Integration of Global Equity Markets - A Case for India

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Financial literature has presented a strong emphasis on the interaction amongst international financial markets. The interest has increased considerably following the abolition of foreign exchange controls in both mature and emerging markets during last 15 years as we slowly move towards a free trade zone, the technological developments in communications and trading systems and attaining such technology at cheaper costs, and the introduction of innovative financial products in markets giving market participants opportunity to hedge their risk, increasing cross-border movement of funds, issuers raising funds through American Depository Receipts and Global Depository Receipts, which have created more opportunities for global international investments. The gradual dismantling of regulatory barriers and the introduction of more advanced technology, have called for new market structures and practices keeping in mind to reach a global standardisation. In particular, the new remunerative emerging equity markets have attracted the attention of international fund managers as an opportunity for portfolio diversification and have also intensified the curiosity of academics in exploring international market linkages.

Over the past fifteen years, financial markets have become increasingly global. Asset and liability management has increasingly become a globally integrated function for treasury managers and the issuance of international securities is often used as a substitute for more traditional funding channels. These developments are to be welcomed in so far as the increased level of competition is expected to lead to a more efficient allocation of capital, both nationally and internationally, lower-cost financial services and new means of hedging risk. The financial market failures highlights the inadequacies of a regulatory framework still largely based on old institutional divisions and national jurisdictions but it is a risk for global investors. In the globalised security markets, the main challenge for both investors and policy makers is to take advantage of and promote efficiency enhancing aspects of market interaction, while containing and controlling the undesirable destabilising effects.

In response to these developments, researchers have been trying to establish the nature and the extent of the interdependence between national stock markets. The early literature, however, merely showed whether or not there were benefits from international portfolio diversification, ignoring the issue of how the degree of capital market integration may actually affect these diversification benefits. The findings of the studies mainly revealed that stock markets had become more interdependent; the transmission of information between markets prevented the existence of arbitrage opportunities; and finally the US and Japanese markets, previously considered the leading markets, have lost some of their influence since the 1987 stock market crash.

Emerging equity markets have continued to grow and have seen the relaxation of foreign investment restrictions, especially during the last 15 years, primarily through country deregulation. India, one of the major emerging markets in Asia initiated the financial sector reforms by way of adopting international practices in its financial market. We have also witnessed the issuance of American Depository Receipts (ADR's) or General Depository Receipts (GDR's) that allow trade of foreign securities on the NYSE, NASDAQ or on non-American exchanges. Over the years, Indian Rupee is slowing moving towards full convertibility which has also had an impact in the Indian capital market as international investors have invested about US $15 billion in Indian capital market. It is in this context that this article takes a close look at the how Indian market is comparable to other international important markets in terms of returns and risk as well as the level of their correlations.

A Case for India

Indian capital market has undergone drastic changes in terms of market microstructure changes, specifically in secondary market though primary market is duly supported technologically by the secondary market agents. The policy changes introduced due to financial sector reforms has ensured that the market adopts best practices in trading, settlement as well as risk containment. The setting of National Stock Exchange (NSE) set the ball rolling with regard to the cleaning the system from its anomalies and looking forward to serve the interest of investors who are the backbone of any stock market system. Advanced technology and online-based transactions have modernized the stock market system in the country. In terms of the number of companies listed and total market capitalization, the Indian equity market is considered large relative to the country's stage of economic development. The number of listed companies stands at 9687 as in March 2002 and market capitalization has grown substantially during the last decade. Table-1 gives the details of the market participants in Indian scenario.

Table 1: Market Participants in Securities Market

Market Participants	Number as on	
	March 31, 01	March 31, 02
Securities Appellate Tribunal	1	1
Regulators*	4	4
Depositories	2	2
Stock Exchanges		
With Equities Trading	23	23
With Debt Market Segment	1	1
With Derivative Trading	2	2
Listed Securities	9,922	9,644
Brokers	9,782	9,687
Corporate Brokers	3,808	3,862
Sub-brokers	9,957	12,208
FIIs	527	490
Portfolio Managers	39	47
Custodians	14	12
Share Transfer Agents	186	161
Primary Dealers	15	18
Merchant Bankers	233	145
Bankers to an Issue	69	68
Debenture Trustees	37	40
Underwriters	57	54
Venture Capital Funds	35	34
Foreign Venture Capital Investors	1	2
Mutual Funds	39	37
Collective Investment Schemes	4	6

