors, during the end of year and Christmas festivities. The idea is that some of the cash gifts are invested in the stock market. More specifically, the author suggests that older investors tend to own stable, well capitalized companies and sell a fraction of those holdings at the end of the year to free up funds for gifts. Always according to the author, these stable, large companies are only moderately impacted by this selling. Younger investors tend to more speculative investors, favoring smaller companies. Purchases of those names are likely to push the prices up given their comparatively poor liquidity, driving the market up.

Regardless of what is the real reason behind this effect it seems reasonable to try to determine for which markets there is empirical evidence of such effect actually happening that is the main objective of this article. In an attempt to answer that question a very large data base of stock returns across many countries and jurisdictions was analyzed. The steps followed for this analysis are presented in the next section.

2. Methodology

2.1 Hypothesis

The null hypothesis in this article is that the returns in the month of January are not statistically different from the returns on any other month of the year. This analysis is performed on a global basis including a large amount of countries and jurisdictions. It was not assumed that the returns of the indexes follow a normal distribution. There is ample literature supporting the argument that stocks returns are not normally distributed. Nevertheless, several tests were carried out to confirm such assumption.

2.2 Data

The data are composed of monthly closing values of 106 indexes covering 86 countries and jurisdictions. It includes indexes representing supranational entities such as Europe or the GCC as well as special administrative areas such as Hong Kong in China. According to data from Bloomberg the combined market capitalization of those 84 countries and jurisdictions accounted for approximately 92.3% of the global market capitalization as of July 2017. There is no double counting, with the estimate excluding the market capitalization of supranational indexes such as those covering Europe or the GCC.

The length of the time series varies from country to country and from index to index. The Dow Jones index for instance has a much longer time series than some of the emerging markets indexes. The analysis was performed using the entire data set for each index as well as using, from comparability purposes, only the last 15 years of values as of end of June 2017. For consistency in all the cases the same numbers of data points per month were used. All the data were obtained from Bloomberg. Monthly returns were obtained using monthly closing prices and formula [1]. The data was then grouped by month (from January to December).

$$Monthly\ Return_T = \frac{Closing\ price_T}{Closing\ price_{T-1}} - 1 \quad [1]$$

2.3 Procedure

In a preliminary test the hypothesis that the index returns are normally distributed were checked with a Lillie test and an Anderson Darling test for each index for every month. As expected, for most cases the hypothesis that the index returns are normally distributed was rejected at a 5% confidence level. The results of the Anderson-Darling and the Lillie tests for every month for every index can be found in Appendix 2 and Appendix 3. The null hypothesis of the Anderson Darling test is that the data come follow a normal distribution. For the vast majority of the indexes the hypothesis that the monthly returns follow a normal distribution (for all the months of the year) cannot be accepted. According to the Anderson Darling test there were only 4 indexes, out of the 106 analyzed, in which the assumption that the returns follow a normal distribution for all the 12 months of the year cannot be rejected. Those four indexes are the PSI All Share (Portugal), Nigerian Stock Exchange Index (Nigeria), Tunisian Stock Exchange Index (Tunisia) and the S&P NZX All Index (New Zealand). Using the Lillie test similar results were obtained with no rejection of the null hypothesis of a normal distribution only in 10 out of 106 indexes analyzed at a 5% significance level. The null hypothesis in the Lillie test is that the underlying data follows a normal distribution. The 10 indexes for which the hypothesis that their returns follow a normal distribution are the S&P 1500 (U.S.), Colombia Colcap Index (Colombia), Ibex 35 (Spain), PSI All Share All Share Index (Portugal), Oslo All Share Index (Norway), Vienna Stock Exchange Index (Austria), Tunisia Stock Exchange Index (Tunisia), Nigeria Stock Exchange Index (Nigeria), Tadawull All Share Index (Saudi Arabia) and Bloomberg GCC 200 (GCC).Given that for the vast majority of the indexes the monthly returns do not appear to follow normal distribution hence nonparametric tests, such as the Wilcoxon Rank Sum and the Kruskal Wallis tests, were used to compare the returns. These tests do not assume that the data follows a normal distribution. The Wilcoxon test compares the medians of two data sample to determine if they are statistically equal at a certain confidence level. The purpose of the Kruskal Wallis test is determining if two, or more, samples of data come from the same distribution or not at a determined confidence level.

The returns in January were compared with the returns for all the other eleven months of the year using the Wilcoxon test. The results for the Wilcoxon tests for the entire available data set for the data provider can be found in Table 2. The results obtained using the Kruskal Wallis test can be found in Table 4. Given that the entire data series available for each index are not of the same size it seemed reasonable, for comparability purposes, to do some further analysis using the same data time period for all the indexes. The time period used was 15 years (ending in June 2017). It should be noted that not all the indexes have a time series of monthly returns for 15 years. In fact, of the 106 indexes analyzed 16 did not have data available for the required period. The list of indexes that did not fulfill this requirement can be seen in Table 1.

Table 1. Excluded indexes

FTSE Italia All Share (Italy)	Tanzania All Sh. Ind (Tanzania)	Dubai Fin. Market Ind. (Dubai)
Ljubljana St.Ind (Slovenia)	Nairobi Sec. Exc. All (Kenya)	Chile 65 (Chile)
St. Ex. Rep.Srpska (Serbia)	Ghana Composite Ind. (Ghana)	Bloomberg GCC (GCC)
MBI 10 (Macedonia)	Kuwait St. Exc. Ind. (Kuwait)	Laos Comp. Ind. (Laos)
Cyprus Gen. Exc.Ind (Cyprus)	Bahrain Bourse All (Bahrain)	
FTSE JSE Nam. Ind (Namibia)	QE All Share (Qatar)	

The same process as before was repeated with these shorter times with a Wilcoxon and a Kruskal Wallis test performed in all of indexes. The results of the Wilcoxon test for this reduced data series can be found on Table 3 while the results of the Kruskal Wallis tests can be found on Table 4.

Table 2. Wilcoxon test comparing January returns with the rest of month (p-values) for the entire time series

Index	Location	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
S&P 500	U.S.	0.773	0.139	0.977	0.192	0.347	0.369	0.049	0.198	0.625	0.401	0.316
Dow Jones	U.S.	0.480	0.042	0.682	0.171	0.548	0.146	0.006	0.912	0.916	0.219	0.122
Nasdaq Com.	U.S.	0.393	0.461	0.615	0.186	0.984	0.577	0.885	0.48	0.671	0.794	0.848
Nasdaq 100	U.S.	0.189	0.58	0.208	0.196	0.962	0.978	0.895	0.857	0.558	0.54	0.778
N.Y.S.E.I	U.S.	0.825	0.723	0.925	0.43	0.306	0.105	0.048	0.763	1	0.143	0.117
S&P 100	U.S.	0.773	0.139	0.977	0.192	0.347	0.369	0.049	0.198	0.625	0.401	0.316
S&P 1500	U.S.	0.534	0.805	0.379	0.991	0.193	0.103	0.46	0.614	0.879	0.474	0.405
Russell 1000	U.S.	0.269	0.523	0.543	0.116	0.651	0.264	0.659	0.823	0.622	0.996	0.831
Russell 2000	U.S.	0.483	0.234	0.682	0.123	0.557	0.306	0.347	0.921	0.938	0.897	0.791
Russell 3000	U.S.	0.182	0.55	0.477	0.116	0.682	0.255	0.636	0.848	0.682	0.913	0.946
S&P Toronto	Canada	0.048	0.193	0.8	0.196	0.293	0.378	0.132	0.234	0.76	0.75	0.851
S&P BMV	Mexico	0.948	0.056	0.496	0.983	0.416	0.758	0.861	0.775	0.482	0.282	0.141
Bol.al .Pan.	Panama	0.048	0.193	0.8	0.196	0.293	0.378	0.132	0.234	0.76	0.75	0.851
B.A. .In.	Argentina	0.901	0.852	0.78	0.144	0.721	0.576	0.106	0.256	0.828	0.208	0.27
Ibovespa	Brazil	0.438	0.295	0.587	0.393	0.426	0.181	0.14	0.801	0.13	0.194	0.174
Chile 65	Chile	0.977	0.977	0.84	0.751	0.237	0.175	0.997	0.126	0.26	0.126	0.089
Caracas In.	Venezuela	0.843	0.75	0.598	0.598	0.725	0.792	0.328	0.219	0.66	0.701	0.895
S&P BVL	Peru	0.533	0.836	0.822	0.378	0.769	0.64	0.822	0.876	0.333	0.742	0.556
Colombia Colcap	Colombia	0.507	0.047	0.082	0.32	0.125	0.868	0.023	0.59	0.213	0.34	0.068
BCT	Costa Rica	0.637	0.223	0.792	0.404	0.792	0.792	0.056	0.334	0.323	0.598	0.302
Bermuda In.	Bermuda	0.699	0.177	0.236	0.236	0.597	0.751	0.307	0.519	0.474	0.716	0.319
B. Eur. 500	Europe	0.409	0.337	0.839	0.797	0.039	0.133	0.044	0.441	0.19	0.172	0.133
MSCI Europe	Europe	0.275	0.2	0.788	0.788	0.035	0.235	0.11	0.862	0.335	0.367	0.11
S&P Europe 350	Europe	0.261	0.248	0.862	0.716	0.038	0.261	0.125	0.987	0.42	0.42	0.11
DAX	Germany	0.687	0.132	0.865	0.23	0.264	0.104	0.234	0.127	0.431	0.113	0.344
CAC 40	France	0.297	0.371	0.652	0.404	0.093	0.52	0.099	0.61	0.404	0.186	0.036
Ibex 35	Spain	0.284	0.6	0.464	0.311	0.297	0.796	0.54	0.83	0.935	0.62	0.483
FTSE 100	U.K.	0.259	0.317	0.798	0.419	0.088	0.481	0.02	0.929	0.33	0.788	0.121
FTSE All	U.K.	0.816	0.171	0.051	0.788	0.031	0.092	0.004	0.03	0.109	0.079	0.001
Swiss Mar. In.	Switzerland	0.128	0.988	0.219	0.131	0.744	0.816	0.641	0.465	0.913	0.988	0.988
FTSE MIB	Italy	0.704	0.255	0.365	0.815	0.007	0.08	0.051	0.255	0.267	0.122	0.038
FTSE Italia All	Italy	0.63	0.124	0.346	0.323	0.07	0.535	0.077	0.241	0.37	0.135	0.057
PSI All Share	Portugal	0.191	0.697	0.792	0.586	0.465	0.732	0.153	0.25	0.197	0.244	0.375
Irish Overall	Ireland	0.336	0.681	0.83	0.481	0.736	0.473	0.052	0.094	0.227	0.394	0.361
Iceland St. Exc.	Iceland	0.813	0.19	0.024	0.829	0.307	0.392	0.115	0.051	0.085	0.198	0.212
Amsterdam In.	Netherlands	0.946	0.171	0.646	0.528	0.252	0.227	0.003	0.387	0.488	0.094	0.164
Belgium 20	Belgium	0.615	0.084	0.905	0.791	0.203	0.405	0.01	0.276	0.284	0.667	0.098
Brussels St. Exc.	Belgium	0.052	0.928	0.182	0.241	0.641	0.688	0.176	0.399	0.737	0.456	0.851
Luxemburg In.	Luxemburg	0.912	0.537	0.496	0.58	0.384	0.304	0.056	0.764	0.125	0.937	0.987
OMX Cop.	Denmark	0.063	0.633	0.327	0.2	0.352	0.651	0.782	0.314	0.98	0.421	0.669

