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THE IMPACT OF FOREIGN STOCK EXCHANGES ON THE MAIN STOCK EXCHANGE INDEXES IN POLAND

Iwo Augustyński[1]

Abstract

In this paper the author compared 13stock exchange indexes of American, British and German markets and determined their impact on Polish Wig and WIG20 indexes. The analysis proved that the British FTSE100 and FTSE250 as well as the German DAX had the biggest influence on the Warsaw indexes. The relations among all these indexes were also heavily influenced by the Russian and American economic crisis and Poland's access to the European Union.

JEL classification: F30, G12, G14
Key words: stock indexes, international capital flow, globalization

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Introduction

Although there have been relations between quotations from various stock exchanges since their very beginnings, their importance has grown with the creation of synthetic indicators reflecting changes to stock quotes of listed companies, namely stock exchange indexes, and facilitated by revolution in telecommunications, globalization, and finally by development of information technologies, offering hundreds of millions of people access to stock exchanges. At present, thanks to the Internet, investors enjoy immediate access to each significant item of market information. They can freely, and also instantaneously, invest their capital practically on each major world stock exchange. As each service offered through the Internet, the trade in shares has become available to practically every user of the net.

In conditions of global access to market information, the New York Stock Exchange has emerged as a trend-setter in global equity markets impacting other regional and local stock exchanges, including the Warsaw Stock Exchange. However, bearing in mind that Poland belongs to the European Union, in which the biggest financial market is London, and that our most important trade partner is Germany, we can assume that the stock indexes connected with these three markets, have the greatest impact on the Warsaw Stock Exchange indexes.

The aim of this article is to determine:

1) where the main impulses for change come from,
2) their strength,
3) the role of international capital, and

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4) the influence of financial crises on the main indexes of Warsaw Stock Exchange – WIG and WIG20.

We use a linear model, the classic OLS (Ordinary Least Squares) method, where explained variable was the return rate on WIG or WIG20 index, and explaining variables the return rates from selected indexes for the American market DJIA (Dow Jones Industrial Average), DJCA (Dow Jones Composite Average), S&P500 (Standard & Poor 500), Nasdaq and Nasdaq100, the British market (FTSE100 and FTSE250) and the German market (DAX). In the case of American market indexes, we included into our analysis also variables delayed by one day to account for time differences in opening and closing American and European stock exchanges. The strength and direction of the relationship has been shown by assessed parameters of explaining variables.

The analysis confirmed our prediction that the most important financial center in Europe is the City in London. Practically in the whole analyzed period both Warsaw indexes were heavily influenced by FTSE250 and FTSE100. German DAX had bigger influence only twice and only on WIG20.

The review of literature

In research on international capital flow the authors usually take into account a wide range of explaining variables (Claessens, 1993; De Santis and Luhrmann, 2006; Garibaldi, Mora, Sahy and Zettelmeyer, 2001; Jorion and Schwartz, 1986). These determinants may be divided into two basic groups: global (supply) and domestic (demand). The relationship between them is a significant indicator for taking political decisions. Increased sensitivity of portfolio flows to external factors indicates the economy's susceptibility to global processes. If this relation is strong, global financial markets shocks will call for proper adjustment of internal policy to enable the realization of economic goals. Simultaneously, increased independence of the country from changes in global financial markets may point at strong foundations of the domestic economy and proper economic policies being used.

The influence of big markets on others has long been the subject of scientific analyses. However, these relations were examined through analysis of correlations between indexes representing various stock exchanges (Bracker and Koch, 1999; Dalkir, 2009) and concern 'the infection effects' of transmitting economic crises (Dungey, Fry, Martin and Gonzalez-Hermosillo, 2004). We should also remember that the 'infection' and interdependence are not synonymous. According to the approach presented in the work of V. Bodart and B. Candelon (2009), the term 'infection' describes a temporary and considerable change in relations between markets. If this change, being the result of crisis, for example, is long-lasting, we can talk of interdependence.