* DCA, DEA, RBI & SEBI

Keeping in sync with the broad financial reforms in mind a series of reforms was introduced to improve investor protection, automation of stock trading, integration of national markets, and efficiency of market operations. India has seen a significant and remarkable change in the secondary market for equity. The equity market of the country will most likely be comparable with the world's most advanced secondary markets with regard to international best practices. The market moved to compulsory rolling settlement and now all settlement is executed on T+3 basis and market is gearing up for moving to T+1 settlement in 2004 while the Straight Through Processing (STP) is in place from December 2002. The key ingredients that underlie market quality in India's equity market are:

- exchanges based on open electronic limit order book;
- nationwide integrated market with a large number of informed traders and fluency of short or long positions; and
- electronic settlement on T+3 basis and STP
- no counterparty risk.
- derivatives trading

Before 1995, markets in India used open outcry, a trading process in which traders shouted and hand signaled from within a pit. The first exchange to be based on an open electronic limit order book was the NSE, which started trading debt instruments in June 1994 and equity in November 1994. Before 1994, India's stock markets were dominated by BSE and but arrival of the tech oriented NSE changed the entire horizon by bring the trading platform to the doorsteps of the investors through a well managed satellite network and ensuring strict compliance of the rules and guidelines framed by the regulators. In many cases NSE introduced new innovative policies that was later replicated by the entire market. It led to a stage of consolidation and provided a clear and fair deal to the investing population including the foreign investors. The whole exercise has also helped in reducing the transaction cost dramatically.

International Markets

In order to understand how the level of financial liberalization has helped Indian stock market during last one decade or so vis-à-vis other international equity markets, we have taken the six markets consisting of 2 developed markets like NASDAQ and Tokyo and 4 emerging markets including NSE. The entire data has been divided into ten time buckets as we have seen increasing integration of global markets since 1995. The period from January 1990 to November 2002 has been considered for the analysis except in case of NSE, data has been taken from July 1990. The daily returns have been used for analysis. If we take the entire period into consideration, we see that Indian market has provided the best return with comparable risk as measured in terms of standard deviation whereas Taiwan turned out to be most risky with highest standard deviation but a negative return. The correlation matrix looks as below:

Table – 1: Correlation between Various Markets (1990-2002)

	RTN_HANG	RTN_NAS	RTN_NFTY	RTN_NIK	RTN_SING	RTN_TAI
RTN_HANG	1	0.180339	0.122523	0.35865	0.638004	0.258354
RTN_NAS		1	0.06009	0.169271	0.193796	0.09894
RTN_NFTY			1	0.099011	0.1201	0.074638
RTN_NIK				1	0.363577	0.230979
RTN_SING					1	0.295302
RTN_TAI						1

The above table shows that if we take the entire period into account we do not find very significant correlation of NIFTY with major markets. The following tables will give us the relative descriptive statistics of various international markets and it can be seen that NIFTY has done fairly well and consistently the risk as measured in terms of standard deviation has come down and it is the lowest for the period January 2002 to November 2002. With regard to returns, it has also moved generally in tandem with other markets.