OMX Helsinki	Finland	0.141	0.446	0.994	0.807	0.13	0.201	0.923	0.093	0.134	0.473	0.223
Oslo All	Norway	0.314	0.96	0.209	0.227	0.615	0.706	0.669	0.92	0.9	1	0.529
OMX All	Sweden	0.325	0.222	0.09	0.195	0.418	0.28	0.341	0.214	0.13	0.991	0.596
Vienna St. Ex.	Austria	0.574	0.67	0.509	0.449	0.561	0.756	0.112	0.352	0.214	0.801	0.229
Athens St. Exc.	Greece	0.186	0.501	0.728	0.923	0.59	0.412	0.853	0.492	0.631	0.53	0.492
Warsaw St. Exc.	Poland	0.876	0.179	0.405	0.905	0.365	0.833	0.087	0.268	0.245	0.602	0.151
Prague St. Exc.	Czech Rep.	0.244	0.022	0.18	0.629	0.392	0.758	0.03	0.153	0.227	0.203	0.195
MICEX	Russia	0.502	0.907	0.62	0.93	0.243	0.267	0.35	0.08	0.22	0.243	0.231
Budapest In.	Hungary	0.848	0.26	0.978	0.481	0.978	0.589	0.284	0.268	0.641	0.934	0.136
Ukraine PFTS	Ukraine	0.62	0.838	0.293	0.307	0.815	0.704	0.17	0.414	0.108	0.884	0.661
Kazakhstan In.	Kazakhstan	0.605	0.47	0.81	0.389	0.654	0.605	0.191	0.491	0.27	0.81	1
Slovak Share	Slovakia	0.66	0.119	0.02	0.758	0.693	1	0.062	0.965	0.272	0.312	0.983
Zagreb St. Exc.	Croatia	0.74	0.244	0.431	0.431	0.868	0.648	0.561	0.229	0.967	0.772	0.74
Ljubljana In.	Slovenia	0.945	0.206	0.597	0.395	0.28	0.872	0.63	0.124	0.801	0.663	0.124
Rep. Srpska In.	Serbia	0.473	0.918	0.027	0.065	0.442	0.918	0.356	0.682	0.2	0.124	0.282
OMX Tallinn	Estonia	0.706	0.019	0.021	1	0.352	0.05	0.022	0.003	0.119	0.008	0.102
MBI 10	Macedonia	0.194	0.977	0.507	0.403	0.624	0.112	0.471	0.312	0.665	0.089	0.061
OMX Riga	Latvia	0.068	0.021	0.302	0.318	1	0.408	0.535	0.085	0.705	0.757	0.039
OMX Vilnius	Lithuania	0.973	0.203	0.605	0.318	0.558	0.945	0.973	0.036	0.945	0.286	0.654
Bulgaria Ind	Bulgaria	0.611	0.235	0.777	0.559	0.692	0.51	0.51	0.418	0.985	0.44	0.836
Borsa. Ist. 100	Turkey	0.058	0.06	0.756	0.096	0.043	0.256	0.009	0.01	0.244	0.166	0.017
Cyprus General	Cyprus	0.624	0.931	0.751	0.665	0.312	0.1	0.708	0.583	0.544	0.795	0.624
Malta St. Exc.	Malta	0.2	0.119	0.841	0.481	0.102	0.268	0.014	0.066	0.58	0.563	0.669
FTSE JSE All	S. Africa	0.33	0.597	0.446	0.991	0.218	0.824	0.307	0.55	0.699	0.716	0.275
EGX 30	Egypt	0.137	0.484	0.838	0.255	0.54	0.559	0.051	0.129	0.64	0.748	0.414
MADEX	Morocco	0.561	0.481	0.062	1	0.384	0.384	0.199	0.038	0.025	0.804	0.068
Tunisia St. Exc.	Tunes	0.912	0.716	0.289	0.788	0.693	0.319	0.58	0.189	0.669	0.537	0.275
FTSE JSE Nam.	Namibia	1	0.124	0.798	0.608	0.112	0.538	0.505	0.72	0.2	0.151	0.282
Botswana Gaborone	Botswana	0.818	0.695	0.31	0.655	0.218	0.441	0.076	0.86	0.968	0.543	0.598
Nigerian Ind	Nigeria	0.953	0.953	0.579	0.599	0.54	0.431	0.54	0.414	0.448	0.414	0.559
Tanzania All	Tanzania	0.021	0.91	0.97	0.031	0.308	0.91	0.273	0.791	0.017	0.385	0.734
Nairobi Sec. All	Kenya	0.931	1	0.063	1	0.796	0.796	1	0.489	0.667	0.34	0.667
Ghana Com.	Ghana	0.818	0.818	0.31	0.31	0.818	0.31	0.818	0.485	0.24	0.937	0.394
Kuwait St. Exc.	Kuwait	0.791	0.308	0.678	0.162	0.91	0.623	0.791	0.427	0.273	0.623	0.045
Tel Aviv St. Exc.	Israel	0.015	0.712	0.112	0.816	0.816	0.712	0.67	0.222	0.522	0.861	0.574
Blom Ind	Lebanon	0.407	0.087	0.024	0.529	0.314	0.466	0.9	0.138	0.092	0.651	0.209
Bahrain All	Bahrain	0.918	0.918	0.918	0.608	0.918	0.608	0.505	0.356	0.305	1	0.72
Tadawull All	S. Arabia	0.645	0.282	0.13	0.775	0.93	1	0.16	0.826	0.312	0.282	0.087
Amman St. Exc.	Jordan	0.705	0.371	0.158	0.513	0.945	0.973	0.836	0.256	0.203	0.783	0.513
Muscat MSM 30	Oman	0.877	0.861	0.548	0.771	0.362	0.277	0.985	0.561	0.727	0.438	0.426
Blg. GCC 200	GCCC	0.948	0.264	0.793	0.555	0.896	0.646	0.511	0.694	0.264	0.646	0.115
QE All Share	Qatar	0.473	0.427	0.85	0.678	0.91	0.308	0.241	0.623	0.308	0.385	0.212
Dubai F. M. G.	UAE	0.798	0.2	0.412	0.238	0.682	0.608	0.838	0.72	0.124	0.878	0.101
Abu Dhabi G.	UAE	0.59	0.229	0.804	0.431	0.709	0.481	0.431	0.934	0.068	0.74	0.281
M. SEMDEX	Mauritius	0.096	0.762	0.641	0.193	0.967	0.915	0.103	0.031	0.863	0.98	0.915
Tokyo St. Ind.	Japan	0.346	0.723	0.874	0.268	0.388	0.691	0.12	0.043	0.713	0.493	0.234

Nikkei 225	Japan	0.922	0.645	0.297	0.209	0.645	0.293	0.176	0.345	0.785	0.235	0.26
NSE Nifty 50	India	0.756	0.592	0.604	0.299	0.426	0.836	0.201	0.945	0.511	0.917	0.863
S&P Sensex	India	0.51	0.415	0.971	0.358	0.374	0.728	0.12	0.938	0.47	0.744	0.84
HIS Index	HK – China	0.463	0.454	0.076	0.307	0.223	0.356	0.607	0.722	0.892	0.064	0.454
CSI 300	M. China	0.199	0.678	0.431	0.901	0.868	0.709	0.534	0.836	0.184	1	0.709
Shanghai Comp.	M. China	0.375	0.615	0.708	0.876	0.934	0.301	0.978	0.949	0.268	0.481	0.355
Shenzhen Comp.	M. China	0.194	0.509	0.655	0.522	0.509	0.985	0.244	0.742	0.146	0.742	0.954
Kospi	South Korea	0.627	0.239	0.17	0.604	0.779	0.331	0.364	0.905	0.837	0.285	0.517
Bangkok SET	Thailand	0.446	0.674	0.947	0.888	0.819	1	0.277	0.277	0.52	0.888	0.404
Straits Time	Singapore	0.318	0.039	0.558	0.783	0.113	0.513	0.085	0.428	0.449	0.046	0.068
FTSE KLCI	Malaysia	0.567	0.718	0.093	0.156	0.51	0.15	0.081	0.683	0.634	0.358	0.607
Jakarta Ind.	Indonesia	0.568	0.436	0.042	0.115	0.415	0.272	0.272	0.946	0.84	0.995	0.736
Philippine Ind	Philippines	0.6	0.674	0.004	0.158	0.923	0.234	0.284	0.501	0.429	0.631	0.959
Karachi KSE100	Pakistan	0.6	0.674	0.004	0.158	0.923	0.234	0.284	0.501	0.429	0.631	0.959
Sri Lanka Ind.	Sri Lanka	0.692	0.311	0.814	0.317	0.888	0.103	0.372	0.825	0.634	0.424	0.087
MSE top 20	Mongolia	0.022	0.42	0.962	0.912	0.812	0.764	0.693	0.693	0.812	0.764	0.261
Laos Index	Laos	0.589	1	0.009	0.132	0.093	0.31	0.31	0.041	0.485	0.818	0.041
Ho Chi Minh In.	Vietnam	0.491	0.371	0.513	0.215	0.449	0.605	0.428	0.335	0.679	0.535	0.918
Australian All	Australia	0.687	0.037	0.063	0.758	0.165	0.544	0.71	0.129	0.507	0.888	0.238
S&P/NZX All	New Zealand	0.063	0.362	0.461	0.023	0.6	0.383	0.277	0.614	0.535	0.342	0.497

Data source: Bloomberg

Table 3. Wilcoxon test comparing January returns with the rest of month (p-values) for the last 15 years

Index	Jurisdiction	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
S&P 500 Index	U.S.	0.089	0.868	0.481	0.534	0.320	0.678	0.804	0.362	0.901	0.901	0.836
Dow Jones Industrial	U.S.	0.384	0.431	0.709	0.868	0.320	0.320	0.507	0.340	0.507	0.481	0.125
Nasdaq Composite	U.S.	0.097	1.000	0.263	0.455	0.263	0.804	0.246	0.263	0.590	0.619	0.648
Nasdaq 100	U.S.	0.031	0.619	0.300	0.481	0.281	0.709	0.125	0.125	0.481	0.455	0.619
N.Y. Stock Ex Comp.	U.S.	0.678	0.561	0.836	0.934	0.229	0.481	0.281	0.678	0.709	0.590	0.147
S&P 100	U.S.	0.213	0.300	0.507	0.740	0.281	0.561	0.934	0.320	0.804	0.678	0.340
S&P 1500	U.S.	0.106	0.709	0.431	0.561	0.340	0.648	0.804	0.431	0.967	0.934	0.868
Russell 1000	U.S.	0.106	0.772	0.455	0.590	0.340	0.678	0.934	0.431	0.967	0.868	0.901
Russell 2000	U.S.	0.590	0.836	0.619	0.590	0.590	0.431	0.868	0.281	0.836	0.534	0.868
Russell 3000	U.S.	0.097	0.678	0.455	0.590	0.340	0.678	0.868	0.407	1.000	0.967	0.901
S&P Toronto Com.	Canada	0.281	0.740	0.967	0.455	0.836	0.868	0.709	0.709	0.507	0.836	0.868
S&P BMV Mexico	Mexico	0.868	0.047	0.678	0.507	0.431	0.455	0.590	0.431	0.089	0.213	0.106
Bolsa de Valores Pan.	Panama	0.362	0.772	0.431	0.590	0.967	0.115	0.125	0.320	0.362	0.016	0.062
Buenos Aires Stock Ex.	Argentina	0.804	0.384	0.836	0.159	0.147	0.619	0.407	0.184	0.507	0.320	0.384
Ibovespa	Brazil	0.590	0.135	0.171	0.481	0.062	0.199	0.125	0.934	0.115	0.106	0.159
Caracas Stock Exc.	Venezuela	0.320	0.281	0.590	0.481	0.340	0.300	0.184	0.804	0.263	0.648	0.619
S&P BVL Peru	Peru	0.934	0.534	0.619	0.534	0.507	0.619	0.648	0.455	0.340	0.507	0.431
Colombia Colcap	Colombia	0.507	0.047	0.082	0.320	0.125	0.868	0.023	0.590	0.213	0.340	0.068
BCT Costa Rica	Costa Rica	0.663	0.787	0.362	0.772	0.678	0.246	0.431	0.804	0.934	0.619	0.934
Bermuda Stock Ex.	Bermuda	0.804	0.047	0.125	0.125	0.934	0.619	0.340	0.362	0.263	0.740	0.362
Bloomberg Europe 500	Europe	0.281	0.199	0.740	1.000	0.281	0.740	0.340	0.772	0.384	0.868	0.407
MSCI Europe Index	Europe	0.362	0.171	0.709	1.000	0.263	0.590	0.300	0.868	0.481	0.868	0.263