Apart from the correlation analysis, which is the most intuitive one, specialist literature has proposed many other methods testing the transmission of volatility and 'infection'. Scientists have used discrete choice models, GARCH models, models based on Markov chains, they have also tried tests of reaction to unpredictable information (the review of these models may be found in the work of Dungey at al (2004)), frequency domain analysis (Bodart and Candelon, 2009), VAR models (Eun and Shim, 1989) or the analysis of co-integration (Bachman, Choi, Jeon and Kopecky, 1996). Empirical analysis of return rates in a longer period time showed that financial markets also witnessed the following phenomena: the effect

of data focus (after a period of great fluctuations, there come period with lower fluctuation), fat tails of distribution (the probability of very high or very low values is bigger than in normal distribution), skewness of the distribution (distribution of return rates is not symmetrical to the average, which can be attributed to different behavior of investors during bull and bear market), long-term dependence of data (after significant increases, there are further increases, after which sudden falls come, followed by further falls), leverage effect (variance of the process depends on the previous return rates, together with the drop of instrument prices, there appears a growing tendency of return rates variances).
There are also additional problems of simultaneousness, omitted variables or heteroskedasticity of data, which may increase the correlation ratio and lead to the interpretation of interdependence as 'infection' (Bunda, Hamann, Lall, 2010). The remaining models, on the other hand, though deprived of these faults, show a significant degree of complexity and difficulty of interpreting the results. Therefore in this article linear models with many explaining variables have been used, including delayed variables, calculated by means of a classical method of least squares. It allows us to avoid the inconvenience of correlation ratio and provides us with easily interpretable results.

The modeling of interrelations

The choice of the explaining variables reflects the importance of particular stock exchanges for the global capital flow, following the theory of gravity (Portes, Rey, 2005). The biggest centers are the USA, Western Europe, Japan and Great Britain (Roxburgh et al, 2009). The biggest economy of Western Europe and our biggest trade partner is Germany. The analysis did not take into account Japan, due to considerable distance between Tokyo and Warsaw stock exchanges.
We took into consideration though, the earlier opening of American stock exchanges and introduced a one-day delayed variable into our calculations for the American indexes.
In order to analyze the influence of particular stock exchanges for WIG and WIG20, we construed the following multi-factor models:

$$\begin{cases} R = \sum \beta_{UE} R_{UE} + \sum \beta_{USA} R_{USA} + \varepsilon \\ R = \sum \beta_{UE} R_{UE} + \sum \beta_{USA(t-1)} R_{USA(t-1)} + \varepsilon \end{cases}$$

$$R_{UE} \ni (FTSE100, FTSE250, DAX),$$
$$R_{USA} \ni (DJIA \vee DJCA, Nasdaq \vee Nasdaq100, S\&P500)$$

where

R = return rate from WIG or WIG20 index,
R_{UE} = return rate from European indexes (FTSE100, FTSE250 and DAX),

R_{USA} = return rate from American indexes (DJCA or DJIA, Nasdaq or Nasdaq100[2], S&P500),

β_{UE} and β_{USA} = assessed parameters of respectively strength and direction of influence of a given index on return rate of WIG or WIG20 indexes,

ε = parameter including the influence of the remaining factors, both domestic and unaccounted global ones.

In case of American market indexes, the model also uses one-day delayed variables to take into account the earlier opening of the New York stock exchange. As a result, for each analyzed period, for each dependent variable eight models have been constructed, reflecting appropriate pairs of independent variables (four combinations for two pairs of linearly interdependent variables) and the delay of independent variables of the American market. From this set we picked one model for each dependent variable for each analyzed period on the basis of Akaike information criteria (AIC). AIC serves the purpose of filtering excess parameters, which do not improve significantly the adjustment of the model to empirical data. The best model is the one which minimizes AIC (AIC has the lowest value) (Kukier, Szydłowski, Tambor, 2008).

The data was obtained and processed in the following way:

1) data was taken from www.stooq,pl and finance.yahoo.com (FTSE100),
2) time series covers the period of 04.01.1999 to 30.12.2009,
3) for our analysis we used daily closing values of he index,
4) to achieve comparability we removed the values from the days in which at least one index was not quoted, it gave us altogether 2641 observations,
5) to obtain the stationariness[3] we calculated into return rates from the index according to the formula: $r = \frac{(d+\Delta V)}{V} \cdot 100\%$ where r is a return rate, d – dividends, V initial value, ΔV – value change. We used daily return rates for our analysis, therefore d=0.