Table-2: Descriptive Statistics of Markets during various Time Buckets

Market	Mean	Max	Min	Std dev	Skewness	Kurtosis	Counts
1990-2002							
NIFTY	0.045705	12.08607	-12.52194	1.842687	0.021077	7.913296	2899
HANGSENG	0.040017	17.24699	-14.73457	1.725790	-0.029773	11.89161	3198
NASDAQ	0.035900	13.25464	-10.16841	1.615344	-0.014072	8.585586	3257
NIKKEI	-0.045099	12.42784	-7.233984	1.552938	0.260978	6.119925	3185
SINGAPORE	0.005187	14.86849	-9.671156	1.376723	0.219625	13.05137	3239
TAIWAN	-0.016714	6.575960	-7.044664	1.940910	-.186004	5.040541	3370
1990-94							
NIFTY	0.155762	12.08607	-12.52194	2.221817	-0.000844	8.048830	927
HANGSENG	0.085270	5.708253	-8.766046	1.443357	-0.540929	7.446240	1243
NASDAQ	0.038971	3.740751	-4.337177	0.851772	-0.485017	5.607465	1265
NIKKEI	0.054739	12.42784	-6.825456	1.579415	0.508018	7.943396	1232
SINGAPORE	0.040102	5.290150	-7.522931	1.098592	-0.354246	9.234090	1256
TAIWAN	-0.037788	6.576970	-7.044664	2.376820	-0.217216	4.251908	1283
1995-2002							
NIFTY	-0.006031	7.539400	-8.840460	1.632444	-0.035503	5.890151	1972
HANGSENG	0.011246	17.24699	-14.73457	1.883261	0.136190	12.11118	1955
NASDAQ	0.033950	13.25464	-10.16841	1.951049	0.014983	6.469578	1992
NIKKEI	-0.039018	7.655334	-7.233984	1.536378	0.092316	4.835971	1953
SINGAPORE	-0.016928	14.86849	-9.671155	1.526760	0.367621	12.55962	1983
TAIWAN	-0.017940	6.172055	-6.975741	1.639420	-0.056386	4.460433	2065
1996-2002							
NIFTY	0.008320	7.539400	-8.840460	1.678288	-0.042969	5.837611	1736
HANGSENG	0.000761	17.24699	-14.73457	1.955767	0.139019	11.79568	1708
NASDAQ	0.019563	13.25464	-10.16841	2.062714	0.038356	5.911165	1740
NIKKEI	-0.045150	7.655334	-7.233984	1.551821	0.092343	4.785304	1704
SINGAPORE	-0.018262	14.86849	-9.671156	1.589816	0.398684	12.04474	1734
TAIWAN	-0.010417	6.172055	-6.975741	1.677680	-0.045720	4.354235	1805
1997-2002							
NIFTY	0.010429	7.539400	-8.840460	1.704019	-0.133169	5.992193	1485
HANGSENG	-0.018931	17.24699	-14.73457	2.069116	0.197405	10.87957	1459
NASDAQ	0.009137	13.25464	-10.16841	2.195655	0.057944	5.362018	1486
NIKKEI	-0.051030	7.655334	-7.233984	1.628346	0.099104	4.523788	1457
SINGAPORE	0.023924	14.86849	-9.671156	1.683190	0.409578	11.15500	1483
TAIWAN	-0.026890	6.172055	-6.774492	1.763574	0.027031	3.998823	1543
1998-2002							
NIFTY	-0.002250	7.539400	-7.709890	1.697669	-0.057167	5.544335	1240
HANGSENG	-0.004076	13.39501	-9.285365	1.962844	0.227536	6.818478	1214
NASDAQ	-0.004873	13.25464	-10.16841	2.351238	0.093107	4.803724	1233
NIKKEI	-0.041735	7.221743	-7.233984	1.602079	0.119367	4.431986	1211
SINGAPORE	-0.006198	14.86849	-9.094981	1.721240	0.522348	10.52465	1232
TAIWAN	-0.043675	6.172055	-6.774492	1.814623	0.098418	3.864196	1279

1999-2002

Market	Mean	Max	Min	Std dev	Skewness	Kurtosis	Counts
NIFTY	0.017325	7.539400	-7.709890	1.677351	-0.042032	5.839664	990
HANGSENG	0.001601	5.434228	-9.285365	1.692946	-0.220550	4.926722	966
NASDAQ	-0.040154	13.25464	-10.16841	2.495397	0.175871	4.415927	981
NIKKEI	-0.042276	7.221743	-7.233984	1.573830	0.058459	4.406794	965
SINGAPORE	0.000298	5.523972	-9.094981	1.443407	-0.314712	6.305213	982
TAIWAN	-0.031269	6.172055	-6.774492	1.891901	0.079540	3.762597	1008

2000-2002

Market	Mean	Max	Min	Std dev	Skewness	Kurtosis	Counts
NIFTY	-0.047296	7.277060	-7.202260	1.624810	-0.119126	6.020812	727
HANGSENG	-0.070666	5.434228	-9.285365	1.692146	-0.349077	5.486168	719
NASDAQ	-0.138855	13.25464	-10.16841	2.706737	0.278472	4.165371	729
NIKKEI	-0.100169	7.221743	-7.233984	1.6555977	0.087979	4.303523	720
SINGAPORE	-0.078616	4.6905236	-9.094981	1.407577	-0.502821	7.160549	730
TAIWAN	-0.079522	6.172055	-6.774492	1.988699	0.128457	3.494674	742