S&P Europe 350	Europe	0.340	0.263	0.678	0.967	0.281	0.561	0.340	0.836	0.534	0.901	0.281
DeustcheBorse DAX	Germany	0.340	0.407	0.229	0.740	0.300	0.407	0.481	0.619	0.868	0.934	0.507
CAC 40	France	0.362	0.135	0.836	0.901	0.125	0.648	0.407	0.804	0.648	0.619	0.159
Ibex 35	Spain	0.934	0.213	0.836	0.481	0.042	0.678	0.213	0.868	0.590	0.534	0.246
FTSE 100	U.K.	0.362	0.263	0.772	0.868	0.213	0.740	0.213	0.229	0.384	0.507	0.340
FTSE All Share	U.K.	0.320	0.320	0.836	0.772	0.199	0.709	0.263	0.362	0.384	0.590	0.455
Swiss Market Index	Switzerland	0.199	0.171	0.648	0.901	0.407	0.804	0.455	0.678	0.561	0.934	0.246
FTSE MIB Borsa	Italy	0.481	0.159	0.534	0.561	0.047	0.481	0.171	0.534	0.507	0.320	0.068
PSI All Share	Portugal	0.246	0.967	0.619	0.740	0.481	0.901	0.362	0.901	0.868	0.320	0.281
Irish Stock Ex. Overall	Ireland	0.281	0.678	0.678	0.384	0.678	0.481	0.184	0.836	0.507	0.836	0.534
Iceland Stock Exc.	Iceland	0.772	0.320	0.062	0.772	0.263	0.590	0.229	0.089	0.184	0.619	0.106
Amsterdam Stock Ex.	Netherlands	0.648	0.125	0.836	1.000	0.362	0.967	0.229	1.000	0.967	0.772	0.836
Belgium 20	Belgium	0.407	0.115	0.320	0.561	0.229	0.836	0.068	0.648	0.229	0.281	0.229
Brussels St. Exc.	Belgium	0.097	0.619	0.901	0.934	0.772	0.678	0.199	0.340	0.678	1.000	0.481
Luxemburg Sto. Exc.	Luxemburg	0.901	0.481	0.561	0.934	0.507	0.590	0.171	0.678	0.147	0.740	0.934
OMX Copenhagen	Denmark	0.171	0.561	0.561	0.340	0.362	0.678	0.836	0.362	0.709	0.384	0.868
OMX Helsinki	Finland	0.213	0.804	0.678	0.709	0.263	0.407	1.000	0.507	0.407	1.000	0.740
Oslo All Share	Norway	0.481	0.901	0.159	0.362	0.678	0.561	1.000	0.590	0.772	0.481	0.740
OMX Stockholm All	Sweden	0.648	0.184	0.648	0.619	0.340	0.184	0.125	0.678	0.028	0.901	0.320
Vienna Stock Exchange	Austria	0.590	0.407	0.868	0.967	0.213	0.772	0.199	0.320	0.481	0.648	0.229
Athens St. Exc. Gen.	Greece	0.455	0.481	0.901	0.967	0.320	0.934	0.868	0.678	1.000	0.648	0.263
Warsaw St. Exc.	Poland	0.836	0.106	0.534	0.934	0.125	0.804	0.507	0.740	0.431	0.125	0.213
Prague St. Exc.	Czech Rep.	0.619	0.062	0.075	0.740	0.135	0.534	0.082	0.199	0.115	0.125	0.082
MICEX	Russia	0.263	0.455	0.246	0.455	0.300	0.229	0.246	0.125	0.171	0.507	0.199
Budapest St. Exc.	Hungary	0.709	0.300	0.772	0.740	0.836	0.772	0.740	0.481	0.561	0.901	0.213
Ukraine PFTS	Ukraine	0.804	0.534	0.619	0.868	0.648	0.709	0.159	0.384	0.038	0.868	0.619
Kazakhstan St. Exc.	Kazakhstan	0.934	0.229	0.934	0.619	0.561	0.340	0.199	0.407	0.184	0.678	0.868
Slovak Share	Slovakia	0.246	0.089	0.047	0.246	0.340	0.229	0.125	0.678	0.147	0.051	0.740
Zagreb St. Exc.	Croatia	0.740	0.147	0.431	0.431	0.868	0.648	0.561	0.229	0.967	0.772	0.740
OMX Tallinn	Estonia	0.362	0.034	0.082	0.407	0.300	0.147	0.115	0.020	0.281	0.047	0.135
OMX Riga	Latvia	0.097	0.031	0.678	0.281	0.619	0.804	0.678	0.047	0.772	0.534	0.062
OMX Vilnius	Lithuania	0.868	0.300	0.740	0.407	0.246	0.481	0.740	0.125	0.740	0.455	0.901
Bulgaria St. Exc.	Bulgaria	0.678	0.263	0.407	0.384	1.000	0.455	0.481	0.300	0.836	0.534	0.934
The BorsaIstambul 100	Turkey	0.455	0.023	0.590	0.068	0.051	0.678	0.184	0.159	0.199	0.281	0.056
Malta St. Exc.	Malta	0.868	0.038	0.648	0.384	0.213	0.507	0.042	0.023	0.967	0.934	0.836
FTSE JSE Africa All	S. Africa	0.089	0.648	0.967	0.619	0.709	0.804	1.000	0.561	0.709	0.772	1.000
Egyptian Exc. EGX 30	Egypt	0.246	0.229	0.772	0.320	0.507	0.384	0.082	0.229	0.901	0.967	0.407
MADEX Casablanca	Morocco	0.561	0.481	0.062	1.000	0.384	0.384	0.199	0.038	0.025	0.804	0.068
Tunisia St. Exc.	Tunes	0.740	0.678	0.384	0.967	0.836	0.534	0.678	0.125	0.740	0.320	0.115
Botswana Gaborone	Botswana	0.678	0.740	1.000	0.709	0.648	0.709	0.115	0.836	0.772	1.000	0.740
Nigerian Sto. Exc.	Nigeria	0.031	0.023	0.003	0.025	0.042	0.003	0.340	0.320	0.147	0.018	0.534
Tel Aviv St. Exc.	Israel	0.042	0.868	0.068	0.590	0.709	0.678	0.678	0.534	1.000	0.648	0.648
Blom Stock Index	Lebanon	0.836	0.590	0.023	0.934	0.455	0.648	0.455	1.000	0.740	0.229	0.619
Tadawull All Share	Saudi Arabia	0.619	0.340	0.590	0.868	1.000	0.709	0.213	0.561	0.089	0.171	0.106
Amman St. Exc.	Jordan	0.678	0.619	0.246	0.590	0.934	0.967	0.590	0.184	0.362	0.967	1.000
Muscat MSM 30	Oman	0.804	0.507	0.481	0.648	0.431	0.125	0.836	1.000	0.740	0.159	0.184

Abu Dhabi General	UAE	0.590	0.229	0.804	0.431	0.709	0.481	0.431	0.934	0.068	0.740	0.281
Mauritius SEMDEX	Mauritius	0.281	0.868	0.709	0.082	0.934	0.934	0.340	0.097	0.709	0.772	0.804
Tokyo St. Exc. Ind.	Japan	0.836	0.619	0.507	0.709	0.590	0.481	0.171	0.561	0.868	0.804	1.000
Nikkei 225	Japan	0.934	0.836	0.362	0.648	0.648	0.340	0.097	0.300	0.967	0.590	0.804
NSE Nifty 50	India	0.934	0.455	0.740	0.281	0.934	0.648	0.590	0.481	0.362	0.678	1.000
S&P BSE Sensex	India	0.770	0.540	0.815	0.559	0.770	0.579	0.280	0.953	1.000	0.661	0.930
HIS Index	HK – China	0.772	0.018	0.836	0.678	0.171	0.678	0.901	1.000	0.534	0.590	0.097
CSI 300	M. China	0.199	0.678	0.431	0.901	0.868	0.709	0.534	0.836	0.184	1.000	0.709
Shanghai Comp.	M. China	0.184	0.481	0.619	0.836	0.619	0.507	0.384	0.804	0.246	0.678	0.534
Shenzhen Comp.	M. China	0.068	0.868	0.561	0.648	0.590	0.967	0.678	0.772	0.229	0.868	0.740
Korea St. Exc.Kospi	South Korea	0.709	0.147	0.772	0.868	1.000	0.967	0.590	0.836	0.709	0.561	0.229
Bangkok SET	Thailand	0.362	0.229	0.868	0.619	0.455	0.678	0.384	0.934	0.125	0.804	0.135
Straits Time	Singapore	0.407	0.034	0.229	0.561	0.263	0.868	0.213	0.901	0.481	0.062	0.082
FTSE Bursa KLCI	Malaysia	0.362	0.097	0.431	0.901	0.031	0.648	0.082	0.648	0.340	0.300	0.340
Jakarta St. Exc. Ind.	Indonesia	0.901	0.281	0.147	0.481	0.740	0.934	0.075	0.967	0.619	0.320	0.199
Philippine St. Exc.	Philippines	0.619	0.199	0.028	0.772	0.320	0.199	0.901	0.507	0.709	0.362	0.362
Karachi KSE100	Pakistan	0.431	0.229	0.804	0.431	0.263	0.384	0.135	0.147	0.619	0.159	0.068
Sri Lanka Ind.	Sri Lanka	0.934	0.868	0.804	0.199	0.619	0.023	0.384	0.455	0.678	0.199	0.147
MSE top 20	Mongolia	0.082	0.340	0.772	0.709	0.967	0.772	0.590	0.407	0.590	0.507	0.340
Ho Chi Minh St. In.	Vietnam	0.534	0.407	0.678	0.648	0.934	0.901	0.320	0.199	0.901	0.407	0.740
Australian All Or. In.	Australia	0.901	0.125	0.051	0.507	0.507	0.455	0.561	0.097	0.772	0.171	0.740
S&P/NZX All index	New Zealand	0.147	0.229	0.135	0.362	0.340	1.000	1.000	0.246	0.934	0.619	0.340

Data source: Bloomberg

Table 4. Kruskal-Wallis probability tables

Name	Ticker	Full series	Last 15 years	Name	Ticker	Full series	Last 15 years
S&P 500	SPX	0.0835	0.4622	Ljubljana Exc. Ind.	SBITOP	0.2967	*
Dow Jones Industrial	INDU	0.0020	0.1999	Rep. SrpskaInd.	BIRS	0.1192	*
Nasdaq Composite	CCMP	0.8294	0.5898	OMX Tallinn Ind.	TALSE	0.0070	0.4359
Nasdaq 100	NDX	0.7929	0.176	MBI 10 Ind.	MBI	0.1151	*
N.Y. Stock Ex Comp.	NYA	0.2297	0.4391	OMX Riga Ind.	RIGSE	0.1218	0.0829
S&P 100	OEX	0.2793	0.2742	OMX Vilnius Ind.	VILSE	0.4460	0.4415
S&P 1500	SPR	0.2764	0.4772	Bulgaria St. Exc.	SOFIX	0.7399	0.6701
Russell 1000	RIY	0.4163	0.4464	BorsaIstambul 100	XU100	0.2077	0.2056
Russell 2000	RTY	0.3885	0.765	Cyprus Gen Exc.	CYSMMAPA	0.3863	*
Russell 3000	RAY	0.429	0.5147	Malta St. Exc. Ind.	MALTEX	0.2197	0.0400
S&P Toronto Com. Ind.	SPTSX	0.0037	0.6951	FTSEJSE Africa All	JALSH	0.5511	0.3757
S&P BMV Mexico Ind.	MEXBOL	0.3131	0.393	Egyptian EGX 30	EGX30	0.0607	0.0624
Bolsa de Valores Pan.	BVPSBVP	0.3441	0.3528	MADEX	MOSEMDX	0.1005	0.1005
				Casablanca			
Buenos Aires Ind.	MERVAL	0.284	0.6235	Tunisia St. Exc. Ind.	TUSISE	0.5602	0.5449
Ibovespa Ind.	IBOV	0.9127	0.4844	FTSE JSE Namibia	FTN098	0.3473	*
Chile 65 Ind.	CHILE65	0.1564	*	Botswana Gaborone	BGSMDC	0.1261	0.6382
Caracas St. Exc. Ind.	IBVC	0.4893	0.9816	Nigerian Sto. Exc.	NGSEINDX	0.0269	0.0255
S&P BVL Peru Ind.	SPBLPGPT	0.9048	0.9929	Tanzania All Share	DARSDSEI	0.0275	*
Colombia Colcap Ind.	COLCAP	0.3908	0.3908	Nairobi Exc. All	NSEASI	0.4341	*
BCT Costa Rica Ind.	CRSMBCT	0.8017	0.9302	Ghana Composite	GGSECI	0.5366	*
Bermuda Stock Ex.	BSX	0.2968	0.4588	Kuwait St. Exc. In	SECTMIND	0.4231	*
Bloomberg Europe 500	BE500	0.0904	0.4593	TelAviv St. Exc.	TA-125	0.1009	0.0918

MSCI Europe Ind.	MXEU	0.0953	0.4528	Blom Stock Index	BLOM	0.1714	0.2673
S&P Europe 350 Ind.	SPEURO	0.0956	0.5236	Bahrain Bourse All	BHSEASI	0.7358	*
DeustcheBorse DAX	DAX	0.0612	0.2732	Tadawull All Share	SASEID	0.7182	0.7326
CAC 40 Ind.	CAC	0.0993	0.0001	Amman St. Exc.	JOSMGNFF	0.3991	0.5056
Ibex 35 Ind.	IBEX	0.6770	0.4845	Muscat MSM 30	MSM30	0.5979	0.1575
FTSE 100 Ind.	UKX	0.0358	0.0545	Bberg GCC 200	BGCC200	0.1357	*
FTSE All Share Ind.	ASX	0.0103	0.0903	QE All Share Ind.	QEAS	0.0915	*
Swiss Market Ind.	SMI	0.4326	0.434	Dubai Fin. Mar. Ind.	DFMGI	0.1759	*
FTSE MIB BorsaItaliana	FTSEMIB	0.1169	0.4294	Abu Dhabi General	ADSMI	0.0674	0.0674
FTSE Italia All Share	ITLMS	0.3817	*	Mauritius SEMDEX	SEMDEX	0.1966	0.5281
PSI All Share Ind.	BVLX	0.2533	0.6323	Tokyo St. Exc. Ind.	TPX	0.0618	0.6331
Irish Stock Ex. Overall	ISEQ	0.0548	0.5013	Nikkei 225 Ind.	NKY	0.1395	0.4443
Iceland Stock Exc. Ind.	ICEXI	0.1467	0.3665	NSE Nifty 50 Ind.	NIFTY	0.6363	0.6352
Amsterdam Stock Ex.	AEX	0.0825	0.7233	S&P BSE Sensex	SENSEX	0.3559	0.9332
Belgium 20 Ind.	BEL20	0.1872	0.4421	HIS Index Ind.	HSI	0.0069	0.0558
Brussels St. Exc. Belgian	BELSTK	0.3395	0.5831	CSI 300 Ind.	SHSZ300	0.5993	0.5993
Luxemburg Sto. Exc.	LUXXX	0.3395	0.7235	Shanghai Comp.	SHCOMP	0.5402	0.5488
OMX Copenhagen	KAX	0.3074	0.4715	Shenzhen Comp.	SZCOMP	0.3397	0.4412
OMX Helsinki Ind.	HEX	0.1610	0.6601	Kospi	KOSPI	0.216	0.7547
Oslo All Share Ind.	OSEAX	0.4304	0.6236	Bangkok SET Ind.	SET	0.9354	0.8611
OMX Stockholm All	SAX	0.0147	0.2498	Straits Time Ind.	STI	0.0678	0.0202
Vienna Stock Exchange	WBI	0.1059	0.5944	FTSE Bursa KLCI	FBMKLCI	0.0177	0.0579
Athens St. Exc. General	ASE	0.4789	0.7365	Jakarta Stock Exc.	JCI	0.0778	0.0514
Warsaw St. Exc. Ind.	WIG	0.6257	0.7541	Philippine St. Exc.	PCOMP	0.0443	0.1797
Prague St. Exc. Ind.	PX	0.0112	0.2971	Karachi KSE100	KSE100	0.3742	0.7760
MICEX Ind.	INDEXCF	0.7925	0.8423	Sri Lanka Colombo	CSEALL	0.1497	0.0019
Budapest St. Exc. Ind.	BUX	0.3000	0.6054	MSE top 20 Ind.	MSETOP	0.0997	0.0987
Ukraine PFTS Ind.	PFTS	0.1164	0.1496	Laos Composite Ind.	LSXC	0.0230	*
Kazakhstan St. Exc.	KZKAK	0.6398	0.6789	Ho Chi Minh St.	VNINDEX	0.8557	0.7380
Slovak Share Ind.	SKSM	0.1011	0.3488	Australian All Ind.	AS30	0.0382	0.0760
Zagreb St. Exc. Ind.	CRO	0.7734	0.6876	S&P/NZX All Ind.	NZSE	0.0125	0.0334

*No data available for the period requested

Data source: Bloomberg

3. Results

The average returns per month for all the indexes analyzed as well as their standard deviations can be found in Appendix 1. These results, for an easier visualization, are presented grouped according to geographical characteristics and divided into five regions: Americas, Western Europe, Eastern Europe, Middle East & Africa and Asia & Oceania.