The results of the analysis are shown in table 1.

[2] Due to the fact that both indexes have the same companies, so there is a linear relation between them. This is unacceptable in constructing a linear model.

[3] Stationarity of time series is necessary to build a linear model using the classic method of least squares. To check the stationarity of time series we used the ADF test.

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Table 1: Assessment of parameters of explaining variables for WIG and WIG20 in 1999-2009

	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		1999-2009	
	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG
DJIA																								
S&P500																							-0.10	
DJCA																	0.24	0.16						
Nasdaq					0.15	0.10																	0.11	
Nasdaq100									0.18	0.14														
FTSE100											-0.37	-0.33	0.66	0.50	0.52	0.36					-0.42	-0.33		
FTSE250	0.69	0.35	1.06	0.67	0.85	0.63	0.51	0.42	0.57	0.49	0.53	0.45	0.58	0.53	0.45	0.42	0.35	0.45	0.57	0.49	0.63	0.58	0.67	0.57
DAX	0.46		0.32				0.09	0.07			0.40	0.35	-0.23	-0.20			0.44	0.34	0.23	0.19	0.69	0.51	0.19	0.12
DJCA-1*			0.18	0.38																				
DJIA-1*		0.46																	0.13	0.13	0.43	0.39		
Nasdaq-1*		0.19																			-0.46	-0.38		0.08
Nasdaq100-1*				0.13																				
S&P500-1*															0.27	0.26								

* variables delayed by one day

Source: own work

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Results of the analysis

Analyzing the results gathered in table 1, we can state the following:

1) With the exception of the first two years in the analyzed period, both Warsaw Stock exchange indexes, WIG and WIG20, each year depend on the same variables in other words each year since 2001 the same variables explain 'behavior' of WIG and WIG20. It is quite natural, bearing in mind the fact that the companies belonging to WIG20 index also belong to WIG index. This does not mean, however, that the set of explaining variables is the same each year, though it is visible that FTSE250 is always its part. It is more important, however, that each year, excluding 2004 and 2005, the set of explaining variables is different.
2) We have a similar situation with the signs attached to explaining variables. They are the same for explaining variables for WIG and WIG20 in the whole period (in 2004, 2005 and 2009, they are negative with some variables). The explanation is the same as in the previous point. What is really interesting though, is the lack of 'consistency' shown in the fact that the minus sign does not stay in the next years with any explaining variable. The negative sign most often accompanies the FTSE100 index – twice in 2004 and 2009, which constitutes half of the cases in which the same variable appears. Apart from that, the negative relation between the explaining variable and the explained variable appeared in 2005 for the German DAX index and in 2009 for the Nasdaq index delayed by one day.
3) The second most frequently appearing explaining variable in the models was the DAX index, which did not appear only three times, in 2001, 2001 and 2006. We could draw a conclusion here that the return rates of the main Polish indexes depend mainly on the biggest regional financial market and our biggest trade partner. Their vital importance is also influenced by deep integration of financial markets connected with the EU membership. It is consistent with theoretical assumptions connected with the concept of club convergence (Baumol, 1986)[4], gravity model (Leamer and Levinsohn, 1994; Portes and Rey, 2000) or the concept of diversification and integration of capital markets (Portes and Rey, 2000; Bracker and Koch, 1999; Claessens, 1993),
4) The order of explaining variables according to the size of coefficients is the same for WIG and WIG20 for years 2001-2004 and 2008. This means that in less than a half of the analyzed period the same explaining variables have comparable influence on both indexes. Therefore we can deduct that even if the same stock indexes influence WIG and WIG20, their importance is often different.
5) The index of medium-sized companies of the London Stock Exchange, FTSE250 has the biggest impact on the general index of Warsaw Stock Exchange, WIG. It also had similar importance for WIG20 – the index of the biggest companies quoted on the

[4] An in-depth review of various convergence concepts can be found in the article by N. Islam (2003).

Warsaw Stock Exchange, that is in years 1999-2004 and in 2008. It clearly points at strong and stable relation between the Polish stock exchange and the most important financial market in the region, namely the City. Moreover it suggests that international investors are grouping companies not only respectively to their origins (emerging or developed market) but also respectively to their size[5]. On the other hand, WIG20, probably due to higher liquidities included in its assets shows lower dependence on one foreign market.