2001-2002

Market	Mean	Max	Min	Std dev	Skewness	Kurtosis	Counts
NIFTY	-0.038872	7.269850	-6.309540	1.389234	-0.107612	7.199312	477
HANGSENG	-0.085956	4.345420	-9.285365	1.525488	-0.239763	5.783541	471
NASDAQ	-0.107591	13.25464	-7.506494	2.49571	0.424905	4.658334	477
NIKKEI	-0.085385	7.221743	-6.864457	1.759974	0.225073	3.904861	473
SINGAPORE	-0.067158	4.905236	-7.713594	1.325112	-0.258062	6.582865	479
TAIWAN	-0.002520	5.612609	-5.949297	1.898597	0.217979	3.167696	471

2002-2002

| Market	Mean	Max	Min	Std dev	Skewness	Kurtosis	Counts
NIFTY	-0.003872	7.269850	-2.840630	1.071243	1.390680	12.00914	229
HANGSENG	-0.048454	4.051014	-3.371137	1.239223	0.352092	3.211076	228
NASDAQ	-0.120881	7.493773	-4.268674	2.222674	0.421316	2.768310	229
NIKKEI	-0.059503	5.735232	-4.104463	1.658501	0.256513	3.094187	228
SINGAPORE	-0.065701	4.905236	-2.779504	1.162164	0.562637	4.633706	229
TAIWAN	-0.074909	5.484529	-5.949297	1.809273	0.193920	3.477865	227

The important point to note here is that all the market have generally moved in tandem during various time buckets through we see that during the period 1998-2002, 2000-2002, 2001-2002 and 2002-02 time buckets all the markets have recorded negative returns to investors. However, this is in terms of local currencies as we have taken the stock index returns in terms of their respective local currencies. Some of the currencies might have been depreciated or appreciated against US $. However, we see that NIFTY has the lowest standard deviation for the time bucket of 1995-02 and 2002-02 and comparable values in other time buckets as well. The movement of markets in terms of daily returns are given in Figure-1. It can be seen that all the markets have moved in tandem. The chart-1 shows the movement of indices of the six important markets considered for the study.

Chart 1:
Movement of International Markets (1990-2002)

Figure-1: Movement of Returns in Various Markets (1990-2002)