3.1 Wilcoxon (Entire Time Series)

Using the entire time series available in Bloomberg for the previously mentioned 106 indexes and after making the number of data points for each month equal a total of 66 indexes, representing 62.3% of the total, were found to have no statically different returns in the month of January compared to all the other 11 months of the year, 27 indexes had one month with returns statistically different from January, 8 with 2 months, 2 with 3 months, 2 with 4 months and 1 with 6 months. In most of the cases then there was no statistically significant difference. These results can be found in Table 2. The index with 6 months of statistically different returns compared to the returns of January was the OMX Tallin, an index representing the Estonian stock market. The median return, point estimate, for the OMX Tallin index is negative in January and statistically significantly lower than in March, April, July, August, September and November. The point estimates for the median in all these months were positive. These results would suggest that the returns in January for the OMX Index have been lower than the results in several other months. The January Effect is typically understood as the opposite effect with January having bigger returns than other months. The two indexes with 4 months statistically different from the results in January were the FTSE All Share Index (U.K.) and

the BorsaIstambul 100 Index (Turkey). In both cases there was no significant difference in returns when comparing January to the rest of months in the first quarter. In the case of the U.K. index the point estimate for the median value of the return for the month of January was negative but small. The index had positive returns in all the 4 months with statistically significantly different returns (June, August, September and December). In the case of the Borsa Istambul Index the point estimates of the median followed a similar pattern than in the FTSE All Share index, with the same distribution of months (including the negative value for January and the positive value for all the other months), but with larger differences in the point estimated for the returns. The two indexes with 3 months with statistically different returns when compared to January are the Tanzanian All Share Index (Tanzania) and the Laos Composite Index (Laos). There is more disparity of results with these two cases. On one hand there is the case of the index for Tanzania. The results for this index were similar to the previous cases with the point estimate for the median coming negative but small in January followed by a few months of positive results (February, May and October). On the other hand there is the case of Laos, with rather strong results in January and three months of statistically significantly returns (April, September and December). It should be noted that the data series for the index is Laos is relatively short with only 6 years of returns available in Bloomberg (always fulfilling the requirement of having the same number of data points per month).

The eight indexes that have two months with returns statistically different from January can be seen in table 5. For none of the eight indexes there was a statistically significant difference between January and February. For a majority of indexes, 5 out of 8, there was a statistically significant difference between January and March. The results for the tests for these eight indexes (over the entire data series) seem to support that the results were statistically similar for most of the month. For the other two months the results in January seem to be weaker than in those two months for all these eight indexes.

Table 5. Indexes with 2 months

Dow Jones Industrial (U.S.)	Prague St. Exc. Index(Czech Rep.)
Colombia Colcap (Colombia)	OMX Riga (Latvia)
Bloomberg Europe 500 (Europe)	MADEX Casablanca (Morocco)
FTSE MIB Borsa(Italy)	Straits Time Index (Singapore)

Of the 106 indexes there were 27 that had one month with statistically different results when compared to January. The list of these indexes can be found in Table 6. Of the 27 cases the point estimate for the median was higher than the month with different returns, according to the Wilcoxon test, in 11 cases. Those 11 indexes are the S&P Toronto Composite, Bolsa de Valores de Panama Index, MSCI Europe Index, Tel Aviv Stock Exchange Index, Blom Stock Exchange Index, Jakarta Stock Exchange Index, Philippines Stock Exchange Index, Karachi Stock Exchange Index, MSE Top 20 and the Australian All Index. Only in four of these cases (S&P Toronto Composite, Bolsa de Valores de Panama Index, Tel Aviv Stock Exchange Index and MSE Top 20 Index) the results in February seem to be lower than the returns in January. Another four indexes had lower returns in April with the rest of months with lower returns distributed across the first half of the year. There were no months with significantly lower returns than January in the second half of the year i.e., after June.

Table 6. Indexes with one month statistically different from January

S&P 500	OMX Vilnius
N.Y. Stock Ex Comp.	Malta St. Exc.
S&P 100	Kuwait St. Exc.
S&P Toronto Com.	Tel Aviv St. Exc.
Bolsa de Valores de Panama Index	Blom Stock Index
MSCI Europe Index	Mauritius SEMDEX
S&P Europe 350	Tokyo St. Exc. Ind.
CAC 40	Jakarta Stock Exchange
FTSE 100	Philippine St. Exc.
Iceland Stock Exc.	Karachi KSE100
Amsterdam Stock Ex.	MSE top 20

Belgium 20	Australian All Or. In.
Slovak Share	S&PNZX All index
St. Exc. Ind. Rep.Srpska	

3.2 Wilcoxon (Last 15 Years)

The first thing to notice is that, as previously mentioned, when performing the analysis on the data series including the last 15 years of returns there is a shorter number of indexes. This is due to the fact that not all the indexes have 15 years of returns available. For a list of the indexes excluded from this analysis please see Table 1. Of the 90 indexes examined 67, representing 74.4% of the total, presented no statistically significant different returns when using the Wilcoxon test. This represents a higher proportion that when analyzing the entire dataset available i.e., all the years, but excluding the indexes with less than 15 years of track record (the indexes in those two approaches would be the same but the time length of the data series would be different). When using the entire data series for the 90 indexes there is a total of 54 cases, representing approximately 60% of the cases, in which there is no statistically significant difference between the performance in January and the performance in any of the other months of the year. This seems to support the idea that the January-Effect might be dissipating over time.

When analyzing the last 15 years of data 17 indexes had returns statistically different in the month of January compared to another month in the same year. Three indexes had two months statistically different, two indexes three months and one index 7 months. The index that had 7 months with returns different from the returns on January was the Nigeria Stock Exchange Index. It would appear that in the case of Nigeria, during the last 15 years, that there are indications of a sizeable January Effect. The point estimate of the returns of this index is positive and statistically different from those on February, March, April, May, June, July and November with the majority of the point estimate for the returns in those months actually being negative.

The indexes that had three months of statisticallydifferent results were the OMX Tallim (Estonia) and the Malta Stock Exchange Index (Malta). Both of these indexes had negative median returns in the month of January. Similarly to the case when the entire data set is analyzed the Estonian index is one of the indexes that has the largest amount of months with statistically different returns when compared to the month of January. The returns in Estonian index seem to be negative for the month of January. It should be noted that the results in both cases, with the entire data set or only the last 15 years, the median of the returns is negative but the magnitude of the point estimate appears to decrease. This perhaps points to an inverse, but decreasing, January-Effect in the Estonian case. In the case of Malta the point estimate of the returns in January is also negative, with the months of March, August and September having statistically different results and positive point estimates for the median returns.

The indexes that have two months of statistically different results, compared to January, are the OMX Riga (Latvia), the Madex Casablanca (Morocco) and the Colcap Index (Colombia). In all these cases the point estimate of the median return for the month of January was negative or very close to zero while the point estimates for the months with statistically different returns were all positive. These results seem to indicate that there is no January-Effect in the traditional sense.

The 17 indexes that had one month of statistically different returns can be seen in table 7. Of all these 17 indexes the returns were higher in January, compared to the other statistical different month, for five indexes. These indexes are the Nasdaq 100 Index (U.S.), the Tel Aviv Stock Exchange Index (Israel) and the Blom Index (Lebanon), Philippines Stock Exchange Index (Philippines) and Sri Lanka Colombo Index (Sri Lanka). In most of these cases the months of lower returns followed closely after January. In the cases of theNasdaq 100 Index and the Tal Aviv Stock Exchange Index it occurred in February and in the cases of the Blom Index and the Philippines Stock Exchange Index in April. The exception of this trend was the Sri Lanka Colombo Index with the significantly different month happening in July. The point estimates of the median returns of all these three month were negative. There are no indications of higher returns in January for the other 14 indexes. Most of the statistically different performances happened in the first half of the year with only four cases happening after June. The four cases with different performances after June were the Bolsa de Valores de Panama Index (November), the OMX Stockholm All Index (October), Ukraine PFTS Index (October) and the Sri Lanka Colombo Index (July).

Table 7. Indexes with one month statistically different from January (time series of 15 years)

Nasdaq 100 (U.S.)	Bora Istambul 100 (Turkey)
S&P BMV (Mexico)	Tel Aviv Stock Exchange Index (Israel)

Bolsa de Valores Index (Panama)	Blom Stock Index (Lebanon)
Bermuda Stock Exchange Index (Bermuda)	HSI Index (Hong Kong - China)
Ibex 35 (Spain)	Straits Time Index (Singapore)
FTSE MIB Borsa (Italy)	FTSE Bursa KLCI (Malaysia)
OMX Stockholm All (Sweden)	Philippine Stoc. Exc. Ind. (Philippines)
Ukraine PFTS (Ukraine)	Sri Lanka Colombo Index (Sri Lanka)
Slovak Share Index (Slovakia)	

3.3 Kruskal-Wallis

The results for the Kruskal-Wallis test, for both the entire time series as well as the last 15 years, can be found in Table 1. This test tries to determine if the returns for all the 12 months come from the same distribution. Therefore one p value is obtained for all the 12 months rather than having 11 p values for the comparison of the months from February to December (comparing them to the returns in January).

At a 5% confidence level an according to the results from the Kruskal-Wallis test 85.8% of the indexes , using the entire data set available, the returns for all the 12 months came from the same distribution. When the entire length of the time series is used but those indexes with less than 15 years of data are excluded then in 85.6% of the cases the data come from the same distribution. When only the last 15 years of data are used, and indexes with less than those 15 years of returns are included in the analysis, then 93.3% of the cases appear to come from the same distribution supporting the idea that the January-Effect is apparently dissipating over time. It should be noted that the test does not specifically compared the performance in January with the performance in the rest of months. The test analyzes the returns in all those months in its entirety. Using the entire time series the 15 indexes that do not appear to have the returns for all the months coming from the same distribution can be seen in Table 8. The 13 and 6 indexes for the entire time series length (excluding those indexes with less than 15 years of returns) as the case only including the last 15 years of returns respectively can be seen in Tables 9 and 10.

Table 8. Entire time series, indexes with returns not coming from the same distribution

Dow Jones Industrial Ind.	Tanzania All Share Ind.
S&P Toronto Com. Ind.	HSI Index Ind.
FTSE 100 Ind.	FTSE Bursa KLCI Ind.
FTSE All Share Ind	Philippine St. Exc. Ind.
OMX Stockholm All Ind.	Laos Securities Composite Ind.
Prague St. Exc. Ind.	Australian All Ordinaries Ind.
OMX Tallinn Ind.	S&P/NZX All Ind.
Nigerian Sto. Exc. Ind.	

Table 9. Entire time series (excluding indexes with less than 15 years of returns), indexes with returns not coming from the same distribution

Dow Jones Industrial Ind.	Nigerian Sto. Exc. Ind.
S&P Toronto Com. Ind.	HSI Index Ind.
FTSE 100 Ind.	FTSE Bursa KLCI Ind.
FTSE All Share Ind.	Philippine St. Exc. Ind.
OMX Stockholm All Ind.	Australian All Ordinaries Ind.
Prague St. Exc. Ind.	S&P/NZX All Ind.
OMX Tallinn Ind.	

Table 10. 15 last years, indexes with returns not coming from the same distribution

CAC 40 Ind.	Straits Time Ind.
Malta St. Exc. Ind.	Sri Lanka Colombo Ind.
Nigerian Sto. Exc. Ind.	S&P/NZX All Ind.

4. Conclusions

While there are markets, such as for instance Nigeria, in which there continues to appear to exist the traditional January Effect there seems to be a global trend for the January Effect to gradually dissipate. This was been tested across the vast majority of countries with functioning equity markets. This conclusion is supported for both the results from the Wilcoxon and the Kruskal Wallis test. It was also observed that it is equally, if not more, prevalent an Inverse January Effect, with returns lower in January than in other months, than the traditional January Effect. The Estonian case is a good example of this trend of having lower returns in January than in several other months during the year. When there are statistically significant differences between the returns in January and of the months they tend to happen for month in the first half of the year. It should be noted that there are exceptions to this general trend. The assumption that the monthly return does not, in general, follow a normal distribution was tested with an Anderson Darling and a Lillie tests. In both cases the results point toward not accepting that assumption, which is in agreement with the existing literature. This non normality of returns is the reason why non parametric test were used to compare performance.

