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Statistical Analysis Using Global Indices

Indian market demonstrating definite whopping returns is alluring investors nonetheless with diminutive clarity or indistinctness. And the fact remains that Indian market never operates unconnected and remarkably with global integration there is a robust correlation between Indian and various global markets. Also an excellent opportunity as an investor to diversify your investment portfolio.

Hence it is imperative that we as investors need to comprehend the nuance of these relationship vis-à-vis global indices. And also the need to understand risk-return trade-off which will aid us in computing the risk premium. Needless to say today investors have high admiration for emerging markets and especially countries like India and China. While there is an erroneous belief in most of the analysts that financial market has no correlation with the fundamentals of any country. And the data which I shall present will only confirm that it is a pure misconception. India and China which record highest GDP growth have the best equity markets for investors who look for a lucrative return. Corporate earnings replicate the fundamentally strong GDP growth which in turn will turn out the markets more tantalizing and hence the higher capitalization and huge investments in equity markets. For our analysis we've considered data between December 2008 and 2010.

While we have range of statistical dimension to figure out the risk vs. return trade-off the most prominent one being.

Absolute Return

The return that an asset realizes over a period of time is referred as Absolute Return. It is expressed in percentage growth over the previous value. It looks at the appreciation or depreciation (expressed as a percentage) that an asset achieves over a given period of time.

It gives you the total return on investment and hence it can be calculated at any interval. While it will give you the total return irrespective of the period we will have approximate to the annual return.

This measure looks at the appreciation or depreciation (expressed as a percentage) that an asset achieves over a given period of time.

Once we gaze at this data then we will figure out as to why Indian equity market is the desired destination for FII and domestic players. Indian Equity market recorded the highest absolute return vis-à-vis any global indices during the said period. Among the global indices All Ordinaries (Australia) has the next best return with 54% followed by HANG SENG. CAC 40(France) had recorded the highest negative return of -36% during the said period followed by NIKKIE225 (Japan) with -26% return for 10- year horizon. BSE 30 recorded the highest ever absolute return for 10yr horizon. This has perfect correlation with the FII/Domestic investment during the period. Except in the first year i.e. between 2000 and 2001 and 2006-2007 year-on-year BSE 30 has been accelerating

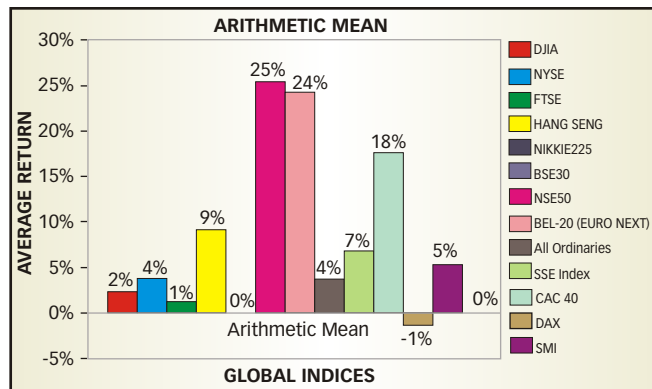
Sl No.	Index	Country	31/12/2000	31/12/2001	31/12/2002	31/12/2003	31/12/2004	31/12/2005	31/12/2006	31/12/2007	31/12/2008	31/12/2009	31/12/2010	Absolute Return
1	DJIA 30	USA	10787.99	10021.57	8341.63	10453.92	10783.01	10717.15	12463.15	13264.82	8776.39	10428.05	11577.51	7
2	NYSE	USA	6945.57	6236.39	5000	6464	7250.06	7753.95	9139.02	9740.32	5757.05	7184.96	7964.02	15
3	FSE100 (UK)	UK	6222.50	5217.40	3940.40	4476.90	4814.30	5618.80	6220.80	6456.90	4434.20	5412.90	5899.90	-5
4	HANG SENG	HONGKONG	15095.53	11397.21	9321.29	12575.94	14230.14	14876.43	19964.72	27812.65	14387.48	21872.50	23035.45	53
5	NIKKIE225	Japan	13785.69	10542.62	8578.95	10676.64	11488.76	16111.43	17225.83	15307.78	8859.56	10546.44	10228.92	-26
6	BSE30	INDIA	3972.12	3262.33	3377.28	5838.96	6602.69	9397.93	13942.24	20286.99	9647.31	17464.81	20509.09	416
7	NSE50	INDIA	1263.55	1059.05	1093.50	1879.75	2080.50	2836.55	3966.40	6138.60	2959.15	5201.05	6134.50	385
8	BEL-20 (EURO NEXT)	BELGIUM	na	2782.01	2025.04	2244.18	2932.62	3549.25	4388.53	4127.47	1908.64	2511.67	2578.60	-7
9	All Ordinaries	AUSTRALIA	3154.7	3359.9	2975.5	3306	4053.1	4708.8	5644.30	6421	3659.30	4882.70	4846.90	54
10	Shanghai Stock Exchange	CHINA	2073.48	1645.97	1357.65	1497.04	1266.50	1161.06	2675.47	5261.56	1820.81	3277.14	2808.08	35
11	CAC 40	FRANCE	5926.42	4624.58	3063.91	3557.90	3821.16	4715.23	5541.76	5614.08	3217.97	3936.33	3804.78	-36
12	DAX	GERMANY	6433.61	5160.10	2892.63	3965.16	4256.08	5408.26	6596.92	8067.32	4810.20	5957.43	6914.19	7
13	SMI	SWITZERLAND	8135.40	6417.80	4630.80	5487.80	5693.20	7583.90	8785.70	8484.50	5534.50	6545.90	6436.00	-21



reaching its peak in 2010 with 20509 basis points.