6) In 2005 and 2006 the changes in return rate of WIG20 index were mainly influenced by the index of the biggest companies of London Stock Exchange, FTSE1000. In 2007 and 2009, German DAX played a similar role. This is in accordance with point c). What is surprising though, is much stronger influence of the London exchange than the German one.
7) To generalize, the London Stock Exchange was best at providing explanation for return rates of both analyzed Warsaw indexes in 2000-2006 and in 2008. Just like in the previous point, one can be surprised by the insignificant role of the stock exchange of our biggest trade partner.
8) The delayed variables only appeared in the models from 1999, 2000, 2006, 2008 and 2009, only in five years in the eleven-year period. What is more, in 1999, they were essential only in explaining the profitability of WIG. Generally speaking, the role of American indexes in analyzed models was also insignificant. We explain it in depth in the next sub-points.
9) Analyzing the influence of American stock exchanges, we can see that they are missing in the models for 2002, 2004 and 2005. However, they influence significantly the WIG index only in the first two analyzed years. Of course we should keep in mind that American stock exchanges influence indirectly WIG and WIG20 – through the London stock exchange. Nevertheless, we can deduce that the lower significance of American indexes can be attributed to quick development of the domestic economy, its strengthened ties with the EU which results in increased inflow of financial resources from the main trade and financial centers of Europe.
10) Analyzing the collected data in greater detail we can notice that the DJIA index did not appear in any model, the S&P500 index turned up only in the total picture of WIG20. As the delayed variable, the DJIA index appeared three times: in 1999, 2008 and 2009. As far as other delayed variables are concerned, Nasdaq appeared twice, in 1999 and 2009. Nasdaq100 appeared only in 2000 as an explaining variable for WIG, DJCA also only once in 2000, while S&P only in 2006. As we can see, the influence of information from the American stock exchange resulting from time difference turned out to be insignificant. Its importance increased, however, in times of crises of Russian

[5] The biggest company in FTSE250 is ca. 2 times more capitalized than biggest polish company.

(1998-1999) and American finances (2007-2010). It is an interesting observation which requires further research.

11) The biggest number of explaining variables appeared in 2009 – there were five, including two delayed ones, and in 1999-2000 – four, including also two delayed ones. Apart from that the number of variables amounted to two in 2001-2003 and in 2006 and to three in other years.
12) If we analyze the number of explaining variables in the models, we can notice that in case of WIG index, there were six years in which three explaining variables appeared, four years with two variables and one year (2009) with five variables. The number of explaining variables for WIG20 index was quite similar. Three explaining variables appeared five times, also two variables appeared in five years and in 2009 there were five explaining variables. We should remember here that the number of variables was determined by the value of information criteria AIC in cases when in a given year for a particular explained variable (WIG or WIG20) there were a few different models with statistically significant explaining variables.
13) The indicators accompanying explaining variables were negative for 2004 and 2009 for FTSE1000 index and in 2005 for DAX index, and in 2009 for delayed Nasdaq index and for both Warsaw indexes. The negative relation between the data is quite surprising, the more so as it appears twice in case of FTSE100 index, while in the same years the relation between WIG and WIG20 indexes and FTSE250 index is positive. It is possible because different companies constitute the composition of these indexes. Even though it is hard to explain. Our accession to the European Union in 2004 may provide some hints, as well as the turbulence caused by the recent financial crisis, but these conclusions need to be proved through further analysis.

Financial crises, Poland's accession to the European Union

In spite of their simplicity, the results of the multi-factor linear models allow us to observe three most important global events, which in the analyzed time had the biggest impact on the Polish economy. Chronologically, these were: the Russian crisis (1998-1999), Poland's accession to the European Union (2004) and the Global Crisis (2007-2010). As far as financial crises are concerned, their impact manifested itself in form of an increased number of explaining variables which significantly influenced the Warsaw Stock Exchange. They concerned mostly the American stock indexes. It is a proof of strong increase in risk aversion among international investors. In a presence of threat to liquidity and solvency it was leading to such actions as 'flight to liquidity' or 'flight to quality' that means to the American securities. Therefore role of the American stock exchange increased at the expense of the London and others.

