



## Validation of Behavioural Bias on Index Rebalancing

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(Received: 04/01/2016; 17/05/2016)

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### Abstract

Index rebalancing is not a new thing, happens very frequently and is reported by exchanges to all the investors well in advance. Generally, price of shares goes up when they are included in the index and godown when they are excluded from the index. This articles looks at share price performance of companies which are included or excluded from the index. The article finds that for higher returns, investors should focus on picking quality stocks from the list of companies which are excluded from the index, as the returns of shares included in the index are not better than the shares excluded.

**Keywords:** Index rebalancing, NSE, free float, annualized returens

**JEL classification:** G13,

**Paper Classification:** Research article

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Index investing is a most simple technique of making your money work. In simple language, invest in stock which are part of Index and your wealth should move exactly as Index moves. There are many funds which are into index investing and a retail investor who does not understand much of equity markets and neither have a view on sectoral funds, thematic funds etc. can invest in Index funds. Index funds are fairly diversified, low cost, low risk with decent returns. Index Investing is a passive investing, where the fund manager is expected to replicate the Index returns, so technically he does not take any risk to beat the benchmark Index as his performance measurement is the benchmark Index (Sharpe, 1992; Fama, 1993).

A company gets included into the index because of factors like liquidity, impact cost, listing history, free float market capitalization etc. Index is constantly revised and companies are removed and added to the Index. Generally it is believed that companies which are included in the Index would do well in the near future and many investors seek to include them in their portfolio due to higher expectation of return in future. Whenever a company gets included in Index, all

the fund houses which replicate the index performance have to sell the stock of company which has been removed and include in their portfolio the new stock, and this result into share price appreciation.

CNX Nifty comprises of 50 actively traded stocks, representing over 66% of free float market capitalization of stocks listed on NSE as on 31 March 2015. It has generated a return of 11% since inception (April 1, 1996). Index Governance team for CNX Nifty have made over 160 changes since inception which means, at different times, 80 companies have been included and 80 excluded. Between the study period of 2005-2015 some of the companies like Bajaj Auto, Dr. Reddy's, Zee Entertainment, Unitech, Idea cellular, Reliance Capital, Reliance Communication, Reliance Power, Siemens, Jaiprakash Associates and DLF have been included / excluded for certain period of time. Whereas some companies like Tata Consultancy Services, NTPC, Cairn India, Power Grid Corporation of India, Axis Bank, etc. are still part of CNX Nifty.

Index rebalancing is not a new thing and it happens very frequently and is reported by the exchanges to all the investors at least a month in advance. The literature generally reports positive price effect on shares included in the Index and negative price effect on shares excluded from Index (Siegel & Schwartz, 2006). Studies by Madhavan (2003); and Chen, Gregory and Singal (2006) evidence existence of abnormal returns around the rebalancing date.

This articles looks at share price performance of companies which are included and excluded since 2005. Two buckets of "annualized returns of share excluded" and "annualized returns of shares included" were formed. Data is sourced from NSE database (NSE, 2015). Prices of shares on the date of inclusion-exclusion are sourced from Thomson Reuter's database.

Companies like, Reliance Petroleum, Sterlite Industries, Indian Petrochemicals Corporation Ltd., and Satyam Computer Services, which have either merged or amalgamated were removed from the data.

If a share is included in the Index after 2005 for part of the year then its compound annual growth rate (CAGR) is calculated considering the price as on the day shares were included till the date the share was part of Index. Tata Consultancy Services (TCS) was included in the index on 25th February, 2005 and the price then was Rs.341. It has been a part of Index since then. CAGR for TCS between 25th February, 2005 and 31st October, 2015 works out to be approximately 19%.

Annualized rates are used to compare the performance of shares. The next step is to segregate these companies into two buckets of "shares included" and "shares excluded" to draw a conclusion based on the mean returns of the two buckets.

T-test is applied to the returns of two portfolios constructed i.e., "shares Included" and "shares Excluded".