RTN_HANG

RTN_NAS

RTN_NFTY

RTN_NIK

RTN_SING

RTN_TAI
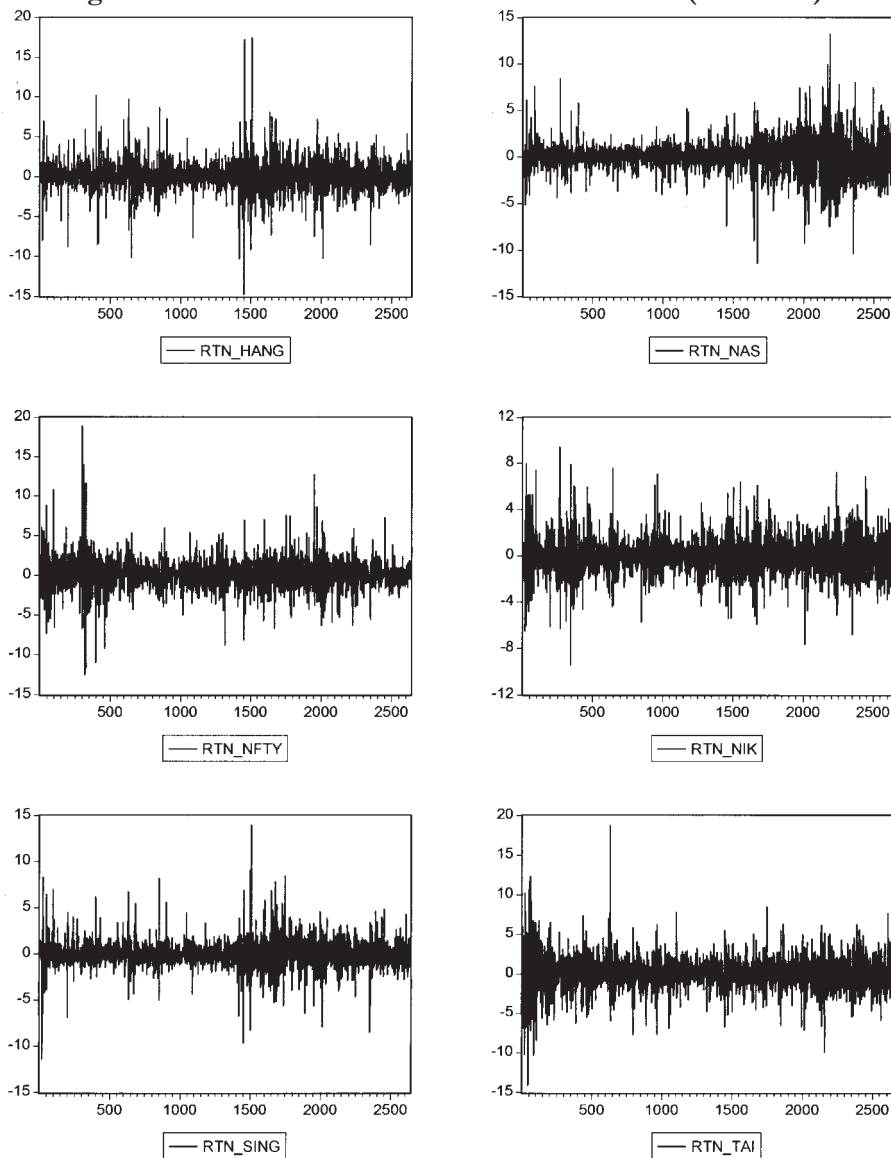
Indian Market

However, the same analysis we now carry out in the Indian market with respect two different indices. We have considered BSE SENSEX and NSE NIFTY for the period from January 1995 to October 2002 for making the analysis. We take the post NSE period of 1995-2002 for our analysis for better representation as NSE consolidated its position in the market from 1995 and used the daily returns to understand the relative riskiness of investment in these two market segments. We have taken the period from 1995 as the major policy changes were initiated bringing Indian market at par with international practices in terms of technology, payment and settlement, risk management, etc.

The time buckets have been chosen keeping various important policy changes introduced in the market, e.g. introduction of derivatives trading and removal of carry forward system, moving towards unified settlement system, introduction of compulsory rolling settlement, moving towards T+3 settlement, introduction of stock futures, etc. as detailed below:

- June 2000 – The introduction of Index Futures trading in India
- April 2001 – The market scam surfaced and removal of carry forward system
- July 2001 – Introduction of compulsory rolling settlement in major listed stocks and change in uniform Risk management system on VaR basis
- November 2001 – Introduction of Futures Trading on individual stocks
- January 2002 – Introduction of Rolling settlement for all listed securities
- April 2002–Introduction of shorter settlement cycle (T+3)

Table 3A – S&P CNX NIFTY

	Descriptive Statistics for NIFTY						
Nifty	Mean Return	Max	Min	Std dev	Skew	Kurtosis	Count
1995-02	-0.006031	7.539400	-8.840460	1.632444	-0.035503	5.890151	1976
1996-02	0.008320	7.539400	-8.840460	1.678288	-0.04297	5.837611	1736
1997-02	0.010429	7.539400	-8.840460	1.704019	-0.13317	5.992193	1485
1998-02	-0.002250	7.539400	-7.709890	1.697669	-0.05717	5.544335	1240
1999-02	0.017325	7.539400	-7.709890	1.677351	-0.04203	5.839664	990
2000-02	-0.047296	7.277060	-7.202260	1.62481	-0.11913	6.020812	727
2001-02	-0.038872	7.269850	-6.309540	1.389234	-0.10761	7.199312	477
2002-02	-0.003872	7.269850	-2.840630	1.071243	1.390680	12.009140	229
Jun00-02	-0.043825	7.269850	-6.309540	1.433995	-0.27589	6.143031	625
Apr01-02	-0.021664	7.269850	-5.499960	1.260898	0.003864	7.741216	414
Jul01-02	-0.015330	7.269850	-5.499960	1.212099	0.063636	9.147384	352
Nov01-02	0.028734	7.269850	-2.840630	1.097718	1.211425	9.83752	268
Apr02-02	-0.043901	3.845250	-2.840630	1.016117	0.08906	3.982751	167