Poland's accession to the European Union influenced mainly the relations between the Warsaw stock exchange and other indexes in a number of ways. This influence is visible in 2004-2005 and manifested itself for example in the same set of explaining variables, which

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did not repeat again in any analyzed period. Moreover, in this period the American stock exchange exceptionally did not have any significant direct importance for the Polish stock exchange. In these years (and also in 2009) the relation between some explaining and explained variables was negative. This refers to FTSE100 index in 2004 and DAX index in 2005.

Conclusions

In this paper we analyzed the impact of changes on some selected world stock exchanges on the Warsaw Stock Exchange. To measure this we used daily return rates of American indexes: DJIA, DJCA, S&P500, Nasdaq and Nasdaq100, British FTSE100 and FTSE250 and German DAX. The analysis concerned the period of 1999-2009. The impact was measured using standard linear model and classic method of least squares, where explained variable was the return rate from WIG or WIG20 index, and explaining variables return rates from those indexes.

It turned out that in the analyzed period the biggest impact on WIG and WIG20 was exerted by the European indexes, especially FTSE250 and DAX. It means that the Polish financial market is so integrated within the European Union that the main change impulses come from the most important European stock exchanges, and the role of the American market is quite small and its influences are indirect, through European stock exchanges.

The analysis confirmed our prediction that the most important financial center in Europe is the City in London. Practically in the whole analyzed period both Warsaw indexes were heavily influenced by FTSE250 and FTSE100. German DAX had bigger influence only twice and only on WIG20.

The significance of the American market grew in times of crises. What is interesting, only then the American indexes changes from the previous days became important. This may imply increased uncertainty among investors and going back to 'sources', that is to the quotations from the most important market in the world.

The fact that among all 13 stock indexes[6] which we analyzed here only two of them – DJIA and S&P500 did not appear in any model, confirms the essential role played by global stock exchanges in shaping return rate of two main indexes on the Warsaw Stock Exchange. Unfortunately, we cannot definitely state whether this is due to some imitative behavior of domestic investors or international capital flow.

The analysis carried out here raised some other questions which should be answered. First of all, the question of negative signs accompanying some variables calls for explanation as well as the fact that this relation is not permanent in time. Also the relations between WIG, WIG20 and FTSE250 and FTSE100 requires more detailed analysis.

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Attachments
Results of model verification

Importance of parameters (p-value)

	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		1999-2009	
	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG
const	0,743	0,910	0,924	0,979	0,308	0,434	0,382	0,239	0,635	0,481	0,508	0,268	0,274	0,155	9,35E-01	0,342	0,864	0,738	0,499	0,121	0,66	0,316	0,617	0,197
DJIA																								
S&P500																							0,018	
DJCA																	0,006	0,029						
Nasdaq					7E-04	0,001																	3E-04	
Nasdaq100									0,002	0,003														
FTSE100											0,038	0,028	0,001	0,002	0,015	0,045					0,022	0,025		
FTSE250	2E-04	0,038	1E-07	1,37E-06	2,43E-11	4,03E-11	2E-04	84E-05	5,75E-07	3E-04	0,002	0,001	1E-04	1,66E-05	0,013	0,005	5E-04	3,15E-07	3,08E-12	4,02E-14	3,74E-05	2,84E-06	1,58E-84	1,94E-78
DAX	5E-08		1E-04				0,030	0,043			6E-04	0,004	0,057	0,044			7E-04	0,002	4E-05	3E-04	5,5E-06	304E-04	2,11E-14	1,03E-10
DJCA-1			0,07	1,35E-05																				
DJIA-1		4E-04																	0,003	3E-04	0,030	0,015		
Nasdaq-1		0,013																			0,009	0,008		5,21E-14
Nasdaq100 -1				1,88E-05																				
S&P500-1															0,066	0,031								
R coefficient^2	*0,298*	*0,245*	*0,370*	*0,418*	*0,305*	*0,296*	*0,197*	*0,201*	*0,181*	*0,179*	*0,195*	*0,201*	*0,275*	*0,285*	*0,3*	*0,299*	*0,452*	*0,509*	*0,571*	*0,611*	*0,479*	*0,495*	*0,340*	*0,337*
Autocorrection, Rest of 1st row	*0,126*	*0,112*	*0,006*	*0,059*	*0,075*	*0,082*	*0,047*	*-0,067*	*0,026*	*0,020*	*-0,028*	*-0,017*	*-0,004*	*0,010*	*0,019*	*0,086*	*-0,089*	*-0,001*	*-0,106*	*-0,035*	*0,066*	*0,088*	*0,008*	*0,028*
AIC	*-1314*	*-1310*	*-1274*	*-1374*	*-1234*	*-1370*	*-1337*	*-1454*	*-1383*	*-1471*	*-1538*	*-1626*	*-1559*	*-1657*	*-1392*	*-1482*	*-1474*	*-1547*	*-1324*	*-1433*	*-1288*	*-1394*	*-1486*	*-1578*