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Appendix 1. Median returns and standard deviation by geography

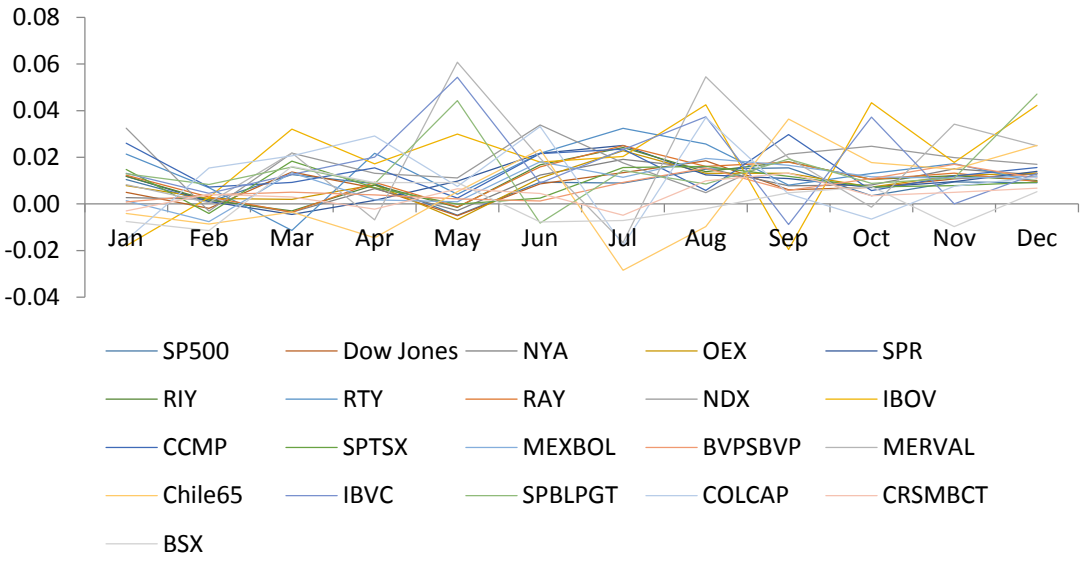

Figure 1. Average return per month – Americas

Data source: Bloomberg

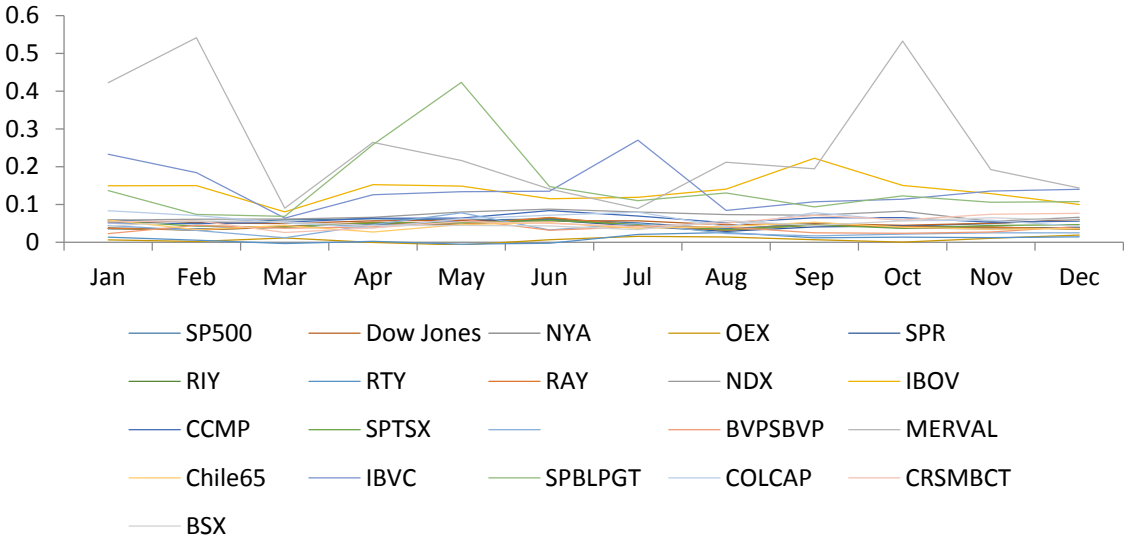

Figure 2. Standard deviation per month – Americas

Data source: Bloomberg

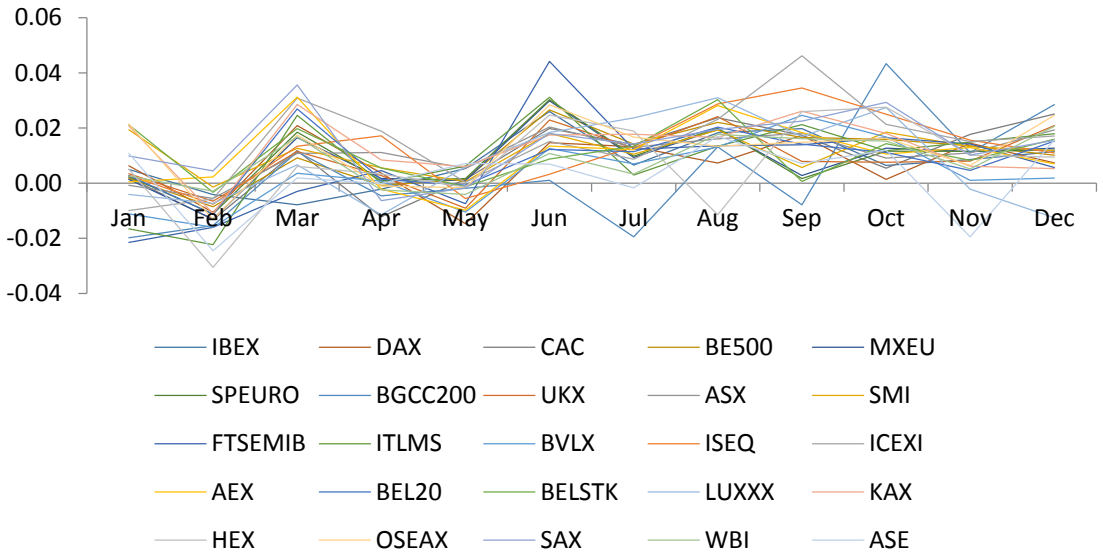

Figure 3. Average return per month – Western Europe

Data source: Bloomberg

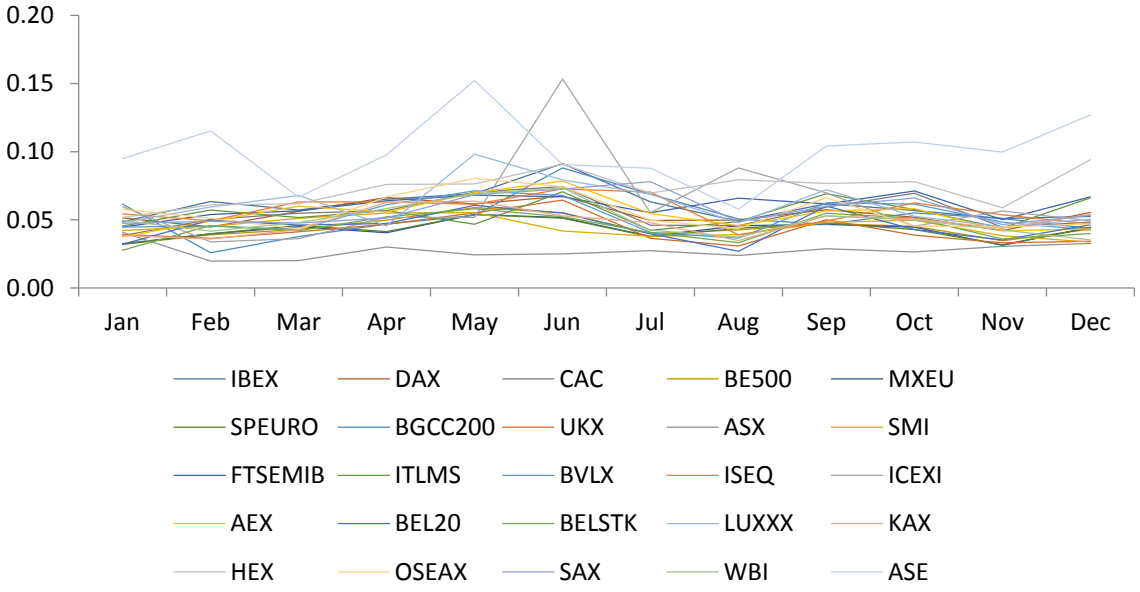

Figure 4. Standard deviation per month – Western Europe

Data source: Bloomberg

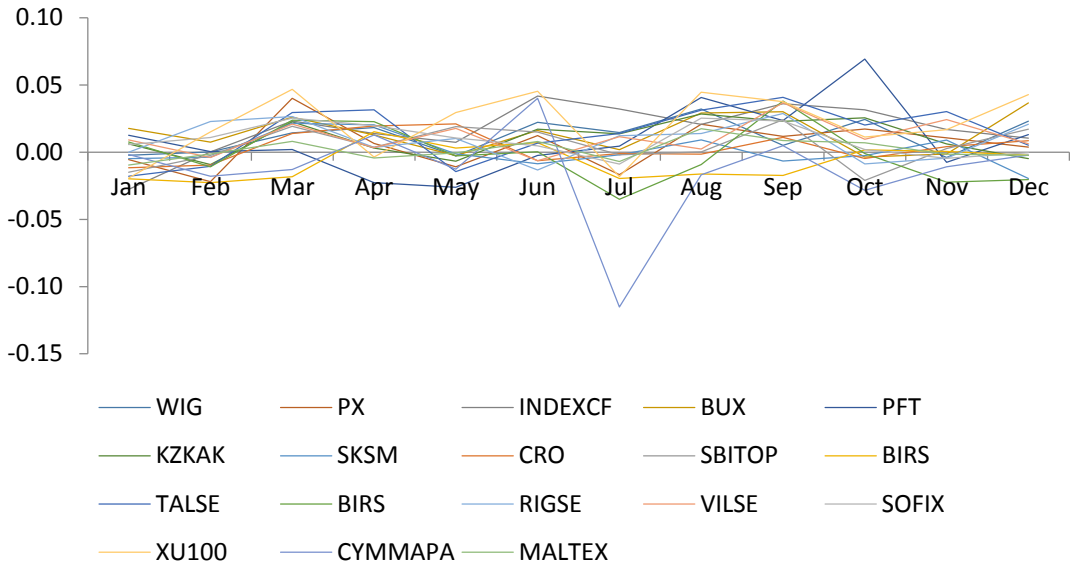

Figure 5. Average return per month – Eastern Europe

Data source: Bloomberg

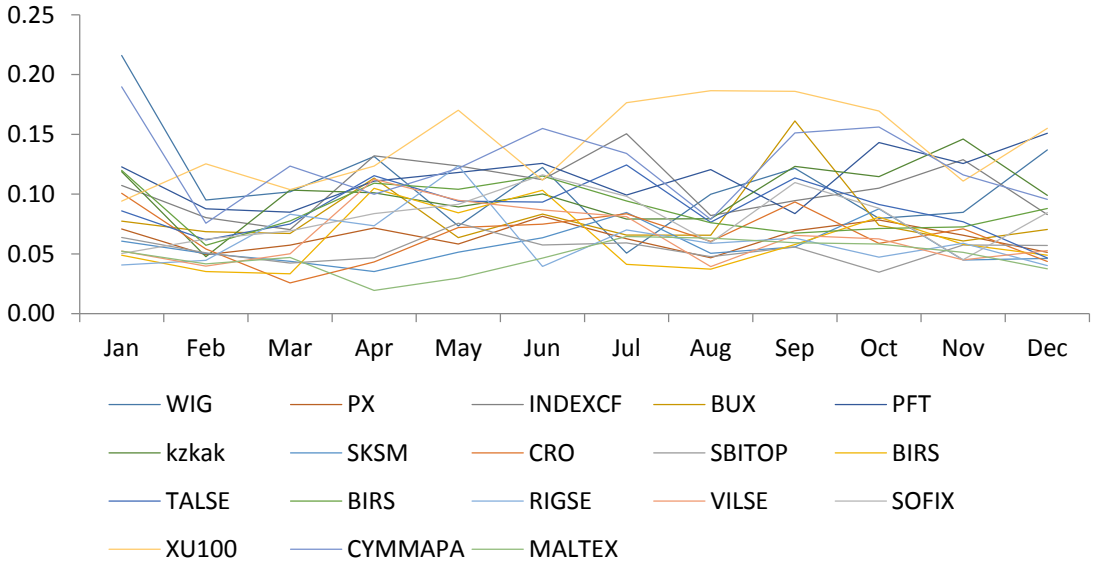

Figure 6. Standard deviation per month – Eastern Europe

Data source: Bloomberg

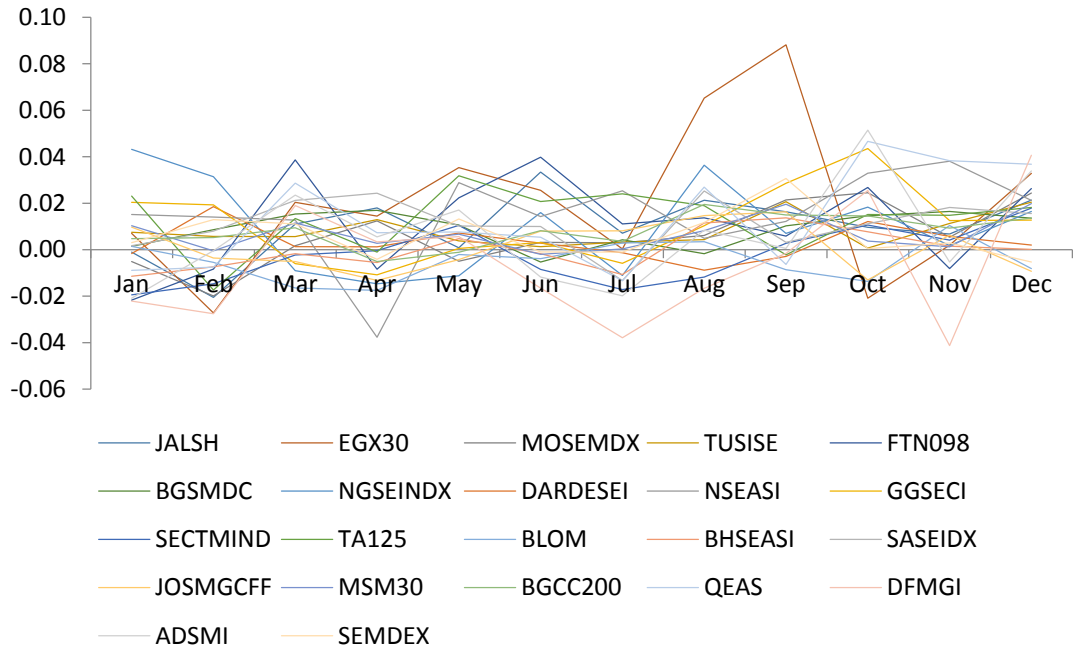

Figure 7. Average return per month – Middle East and Africa

Data source: Bloomberg

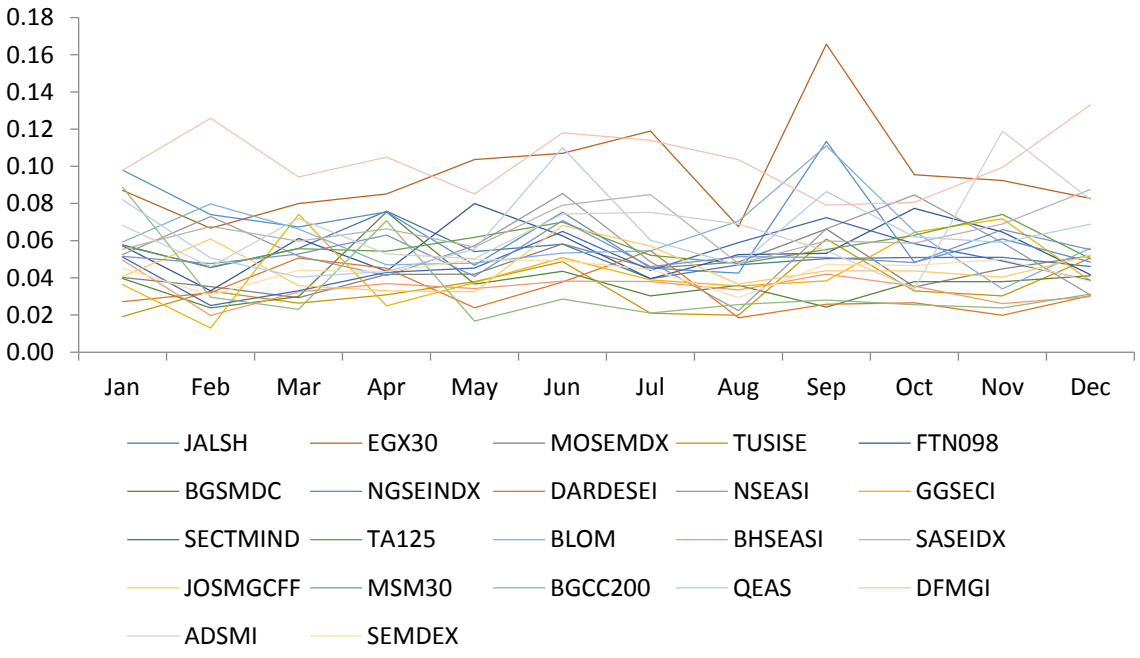

Figure 8. Standard deviation per month – Middle East and Africa

Data source: Bloomberg

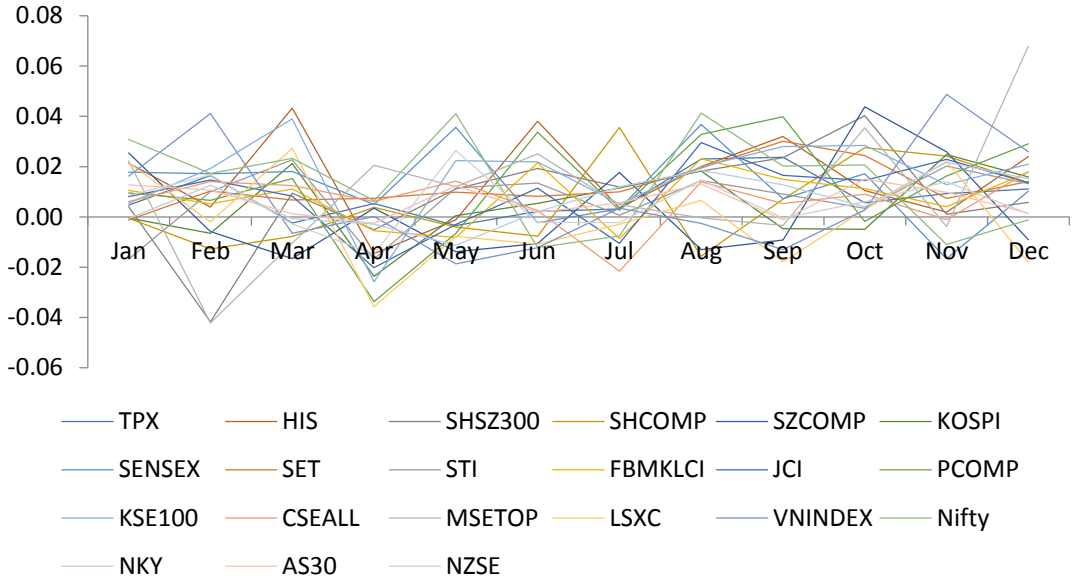

Figure 9. Average return per month – Asia and Oceania

Data source: Bloomberg

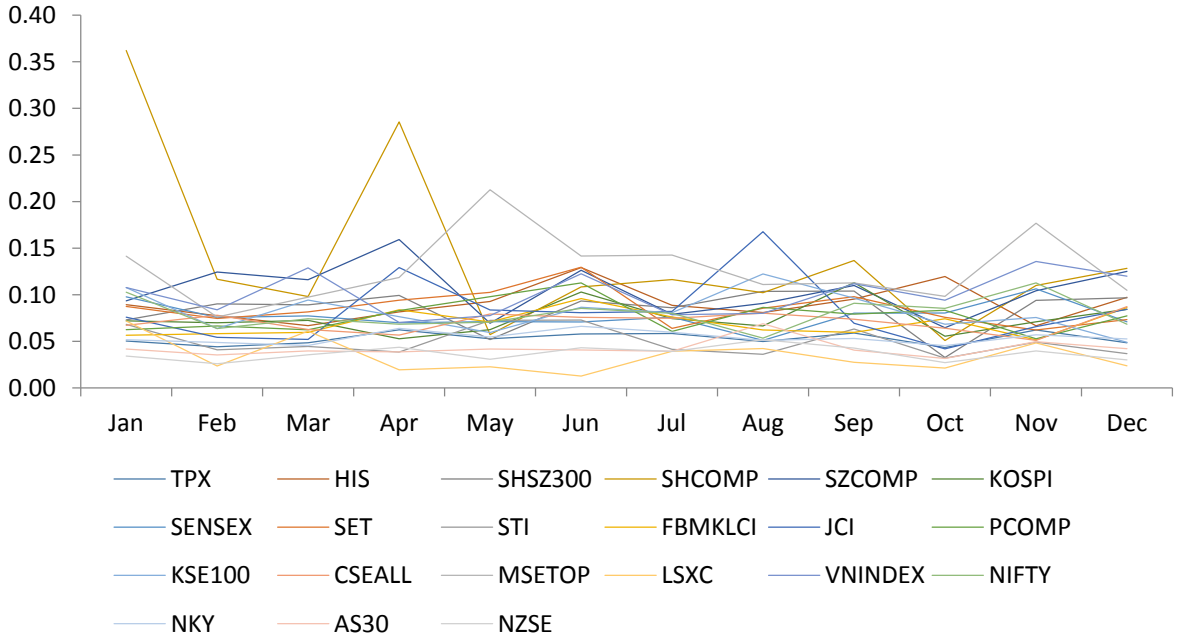

Figure 10. Standard deviation per month – Asia and Oceania

Data source: Bloomberg

Appendix 2. AD Test

Index	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
S&P 500 Ind.	0.001	0.001	0.002	0.001	0.001	0.001	0.112	0.007	0.271	0.039	0.001	0.001
Dow Jones Industrial	0.001	0.001	0.238	0.001	0.001	0.001	0.014	0.001	0.144	0.010	0.001	0.001
Nasdaq Composite Ind.	0.091	0.784	0.498	0.045	0.026	0.071	0.056	0.002	0.548	0.155	0.019	0.390
Nasdaq 100 Ind.	0.103	0.064	0.197	0.052	0.080	0.025	0.238	0.001	0.291	0.115	0.075	0.472
N.Y. Stock Ex Comp.	0.343	0.327	0.346	0.161	0.063	0.001	0.033	0.072	0.672	0.944	0.372	0.702
S&P 100 Ind.	0.603	0.297	0.323	0.105	0.270	0.007	0.211	0.073	0.468	0.507	0.565	0.114
S&P 1500 Ind.	0.361	0.212	0.689	0.048	0.330	0.086	0.027	0.189	0.187	0.239	0.786	0.542
Russell 1000 Ind.	0.486	0.323	0.201	0.201	0.529	0.001	0.081	0.025	0.480	0.246	0.416	0.383
Russell 2000 Ind.	0.197	0.429	0.588	0.030	0.170	0.004	0.104	0.545	0.869	0.975	0.028	0.516
Russell 3000 Ind.	0.501	0.326	0.182	0.232	0.451	0.001	0.051	0.022	0.553	0.265	0.326	0.394
S&P Toronto Com. Ind.	0.001	0.010	0.497	0.001	0.001	0.002	0.096	0.014	0.507	0.188	0.001	0.011
S&P BMV Mexico Ind.	0.878	0.060	0.587	0.356	0.640	0.172	0.848	0.001	0.321	0.047	0.792	0.389
Bolsa de Valores Pan.	0.001	0.010	0.497	0.001	0.001	0.002	0.096	0.014	0.507	0.188	0.001	0.011
Buenos Aires St. Ind.	0.001	0.001	0.347	0.001	0.001	0.814	0.302	0.001	0.001	0.001	0.001	0.003