Table 3B – SENSEX

	Descriptive Statistics for Sensex						
Period	Mean Return	Max	Min	Std Dev	Skewness	Kurtosis	Count
1995-02	-0.010701	7.314108	-8.622134	1.691164	-0.119465	5.078931	1936
1996-02	0.001519	7.314108	-8.622134	1.739976	-0.137136	5.019193	1705
1997-02	0.002324	7.314108	-8.622134	1.773591	-0.202601	5.065011	1466
1998-02	-0.011198	7.314108	-7.502062	1.799897	-0.179918	4.748766	1219
1999-02	0.004489	7.117780	-7.422642	1.774225	-0.216039	4.885210	975
2000-02	-0.061867	7.117780	-7.422642	1.752049	-0.324880	5.051953	727
2001-02	-0.045831	5.076461	-6.220484	1.462878	-0.378462	5.340032	477
2002-02	-0.009501	4.445860	-3.945213	1.124360	0.167615	4.405713	229
Jun00-02	-0.052565	5.076461	-6.366458	1.527611	-0.449149	4.862355	625
Apr01-02	-0.029339	4.445860	-6.027427	1.350216	0.361065	5.474988	414
Jul01-02	-0.022628	4.445860	-6.027427	1.301206	-0.408882	5.930046	352
Nov01-02	0.024489	4.445860	-3.945213	1.154345	0.221725	4.021493	268
Apr02-02	-0.049869	4.445860	-3.022965	1.074575	0.163921	4.325666	167

The above analysis shows some interesting results in terms of volatility and returns. S&P CNX NIFTY has provided lower risk compared to BSE SENSEX in all category of time buckets as measured by standard deviation but BSE SENSEX has not provided higher return for the excess risk. The table 3-C gives us the difference between the values observed in both the markets. It is interesting to note that in all time buckets NSE provided lower risk with higher return. With regard to comparison of higher returns in various time buckets, NSE provided higher returns in 12 out of total 13 time buckets and with regard to lower returns, there were 7 time buckets out of 13 in which BSE provided lesser returns (maximum one day losses) compared to NSE. For example the maximum one day loss in case of NSE during the period April 2002 to November 2002 was 2.84063% while SENSEX has 3.022965% as a maximum single day loss. So in all categories like daily mean return, maximum as well as minimum, we find that NSE has provided higher return but with lesser risk as measured in terms of standard deviation. The data provided here substantiate the fact that investors are moving towards NSE because it provides lesser risk but not necessarily lowerr return. This has also helped in increasing liquidity in NSE and investors have also realized that S&P CNX NIFTY as a product is cheaper. This may be one of the reasons for higher liquidity in F&O segment of NSE. NSE is being perceived to provide a lesser risky platform with the same or higher return as given in the above tables.

Table 3C – Difference

Period	Mean Return	Max	Min	Std dev
1995-02	0.004670	0.225292	-0.218326	-0.058720
1996-02	0.006801	0.225292	-0.218326	-0.061688
1997-02	0.008105	0.225292	-0.218326	-0.069572
1998-02	0.008948	0.225292	-0.207828	-0.102228
1999-02	0.012836	0.421620	-0.287248	-0.096874
2000-02	0.014571	0.159280	0.220382	-0.127239
2001-02	0.006959	2.193389	-0.089056	-0.073644
2002-02	0.005629	2.823990	1.104583	-0.053117
Jun00-02	0.008740	2.193389	0.056918	-0.093616
Apr01-02	0.007675	2.823990	0.527467	-0.089318
Jul01-02	0.007298	2.823990	0.527467	-0.089107
Nov01-02	0.004245	2.823990	1.104583	-0.056627
Apr02-02	0.005968	-0.600610	0.182335	-0.058458

Conclusion

Recently there was a report in the newspaper (ET, 25th November 2002) that BSE Sensex has been one of the lowest volatile index compared to other global indices like NASDAQ, KLSE (Malaysia), Kospi (South Korea), Taiwan, Indonesia, Thailand, etc. However, we have established the fact that S&P CNX NIFTY has lower volatility in comparison to BSE Sensex and hence it is one of the lowest in the world. For making this comment, we have relied on the said newspaper report for other stock indices which are not included in this study. From our analysis of the results as given above in tables, we have seen that all the markets have moved in tandem except sometimes for NASDAQ being a technology exchange which attained very high values due to tech boom of 1999-2000.

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