Coefficient of correlation between levels of selected indexes

	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		1999-2009	
	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG	WIG20	WIG
DJIA	0,871	0,831	-0,056	0,012	0,631	0,656	0,892	0,831	0,903	0,912	0,305	0,033	0,359	0,330	0,774	0,910	0,842	0,814	0,973	0,971	0,969	0,965	0,817	0,735
S&P500	0,757	0,699	0,338	0,342	0,839	0,840	0,917	0,851	0,885	0,897	0,651	0,471	0,767	0,772	0,763	0,861	0,868	0,849	0,966	0,962	0,976	0,977	0,641	0,785
DJCA	0,805	0,785	-0,615	-0,586	0,665	0,663	0,885	0,814	0,904	0,915	0,748	0,713	0,878	0,872	0,767	0,895	0,837	0,867	0,930	0,923	0,951	0,947	0,926	0,896
Nasdaq	0,531	0,474	0,817	0,810	0,870	0,871	0,908	0,853	0,937	0,950	0,387	0,110	0,787	0,795	0,518	0,486	0,823	0,676	0,926	0,914	0,973	0,983	0,338	0,143
Nasdaq100	0,517	0,460	0,785	0,769	0,912	0,903	0,893	0,838	0,929	0,943	0,514	0,311	0,815	0,815	0,445	0,405	0,718	0,550	0,900	0,885	0,968	0,981	0,185	-0,010
FTSE100	0,642	0,563	0,235	0,197	0,892	0,879	0,896	0,818	0,866	0,880	0,797	0,755	0,957	0,970	0,782	0,797	0,765	0,738	0,973	0,969	0,953	0,95	0,555	0,392
FTSE250	0,860	0,822	-0,164	-0,228	0,779	0,784	0,868	0,786	0,948	0,961	0,894	0,803	0,951	0,947	0,783	0,865	0,292	0,431	0,977	0,977	0,961	0,978	0,962	0,959
DAX	0,614	0,555	0,849	0,820	0,822	0,817	0,863	0,771	0,904	0,913	0,548	0,327	0,956	0,969	0,777	0,835	0,830	0,805	0,974	0,966	0,971	0,972	0,698	0,582
DJCA-1	0,802	0,789	-0,612	-0,571	0,652	0,648	0,886	0,817	0,904	0,915	0,752	0,717	0,881	0,874	0,775	0,900	0,826	0,860	0,931	0,924	0,945	0,941	0,925	0,895
DJIA-1	0,867	0,834	-0,050	0,029	0,623	0,642	0,897	0,838	0,909	0,918	0,301	0,026	0,364	0,334	0,777	0,912	0,833	0,806	0,974	0,973	0,964	0,961	0,816	0,734
Nasdaq-1	0,531	0,476	0,818	0,815	0,864	0,864	0,918	0,867	0,936	0,949	0,380	0,102	0,795	0,801	0,527	0,488	0,810	0,664	0,924	0,913	0,972	0,982	0,338	0,143
Nasdaq100 -1	0,516	0,461	0,784	0,774	0,906	0,898	0,905	0,853	0,928	0,942	0,510	0,307	0,821	0,820	0,456	0,408	0,707	0,539	0,898	0,884	0,969	0,981	0,184	-0,010
S&P500-1	0,759	0,711	0,324	0,342	0,831	0,831	0,924	0,861	0,886	0,897	0,650	0,467	0,776	0,779	0,768	0,863	0,863	0,847	0,966	0,962	0,972	0,974	0,640	0,479