Ibovespa Ind.	0.001	0.001	0.817	0.004	0.002	0.198	0.001	0.001	0.001	0.001	0.001	0.701
Chile 65 Ind.	0.002	0.248	0.923	0.028	0.361	0.886	0.021	0.064	0.322	0.929	0.220	0.856
Caracas Stock Exc. Ind.	0.001	0.001	0.143	0.076	0.049	0.006	0.001	0.032	0.161	0.049	0.003	0.009
S&P BVL Peru Ind.	0.001	0.111	0.259	0.001	0.001	0.002	0.046	0.001	0.977	0.001	0.002	0.568
Colombia Colcap Ind.	0.382	0.124	0.121	0.302	0.044	0.034	0.095	0.989	0.098	0.066	0.780	0.153
BCT Costa Rica Ind.	0.008	0.006	0.013	0.928	0.061	0.663	0.012	0.001	0.055	0.084	0.001	0.001
Bermuda Stock Ex. Ind.	0.003	0.062	0.642	0.495	0.495	0.028	0.004	0.002	0.058	0.651	0.001	0.291
Bloomberg Europe 500	0.209	0.400	0.308	0.002	0.166	0.316	0.306	0.517	0.264	0.371	0.552	0.057
MSCI Europe Ind.	0.307	0.836	0.229	0.004	0.060	0.228	0.167	0.705	0.429	0.439	0.561	0.040
S&P Europe 350 Ind.	0.330	0.807	0.178	0.006	0.067	0.273	0.270	0.653	0.408	0.333	0.562	0.041
DAX Ind.	0.782	0.274	0.271	0.001	0.009	0.530	0.022	0.057	0.475	0.487	0.723	0.063
CAC 40 Ind.	0.955	0.931	0.677	0.031	0.461	0.028	0.364	0.616	0.054	0.173	0.680	0.435
Ibex 35 Ind.	0.038	0.332	0.638	0.130	0.326	0.016	0.397	0.962	0.247	0.145	0.423	0.359
FTSE 100 Ind.	0.630	0.312	0.883	0.601	0.951	0.001	0.641	0.940	0.386	0.437	0.990	0.199
FTSE All Share Ind.	0.414	0.601	0.663	0.099	0.058	0.001	0.006	0.063	0.001	0.023	0.003	0.009
Swiss Market Ind.	0.265	0.887	0.816	0.001	0.369	0.028	0.415	0.291	0.941	0.354	0.852	0.810
FTSE MIB BorsaItaliana	0.890	0.279	0.682	0.077	0.035	0.021	0.953	0.534	0.554	0.244	0.425	0.380
FTSE Italia All	0.522	0.393	0.202	0.192	0.179	0.047	0.257	0.438	0.146	0.624	0.620	0.359
PSI All Share Ind.	0.361	0.684	0.432	0.232	0.105	0.124	0.951	0.785	0.881	0.442	0.535	0.722
Irish Stock Ex. Overall	0.689	0.155	0.761	0.053	0.067	0.001	0.051	0.007	0.524	0.542	0.592	0.068
Iceland Stock Exc. Ind.	0.085	0.599	0.001	0.260	0.017	0.001	0.070	0.001	0.192	0.031	0.028	0.081
Amsterdam St. Ex. In.	0.830	0.708	0.061	0.024	0.007	0.001	0.152	0.176	0.033	0.709	0.763	0.111
Belgium 20 Ind.	0.628	0.574	0.032	0.050	0.038	0.001	0.097	0.855	0.203	0.027	0.605	0.166
Brussels St. Exc. Ind.	0.306	0.334	0.016	0.014	0.022	0.017	0.037	0.666	0.543	0.122	0.702	0.054
Luxemburg Sto. Exc. Ind.	0.321	0.923	0.928	0.496	0.009	0.001	0.663	0.334	0.528	0.032	0.070	0.026
OMX Copenhagen Ind.	0.330	0.958	0.685	0.773	0.012	0.003	0.131	0.648	0.417	0.925	0.693	0.032
OMX Helsinki Ind.	0.419	0.128	0.393	0.016	0.782	0.584	0.082	0.007	0.932	0.010	0.594	0.109
Oslo All Share Ind.	0.557	0.591	0.666	0.021	0.103	0.081	0.396	0.393	0.215	0.425	0.243	0.452
OMX Stockholm All	0.121	0.575	0.194	0.107	0.207	0.028	0.510	0.311	0.577	0.067	0.290	0.258