Arithmetic Mean / Average Return

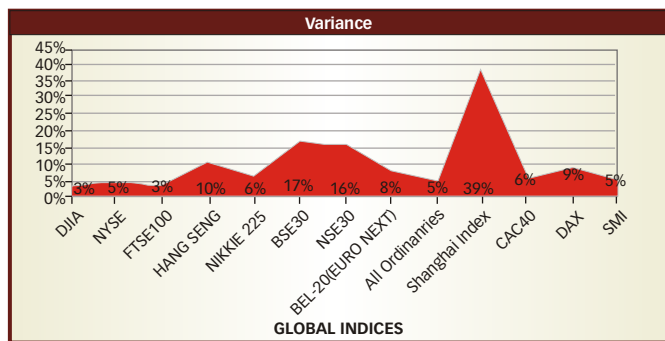
A mathematical representation of value of a series of numbers, calculated as the sum of all the numbers in the series divided by the count of all numbers in the series.



From this figure we can clearly draw an inference as to why Indian Market continues to remain the hot destination for investors both global and domestic. In spite of the volatility in equity market investors have got a mean return of 25% in Indian market. We have perfect correlation between BSE30 and NSE on return front. This is one of the reasons why investors across the globe are tantalized to take exposure in Indian markets. Indian Markets remained resilience even during June 2010 period when all global indices recorded negative return. And our indices are the only to close flat and positive during the said period. CAC 40(France) is the only index which recorded negative growth during the said period followed by DAX (Germany) which no return to the investor. The next best average return of 18% is given by Shanghai Composite.

Variance

Variance measures the variability (volatility) from an average. Volatility is a measure of risk, so this statistic can help determine the risk an investor might take on when purchasing a specific security.

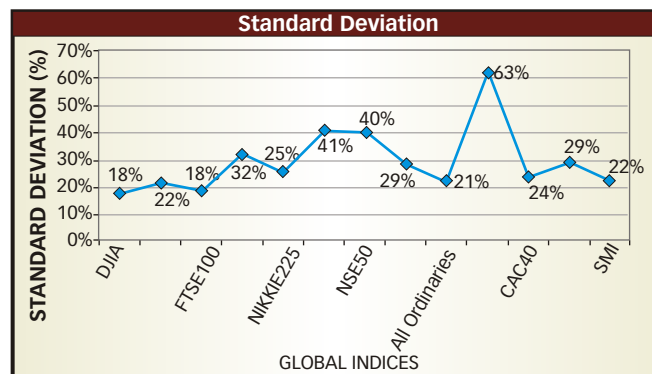


When we analyze variance with the global indices from the risk perspective SSE index recorded the highest variance during the said period. It is generally assumed that higher variance amounts to higher return during bullish phase. And at the same time it will have multiplier effect during bearish

phase. It is a proven fact that market with high variance will record high volatility which in turn gives a scope for better return in bullish market and higher risk during the bearish market. But in the case of SSE index this is proven wrong. While Shanghai recorded highest variance there return is not matching the risk what investor would accept. FTSE100 (UK) and DJIA have the lowest variance but nevertheless it is DJIA which had 7% absolute return whereas FTSE100 recorded a negative -5% during the said period.

Standard Deviation

Standard deviation is a measure of the dispersion of a set of data from its mean. The more spread apart the data, the higher the deviation. Standard deviation is calculated as the square root of variance. To deal with the uncertainty of returns, investors need to think explicitly about a security distribution of probable total return. Given that investors must deal with the uncertain future a number of possible returns can and will occur. Standard deviation is a measure of total risk including therefore both systematic and unsystematic risk. In summary, the standard deviation measures the total risk of one security.



SSE Index and CAC 40 recorded highest deviation from the mean return. Investors planning to invest in these indices should be wary of the risk associated with their investments. Indian equity markets again look very tantalizing for the investors as these markets have the highest return with median standard deviation. Investors are duly rewarded in Indian markets by accepting median deviation form the average return. Moreover your deviation what you accept from the mean return should be duly rewarded with the ROI (Return on Investment).

CORRELATION

A coefficient of correlation is a statistical measure to gauge how much variance in one variable impact the moment of other variable. A correlation of '1' signifies that both the variables are perfectly correlated. If one progresses in one direction the other variable also will move on in the same manner. The more closure to 1 the higher the correlation measurement.

On the contrary a correlation coefficient of '-1' implies that both the variables are negatively correlated. If one moves in



one direction then the other variable advances in opposite direction.