Vienna St. Exc. Ind.	0.247	0.700	0.532	0.083	0.019	0.003	0.217	0.827	0.168	0.256	0.228	0.471
Athens St. Exc. Gen. Ind.	0.240	0.001	0.025	0.015	0.036	0.107	0.198	0.854	0.543	0.013	0.002	0.001
Warsaw St. Exc. Ind.	0.001	0.061	0.011	0.001	0.053	0.088	0.333	0.001	0.002	0.411	0.007	0.001
Prague St. Exc. Ind.	0.040	0.652	0.238	0.018	0.097	0.045	0.327	0.074	0.017	0.685	0.559	0.166
MICEX Ind.	0.017	0.164	0.047	0.011	0.706	0.048	0.002	0.375	0.379	0.009	0.002	0.214
Budapest St. Exc. Ind.	0.377	0.595	0.867	0.047	0.091	0.026	0.776	0.024	0.001	0.705	0.081	0.800
Ukraine PFTS Ind.	0.091	0.178	0.673	0.039	0.293	0.486	0.190	0.003	0.095	0.532	0.019	0.003
Kazakhstan St.Ind.	0.154	0.784	0.320	0.374	0.064	0.004	0.186	0.174	0.013	0.001	0.001	0.003
Slovak Share Ind.	0.867	0.402	0.040	0.835	0.058	0.204	0.021	0.065	0.189	0.001	0.562	0.099
Zagreb St. Exc. Ind.	0.001	0.605	0.941	0.848	0.752	0.001	0.025	0.001	0.833	0.070	0.316	0.116
Ljubljana St. Exc. Ind.	0.640	0.401	0.632	0.196	0.105	0.005	0.544	0.244	0.388	0.425	0.306	0.312
St. Exc. Ind. Rep. Srpska	0.324	0.077	0.803	0.004	0.027	0.015	0.883	0.072	0.003	0.087	0.090	0.416
OMX Tallinn Ind.	0.007	0.167	0.001	0.001	0.051	0.002	0.013	0.576	0.006	0.696	0.094	0.193
MBI 10 Ind.	0.001	0.203	0.097	0.058	0.036	0.050	0.474	0.166	0.990	0.048	0.001	0.001
OMX Riga Ind.	0.307	0.625	0.001	0.015	0.008	0.371	0.181	0.150	0.104	0.134	0.869	0.284
OMX Vilnius Ind.	0.179	0.020	0.060	0.001	0.073	0.006	0.111	0.016	0.171	0.678	0.894	0.029
Bulgaria St. Exc. Ind.	0.535	0.560	0.370	0.024	0.181	0.013	0.044	0.009	0.137	0.003	0.107	0.002
The BorsaIstambul 100	0.204	0.022	0.738	0.193	0.017	0.844	0.039	0.001	0.001	0.052	0.546	0.244
Cyprus General Exc. Ind.	0.031	0.492	0.236	0.001	0.157	0.350	0.804	0.130	0.713	0.134	0.342	0.214
Malta St. Exc. Ind.	0.008	0.124	0.682	0.091	0.851	0.277	0.001	0.001	0.038	0.420	0.013	0.763
FTSE JSE Africa All Ind.	0.271	0.223	0.173	0.001	0.439	0.554	0.123	0.620	0.532	0.984	0.206	0.313
EGX 30 Ind.	0.964	0.688	0.861	0.531	0.813	0.003	0.023	0.397	0.934	0.401	0.044	0.813
MADEX Casablanca Ind.	0.111	0.009	0.961	0.282	0.559	0.042	0.990	0.044	0.213	0.814	0.706	0.737
Tunisia St. Exc. Ind.	0.957	0.518	0.200	0.334	0.610	0.456	0.642	0.886	0.287	0.371	0.111	0.427
FTSE JSE Namibia Ind.	0.158	0.875	0.585	0.338	0.147	0.033	0.609	0.701	0.700	0.023	0.082	0.022
Botswana Gaborone Ind.	0.044	0.246	0.421	0.001	0.009	0.001	0.587	0.001	0.824	0.219	0.060	0.086
Nigerian Sto. Exc. Ind.	0.575	0.628	0.458	0.569	0.847	0.701	0.539	0.488	0.162	0.076	0.183	0.206
Tanzania All Share Ind.	0.055	0.023	0.097	0.001	0.036	0.004	0.019	0.177	0.106	0.099	0.609	0.613
Nairobi Sec. Exc. All Ind.	0.599	0.034	0.024	0.596	0.023	0.013	0.280	0.461	0.371	0.001	0.815	0.156
Ghana Composite Ind.	0.285	0.042	0.268	0.935	0.210	0.859	0.077	0.297	0.213	0.398	0.042	0.209
Kuwait St. Exc. Ind.	0.093	0.694	0.573	0.990	0.053	0.002	0.465	0.012	0.806	0.174	0.749	0.113
Tel Aviv St. Exc. Ind.	0.213	0.107	0.690	0.495	0.057	0.005	0.478	0.977	0.220	0.008	0.721	0.820
Blom Stock Index Ind.	0.001	0.001	0.149	0.621	0.024	0.022	0.128	0.001	0.001	0.001	0.943	0.089
Bahrain Bourse All Share	0.253	0.347	0.506	0.012	0.001	0.168	0.011	0.492	0.613	0.953	0.378	0.554
Tadawull All Share Ind.	0.235	0.035	0.111	0.456	0.071	0.081	0.442	0.025	0.018	0.635	0.946	0.122
Amman St. Exc. Ind.	0.927	0.228	0.005	0.111	0.886	0.001	0.251	0.280	0.189	0.316	0.511	0.030
Muscat MSM 30 Ind.	0.809	0.219	0.010	0.043	0.343	0.001	0.090	0.063	0.492	0.078	0.003	0.381
Bloomberg GCC 200 Ind.	0.570	0.091	0.713	0.336	0.088	0.027	0.546	0.299	0.547	0.076	0.731	0.800
QE All Share Ind.	0.306	0.134	0.979	0.321	0.544	0.002	0.328	0.693	0.134	0.080	0.901	0.212
DFM G. Ind.	0.147	0.004	0.139	0.051	0.242	0.036	0.049	0.756	0.675	0.736	0.214	0.266
Abu Dhabi Gen. Ind.	0.234	0.038	0.191	0.558	0.683	0.006	0.022	0.382	0.847	0.215	0.001	0.069
Mauritius SEMDEX Ind.	0.001	0.180	0.164	0.003	0.255	0.003	0.001	0.897	0.451	0.004	0.007	0.128
Tokyo St. Exc. Ind. Ind.	0.136	0.078	0.450	0.561	0.252	0.005	0.535	0.145	0.240	0.245	0.351	0.013
Nikkei 225 Ind.	0.072	0.141	0.500	0.294	0.229	0.006	0.169	0.894	0.216	0.334	0.800	0.031
NSE Nifty 50 Ind.	0.118	0.120	0.054	0.781	0.288	0.380	0.800	0.254	0.651	0.012	0.038	0.876
S&P BSE Sensex Ind.	0.075	0.080	0.023	0.116	0.244	0.027	0.806	0.044	0.818	0.003	0.033	0.359

HIS Index Ind.	0.410	0.020	0.302	0.215	0.272	0.001	0.001	0.001	0.485	0.001	0.191	0.001
CSI 300 Ind.	0.741	0.677	0.077	0.285	0.044	0.080	0.941	0.103	0.805	0.833	0.487	0.083
Shanghai Comp. Ind.	0.001	0.035	0.299	0.001	0.777	0.102	0.018	0.133	0.004	0.246	0.131	0.043
Shenzhen Comp. Ind.	0.717	0.206	0.119	0.001	0.824	0.023	0.896	0.490	0.880	0.525	0.968	0.005
Korea St. Exc. Kospi Ind.	0.551	0.011	0.162	0.493	0.783	0.008	0.186	0.193	0.001	0.728	0.088	0.740
Bangkok SET Ind.	0.232	0.384	0.141	0.039	0.726	0.001	0.253	0.165	0.256	0.257	0.610	0.001
Straits Time Ind.	0.023	0.173	0.690	0.616	0.127	0.001	0.808	0.473	0.682	0.034	0.003	0.026
FTSE Bursa KLCI Ind.	0.307	0.045	0.054	0.012	0.194	0.002	0.007	0.001	0.510	0.004	0.722	0.157
Jakarta Stock Exc. Ind.	0.745	0.519	0.404	0.001	0.251	0.015	0.015	0.001	0.217	0.024	0.445	0.323
Philippine St. Exc. Ind.	0.154	0.028	0.248	0.035	0.069	0.075	0.831	0.001	0.744	0.002	0.926	0.297
Karachi KSE100 Ind.	0.154	0.028	0.248	0.035	0.069	0.075	0.831	0.001	0.744	0.002	0.926	0.297
Sri Lanka Colombo Ind.	0.048	0.178	0.065	0.408	0.075	0.119	0.016	0.003	0.199	0.140	0.068	0.015
MSE top 20 Ind.	0.081	0.793	0.024	0.424	0.001	0.122	0.015	0.785	0.377	0.577	0.001	0.341
Laos Composite	0.027	0.088	0.420	0.905	0.570	0.562	0.614	0.283	0.990	0.068	0.140	0.804
Ho Chi Minh St. Ind.	0.055	0.641	0.150	0.018	0.224	0.039	0.634	0.001	0.024	0.099	0.228	0.240
Australian All Ord. Ind.	0.097	0.061	0.001	0.051	0.261	0.022	0.021	0.001	0.164	0.458	0.013	0.001
S&P NZX All Ind.	0.056	0.703	0.586	0.088	0.639	0.122	0.115	0.653	0.084	0.331	0.329	0.058

Data source: Bloomberg

Appendix 3. Lillie Test

Index	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
S&P 500 Ind.	0.010	0.017	0.065	0.001	0.006	0.001	0.045	0.014	0.429	0.044	0.001	0.001
Dow Jones Industrial Ind.	0.001	0.019	0.500	0.002	0.001	0.001	0.011	0.001	0.061	0.066	0.027	0.001
Nasdaq Composite Ind.	0.012	0.500	0.500	0.153	0.017	0.140	0.102	0.023	0.500	0.441	0.016	0.381
Nasdaq 100 Ind.	0.028	0.121	0.500	0.297	0.170	0.073	0.176	0.001	0.216	0.227	0.165	0.336
N.Y. Stock Ex Comp. Ind.	0.092	0.500	0.164	0.335	0.159	0.006	0.190	0.126	0.500	0.500	0.338	0.500
S&P 100 Ind.	0.500	0.179	0.232	0.108	0.196	0.018	0.223	0.041	0.500	0.500	0.193	0.143
S&P 1500 Ind.	0.149	0.194	0.423	0.082	0.500	0.174	0.146	0.233	0.073	0.353	0.406	0.224
Russell 1000 Ind.	0.252	0.500	0.136	0.214	0.500	0.007	0.316	0.037	0.263	0.294	0.500	0.302
Russell 2000 Ind.	0.194	0.498	0.500	0.008	0.141	0.091	0.060	0.452	0.500	0.500	0.063	0.243
Russell 3000 Ind.	0.148	0.449	0.090	0.196	0.494	0.005	0.207	0.030	0.298	0.428	0.500	0.242
S&P Toronto Com. Ind.	0.003	0.012	0.500	0.016	0.019	0.017	0.186	0.027	0.309	0.075	0.014	0.017
S&P BMV Mexico Ind.	0.500	0.296	0.324	0.142	0.500	0.317	0.500	0.003	0.449	0.258	0.500	0.500
Bolsa de Valores Pan. Ind.	0.003	0.012	0.500	0.016	0.019	0.017	0.186	0.027	0.309	0.075	0.014	0.017
Buenos Aires St. Ex. Ind.	0.001	0.001	0.077	0.001	0.008	0.500	0.500	0.002	0.078	0.001	0.001	0.018
IbovespaInd.	0.003	0.001	0.500	0.048	0.010	0.246	0.061	0.003	0.003	0.001	0.012	0.500
Chile 65 Ind.	0.015	0.391	0.500	0.082	0.292	0.500	0.007	0.181	0.112	0.500	0.203	0.500
Caracas Stock Exc. Ind.	0.007	0.001	0.065	0.193	0.054	0.032	0.001	0.048	0.307	0.075	0.032	0.035
S&P BVL Peru Ind.	0.001	0.027	0.254	0.001	0.001	0.007	0.145	0.001	0.500	0.002	0.030	0.500
Colombia ColcapInd.	0.286	0.103	0.220	0.098	0.102	0.271	0.401	0.500	0.055	0.096	0.500	0.330
BCT Costa Rica Ind.	0.044	0.003	0.004	0.500	0.094	0.298	0.023	0.010	0.112	0.305	0.004	0.002
Bermuda Stock Ex. Ind.	0.013	0.263	0.500	0.500	0.500	0.056	0.013	0.007	0.020	0.372	0.020	0.372
Bloomberg Europe 500	0.464	0.235	0.280	0.002	0.179	0.392	0.146	0.458	0.089	0.500	0.500	0.036
MSCI Europe Ind.	0.253	0.500	0.434	0.005	0.094	0.500	0.072	0.500	0.358	0.500	0.500	0.011
S&P Europe 350 Ind.	0.365	0.500	0.360	0.006	0.099	0.500	0.065	0.500	0.202	0.471	0.500	0.015