A correlation coefficient of '0' indicates that both the variables have no affiliation as they are not correlated. The moment of one variable shall not have any bearing on the other variable. Any correlation which is 0 or closure to this digit only reveals lots of ambiguity as you cannot formulate any advanced predictions on the moment of variables.

Sl. no	Comparison	Country	Correlation
1	Sensex vs. DJIA	USA	0.1
2	Sensex vs. NYSE	USA	0.9
3	Sensex vs. FTSE 100	UK	0.87
4	Sensex vs. HANG SENG	HONGKONG	0.94
5	Sensex vs. NIKKIE225	JAPAN	0.81
6	Sensex vs. BEL-20(EURO NEXT)	BELGIUM	0.77
7	Sensex vs. All Ordinaries	AUSTRALIA	0.8
8	Sensex vs. Shanghai Stock Exchange	CHINA	0.7
9	Sensex vs. 40	FRANCE	0.88
10	Sensex vs. DAX	GERMANY	0.84
11	Sensex vs. Swiss Market Index	SWITZERLAND	0.84

HANG SENG has the highest correlation with Indian markets. Moreover there is minimal time lag between both the markets which is strengthening the correlation pattern. The next best and effective correlation is recorded with NYSE. Hence if we need to plan for diversification we may always consider DJIA (USA), Shanghai Composite (CHINA) and BEL-20(EURO) as they have one of the lowest correlation patterns.

Coefficient of determination

Sl. no	Comparison	Country	Coefficient of determination(R ²)
1	Sensex vs. DJIA	USA	0.3
2	Sensex vs. NYSE	USA	0.9
3	Sensex vs. FTSE 100	UK	0.9
4	Sensex vs. HANG SENG	HONGKONG	1.0
5	Sensex vs. NIKKIE225	JAPAN	0.9
6	Sensex vs. BEL-20(EURO NEXT)	BELGIUM	0.9
7	Sensex vs. All Ordinaries	AUSTRALIA	0.9
8	Sensex vs. Shanghai Stock Exchange	CHINA	0.8
9	Sensex vs. CAC 40	FRANCE	0.9
10	Sensex vs. DAX	GERMANY	0.9
11	Sensex vs. Swiss Market Index	SWITZERLAND	0.9

The coefficient of determination is a measure that allows us to guess how certain one can predict the moment of one variable with the other. It will also establish the link between two indexes or any other underlying variables. Coefficient of determination is represented as r² and for example if r²=0.50 then it indicates that 50% of the variation can be predicted with the moment of the base variable. It is simply the square root of correlation coefficient which is represented as r. And the other 50% remains unpredictable. Now let us understand this measure through global indices.

From this data we can infer that 100% of Sensex direction can be understood by the momentum of HANG SENG. This has been possible only because of highest correlation which exists between both the indices. Similarly DJIA (USA) has one of the lowest coefficient of determination where the r² = 0.30

which means that only 30% of the sensex direction can be predicted with the DJIA (USA). And the balance 70% momentum remains clueless. DJIA (USA) can always be used to diversify as there is no relation between both the indices.

Coefficient of Variation

This ratio will help you to understand how much risk you are accepting for a given return. This is arrived by using standard deviation as the numerator and average return as the denominator. When we calculate the same we will come to know the risk-return trade off i.e. lower the ratio better the acceptance of risk for a given return. In a nutshell the average return should be high and at the same time the coefficient of variation should be one of the lowest.

Sl. no.	Index	Standard Deviation	Arithmetic Mean	Coefficient of Variation
1	DJIA 30	18	2	9
2	NYSE	22	4	6
3	FTSE100(UK)	18	1	18
4	HANG SENG	32	9	4
5	NIKKIE225	25	0	Na
6	BSE30	41	25	2
7	NSE50	40	24	2
8	BEL-20(EURO NEXT)	29	4	7
9	All Ordinaries	21	7	3
10	SSE index	63	18	4
11	CAC 40	24	-1	-24
13	DAX	29	5	6
14	SMI	22	0	Na

From this analysis it is evident that investors who are with Indian markets have been offered the best risk-return trade off. We do have Shanghai composite with a lower ratio however the mean return is not the best among the global indices. All ordinaries also has the lower ratio and in a similar way the mean return is not supporting the risk what the investor is accepting. NIKKIE 225(JAPAN) and SMI (SWISS MARKET INDEX) are the two indices which has given nil average return between 2000 and 2010. That means whatever initial returns these indices would have given got wiped off at a later stage due to global meltdown.

Planner's perspective

While all these analysis will help us understand both systematic and unsystematic risk the fact remains mere technical analysis and would bound to give us fragmentary and incomplete information. We can draw an inference from the market dynamics only when it is complemented with fundamental analysis and only when we are successful in understanding the psyche of both domestic and global investors.

Needless to say market is not driven fundamentally or technically but it is driven emotionally. And it is very regrettable to say that we do not any effective barometer or yardstick to measure the emotions of investors. We as planners need to be aware of global indices to advice our investors to diversify their portfolio and enlighten them about risk-return trade off.

Source: Yahoofinance