DeustcheBorse DAX Ind.	0.437	0.233	0.475	0.006	0.189	0.500	0.159	0.304	0.500	0.500	0.391	0.036
CAC 40 Ind.	0.500	0.500	0.500	0.019	0.117	0.015	0.430	0.500	0.183	0.500	0.500	0.500
Ibex 35 Ind.	0.200	0.378	0.422	0.174	0.227	0.059	0.500	0.500	0.420	0.095	0.405	0.491
FTSE 100 Ind.	0.500	0.363	0.500	0.500	0.500	0.001	0.500	0.500	0.500	0.464	0.500	0.171
FTSE All Share Ind.	0.500	0.500	0.500	0.035	0.111	0.007	0.029	0.232	0.001	0.184	0.012	0.028
Swiss Market Ind.	0.500	0.500	0.500	0.013	0.380	0.017	0.500	0.373	0.500	0.325	0.500	0.500
FTSE MIB BorsaItaliana	0.500	0.295	0.500	0.034	0.249	0.012	0.500	0.500	0.410	0.223	0.303	0.500
FTSE Italia All Share Ind.	0.317	0.365	0.120	0.115	0.500	0.028	0.143	0.500	0.031	0.411	0.500	0.500
PSI All Share Ind.	0.333	0.500	0.171	0.212	0.076	0.213	0.500	0.500	0.500	0.500	0.368	0.500
Irish Stock Ex. Overall Ind.	0.500	0.144	0.500	0.083	0.151	0.004	0.161	0.014	0.417	0.500	0.500	0.481
Iceland Stock Exc. Ind.	0.344	0.500	0.001	0.223	0.158	0.001	0.334	0.001	0.340	0.122	0.085	0.201
Amsterdam Stock Ex. Ind.	0.500	0.500	0.082	0.199	0.035	0.007	0.465	0.182	0.172	0.500	0.500	0.023
Belgium 20 Ind.	0.379	0.500	0.039	0.042	0.104	0.033	0.474	0.500	0.385	0.422	0.334	0.466
Brussels St. Exc. Ind.	0.244	0.291	0.093	0.004	0.164	0.079	0.076	0.500	0.500	0.221	0.500	0.163
Luxemburg Sto. Exc. Ind.	0.278	0.500	0.500	0.486	0.031	0.025	0.500	0.429	0.500	0.159	0.262	0.017
OMX Copenhagen Ind.	0.500	0.500	0.500	0.431	0.034	0.074	0.160	0.500	0.428	0.500	0.305	0.038
OMX Helsinki Ind.	0.236	0.073	0.249	0.032	0.500	0.500	0.036	0.101	0.343	0.088	0.500	0.083
Oslo All Share Ind.	0.500	0.494	0.500	0.072	0.328	0.071	0.296	0.146	0.315	0.500	0.198	0.500
OMX Stockholm All Ind.	0.090	0.500	0.116	0.062	0.263	0.016	0.500	0.500	0.500	0.092	0.325	0.235
Vienna St. Exc. Ind,	0.265	0.500	0.500	0.108	0.195	0.119	0.211	0.500	0.115	0.500	0.240	0.500
Athens St. Exc. Gen. Ind.	0.252	0.011	0.026	0.084	0.084	0.063	0.393	0.500	0.500	0.044	0.066	0.001
Warsaw St. Exc. Ind.	0.001	0.408	0.109	0.001	0.180	0.042	0.125	0.011	0.036	0.423	0.003	0.001
Prague St. Exc. Ind.	0.105	0.500	0.128	0.060	0.195	0.100	0.384	0.130	0.018	0.493	0.261	0.243
MICEX Ind.	0.003	0.229	0.018	0.034	0.500	0.070	0.041	0.500	0.385	0.049	0.030	0.410
Budapest St. Exc. Ind.	0.500	0.441	0.500	0.152	0.191	0.219	0.500	0.041	0.001	0.483	0.044	0.500
Ukraine PFTS Ind.	0.389	0.067	0.500	0.057	0.413	0.473	0.048	0.031	0.142	0.500	0.115	0.012
Kazakhstan St. Exc. Ind.	0.163	0.500	0.497	0.208	0.339	0.011	0.311	0.401	0.006	0.001	0.022	0.006
Slovak Share Ind.	0.500	0.500	0.018	0.313	0.069	0.080	0.014	0.157	0.156	0.003	0.246	0.463
Zagreb St. Exc. Ind.	0.006	0.239	0.500	0.500	0.467	0.001	0.095	0.001	0.500	0.320	0.297	0.244
Ljubljana St. Exc. Ind.	0.500	0.346	0.500	0.241	0.110	0.024	0.500	0.384	0.500	0.392	0.500	0.434
St. Exc. Ind. Rep. Srpska	0.500	0.036	0.500	0.019	0.068	0.008	0.500	0.056	0.013	0.124	0.045	0.500
OMX Tallinn Ind.	0.012	0.113	0.001	0.001	0.059	0.016	0.008	0.427	0.053	0.500	0.216	0.045
MBI 10 Ind.	0.001	0.254	0.095	0.183	0.039	0.040	0.439	0.264	0.500	0.146	0.003	0.001
OMX Riga Ind.	0.467	0.500	0.020	0.005	0.010	0.471	0.500	0.267	0.057	0.087	0.500	0.189
OMX Vilnius Ind.	0.125	0.036	0.047	0.001	0.029	0.035	0.059	0.033	0.500	0.500	0.500	0.042
Bulgaria St. Exc. Ind.	0.326	0.500	0.500	0.026	0.265	0.068	0.025	0.006	0.389	0.001	0.068	0.003
The BorsaIstambul 100	0.134	0.090	0.500	0.319	0.008	0.500	0.051	0.001	0.001	0.012	0.500	0.078
Cyprus General Exc. Ind.	0.074	0.342	0.098	0.005	0.132	0.255	0.500	0.216	0.500	0.044	0.327	0.387
Malta St. Exc. Ind.	0.059	0.206	0.500	0.018	0.500	0.182	0.014	0.017	0.073	0.210	0.001	0.500
FTSE JSE Africa All Ind.	0.124	0.324	0.031	0.002	0.335	0.500	0.058	0.500	0.404	0.500	0.329	0.110
Egyptian Exc. EGX 30 Ind.	0.500	0.500	0.500	0.446	0.500	0.015	0.044	0.301	0.500	0.204	0.086	0.500
MADEX CasablancaInd.	0.266	0.015	0.500	0.479	0.500	0.101	0.500	0.061	0.302	0.500	0.500	0.500
Tunisia St. Exc. Ind.	0.500	0.078	0.500	0.052	0.500	0.217	0.406	0.500	0.242	0.500	0.285	0.500
FTSE JSE Namibia Ind.	0.189	0.500	0.500	0.133	0.446	0.168	0.381	0.500	0.500	0.050	0.016	0.039
Botswana Gaborone Ind.	0.037	0.309	0.278	0.001	0.032	0.006	0.500	0.012	0.500	0.500	0.085	0.131
Nigerian Sto. Exc. Ind.	0.330	0.500	0.370	0.500	0.500	0.500	0.500	0.500	0.341	0.053	0.056	0.052

Tanzania All Share Ind.	0.022	0.041	0.085	0.001	0.017	0.022	0.022	0.063	0.165	0.058	0.500	0.500
Nairobi Sec. Exc. All Ind.	0.273	0.007	0.008	0.500	0.075	0.161	0.500	0.500	0.500	0.006	0.500	0.266
Ghana Composite Ind.	0.500	0.189	0.366	0.500	0.156	0.500	0.140	0.123	0.170	0.500	0.037	0.169
Kuwait St. Exc. Ind.	0.154	0.431	0.447	0.500	0.019	0.007	0.416	0.027	0.500	0.204	0.500	0.053
Tel Aviv St. Exc. Ind.	0.240	0.166	0.373	0.500	0.037	0.079	0.345	0.500	0.500	0.019	0.500	0.500
Blom Stock Index Ind.	0.001	0.001	0.178	0.500	0.102	0.021	0.289	0.001	0.001	0.003	0.500	0.289
Bahrain Bourse All Share	0.345	0.398	0.190	0.055	0.001	0.171	0.006	0.500	0.500	0.500	0.389	0.356
Tadawull All Share Ind.	0.339	0.104	0.320	0.500	0.274	0.360	0.437	0.114	0.175	0.500	0.500	0.259
Amman St. Exc. Ind.	0.500	0.229	0.009	0.260	0.500	0.006	0.358	0.403	0.273	0.355	0.500	0.114
Muscat MSM 30 Ind.	0.500	0.254	0.015	0.121	0.500	0.062	0.373	0.315	0.248	0.165	0.001	0.247
Bloomberg GCC 200 Ind.	0.318	0.212	0.500	0.500	0.052	0.091	0.241	0.182	0.500	0.101	0.500	0.500
QE All Share Ind.	0.257	0.277	0.500	0.380	0.239	0.001	0.500	0.500	0.383	0.236	0.500	0.292
Dubai Fin. Mar. Gen. Ind.	0.369	0.032	0.100	0.062	0.300	0.049	0.095	0.453	0.500	0.500	0.100	0.255
Abu Dhabi General Ind.	0.180	0.039	0.500	0.500	0.482	0.045	0.044	0.500	0.500	0.187	0.001	0.240
Mauritius SEMDEX Ind.	0.001	0.443	0.286	0.024	0.301	0.006	0.005	0.500	0.291	0.034	0.120	0.045
Tokyo St. Exc. Ind. Ind.	0.161	0.311	0.235	0.466	0.500	0.037	0.500	0.323	0.286	0.445	0.500	0.172
Nikkei 225 Ind.	0.006	0.148	0.500	0.500	0.277	0.034	0.310	0.500	0.203	0.496	0.500	0.038
NSE Nifty 50 Ind.	0.365	0.200	0.267	0.500	0.284	0.451	0.500	0.387	0.500	0.014	0.109	0.500
S&P BSE Sensex Ind.	0.239	0.230	0.088	0.093	0.279	0.002	0.500	0.077	0.500	0.019	0.141	0.255
HIS Index Ind.	0.500	0.109	0.042	0.139	0.500	0.001	0.002	0.001	0.448	0.001	0.144	0.003
CSI 300 Ind.	0.500	0.500	0.007	0.334	0.021	0.088	0.500	0.247	0.500	0.500	0.305	0.212
Shanghai Comp. Ind.	0.001	0.005	0.149	0.001	0.500	0.050	0.033	0.081	0.036	0.234	0.046	0.162
Shenzhen Comp. Ind.	0.500	0.249	0.162	0.012	0.500	0.014	0.500	0.500	0.500	0.500	0.500	0.038
Korea St. Exc. KospiInd.	0.500	0.100	0.077	0.500	0.500	0.010	0.017	0.248	0.005	0.500	0.086	0.500
Bangkok SET Ind.	0.024	0.490	0.492	0.039	0.500	0.006	0.038	0.228	0.386	0.500	0.500	0.001
Straits Time Ind.	0.053	0.500	0.500	0.500	0.089	0.011	0.500	0.269	0.500	0.058	0.029	0.276
FTSE Bursa KLCI Ind.	0.253	0.078	0.045	0.178	0.351	0.018	0.027	0.005	0.463	0.008	0.500	0.361
Jakarta Stock Exc. Ind.	0.261	0.500	0.216	0.004	0.254	0.031	0.058	0.001	0.075	0.076	0.500	0.150
Philippine St. Exc. Ind.	0.261	0.003	0.460	0.179	0.336	0.185	0.500	0.006	0.500	0.011	0.500	0.325
Karachi KSE100 Ind.	0.261	0.003	0.460	0.179	0.336	0.185	0.500	0.006	0.500	0.011	0.500	0.325
Sri Lanka Colombo Ind.	0.033	0.318	0.117	0.500	0.154	0.155	0.011	0.009	0.100	0.254	0.154	0.069
MSE top 20 Ind.	0.010	0.500	0.094	0.311	0.001	0.215	0.080	0.500	0.500	0.356	0.018	0.500
Laos Securities Composite	0.040	0.054	0.469	0.500	0.500	0.342	0.500	0.282	0.500	0.031	0.070	0.500
Ho Chi Minh St. Ind.	0.052	0.500	0.073	0.109	0.500	0.133	0.500	0.001	0.016	0.267	0.346	0.436
Australian All Ord. Ind.	0.296	0.270	0.010	0.047	0.500	0.041	0.011	0.001	0.500	0.324	0.074	0.001
S&P NZX All Ind.	0.123	0.422	0.443	0.131	0.500	0.329	0.419	0.273	0.069	0.169	0.165	0.049

Data source: Bloomberg