**Table 1: Details of companies “Excluded” and “Included” in the Index**

Event Date	Scrip Name	Description	Price on date of Inclusion	Price on date of Exclusion or 30 Oct 2015	Annualized Price CAGR
25-02-2005	Tata Consultancy Services Ltd.	Included	341.01	2495.20	19%
25-02-2005	Indian Hotels Co. Ltd.	Excluded	49.88	99.15	6%
26-09-2005	Jet Airways (India) Ltd.	Included	1115.5	615.65	-39%
26-09-2005	Colgate Palmolive (I) Ltd	Excluded	121.28	955.35	20%
27-06-2006	Suzlon Energy Ltd.	Included	178.39	45.50	-15%
27-06-2006	Siemens Ltd.	Included	64.16	81.33	3%
27-06-2006	Shipping Corporation of India Ltd.	Excluded	92.57	79.10	-2%
27-06-2006	Tata Chemicals Ltd.	Excluded	219.25	408.45	7%
01-09-2006	Reliance Communications Ltd.	Included	299.90	74.25	-25%
01-09-2006	Tata Tea Limited	Excluded	81.87	133.45	5%
04-04-2007	Oriental Bank of Commerce	Excluded	176.55	134.70	-3%
24-09-2007	NTPC Ltd.	Included	180.58	132.80	-4%
24-09-2007	Dabur India Ltd.	Excluded	54.20	269.75	20%
05-10-2007	Unitech Ltd.	Included	327.85	94.30	-42%
12-12-2007	Idea Cellular Ltd.	Included	138.85	73.55	-23%
12-12-2007	Cairn India Ltd.	Included	218.00	153.40	-4%
12-12-2007	Mahanagar Telephone Nigam Ltd.	Excluded	193.20	18.65	-30%
12-12-2007	Hindustan Petroleum Corporation Ltd.	Excluded	332.05	768.45	11%
14-03-2008	DLF Ltd.	Included	653.60	154.95	-20%
14-03-2008	Power Grid Corporation of India Ltd.	Included	95.60	128.75	4%
14-03-2008	Glaxosmithkline Pharmaceuticals Ltd.	Excluded	1050.5	3310.15	15%
26-05-2008	Bajaj Auto Ltd.	Excluded	302.37	1547.45	70%
10-09-2008	Reliance Power Ltd.	Included	170.10	100.70	-14%
10-09-2008	Dr. Reddy's Laboratories Ltd.	Excluded	567.60	1484.55	47%
12-01-2009	Reliance Capital Ltd.	Included	436.95	336.00	-10%
27-03-2009	Axis Bank Ltd.	Included	86.21	475.40	26%
27-03-2009	Zee Entertainment Enterprises Ltd.	Excluded	52.75	313.40	33%
17-06-2009	Jindal Steel & Power Ltd.	Included	417.27	157.20	-15%
22-10-2009	Jaiprakash Associates Ltd.	Included	158.63	52.40	-25%
22-10-2009	Infrastructure Development Finance Company Limited	Included	76.70	75.77	0%
22-10-2009	Tata Communications Ltd.	Excluded	454.45	429.00	-1%
22-10-2009	National Aluminium Co. Ltd.	Excluded	89.20	38.50	-14%
08-04-2010	Kotak Mahindra Bank Ltd.	Included	196.52	687.65	22%
08-04-2010	Grasim Industries Ltd.	Excluded	2570.0	2479.10	-1%
27-06-2011	Sesa Goa Limited	Included	9.80	14.21	-25%

*(Continued)*

01-10-2010	Dr. Reddy's Laboratories Ltd.	Included	1484.5	4279.90	21%
01-10-2010	Bajaj Auto Ltd.	Included	1547.4	2550.45	10%
01-10-2010	Unitech Ltd.	Excluded	94.30	7.60	-49%
01-10-2010	Idea Cellular Ltd.	Excluded	73.55	172.30	19%
01-10-2010	ABB India Ltd.	Excluded	925.45	1238.05	6%
25-03-2011	Grasim Industries Ltd.	Included	2479.1	3712.05	9%
25-03-2011	Suzlon Energy Ltd.	Excluded	45.50	24.60	-13%
10-10-2011	Coal India Ltd.	Included	343.65	319.90	-2%
10-10-2011	Reliance Capital Ltd.	Excluded	336.00	422.40	6%
27-04-2012	Asian Paints Ltd.	Included	352.33	830.65	24%
27-04-2012	Bank of Baroda	Included	152.05	160.20	1%
27-04-2012	Reliance Communications Ltd.	Excluded	74.25	75.30	0%
27-04-2012	Reliance Power Ltd.	Excluded	100.70	50.45	-20%
28-09-2012	Lupin Ltd.	Included	595.95	1928.90	38%
28-09-2012	UltraTech Cement Ltd.	Included	1967.8	2886.10	12%
28-09-2012	Steel Authority of India Ltd.	Excluded	85.45	53.35	-15%
01-04-2013	IndusInd Bank Ltd.	Included	415.70	911.90	30%
01-04-2013	NMDC Ltd.	Included	135.15	93.45	-15%
01-04-2013	Siemens Ltd.	Excluded	81.33	91.40	5%
01-04-2013	Wipro Ltd.	Excluded	378.76	475.85	47%
27-09-2013	Wipro Ltd.	Included	475.85	572.85	9%
27-09-2013	Reliance Infrastructure Ltd.	Excluded	392.35	396.45	0%
28-03-2014	Jaiprakash Associates Ltd.	Excluded	52.40	13.50	-85%
28-03-2014	Ranbaxy Laboratories Ltd.	Excluded	363.85	859.80	54%
28-03-2014	Tech Mahindra Ltd.	Included	459.19	539.15	10%
28-03-2014	United Spirits Ltd.	Included	2659.5	2353.50	-25%
19-09-2014	United Spirits Ltd.	Excluded	2353.5	3145.45	26%
19-09-2014	Zee Entertainment Enterprises Ltd.	Included	313.40	408.65	24%
27-03-2015	DLF Ltd.	Excluded	154.95	116.50	-47%
27-03-2015	Jindal Steel & Power Ltd.	Excluded	157.20	80.15	-112%
27-03-2015	Idea Cellular Ltd.	Included	172.30	140.00	-34%
27-03-2015	Yes Bank Ltd.	Included	816.00	758.65	-12%
29-05-2015	IDFC Ltd	Excluded	75.77	58.85	-59%
29-05-2015	Bosch Ltd.	Included	23668.8	20457.50	-34%
28-09-2015	NMDC Ltd.	Excluded	93.45	100.25	73%
28-09-2015	Adani Ports and Special Economic Zone	Included	307.20	296.25	-38%

Source: NSE

All changes to the NSE nifty were segregated into two portfolio buckets --exclusion and inclusion for a meaningful comparison.



**Table 2: Statistical results of CAGR for stocks Included and Excluded from CNX nifty**

	Annualized Returns			
	Average	Median	Maximum	Minimum
Exclusion from Index	1%	5%	73%	-112%
Inclusion into Index	-4%	-2%	38%	-42%

• Closing prices as on 31 Oct 15 have been used for calculation.

**Table 3: Descriptive statistics for Companies Included in Nifty**

Mean	-0.04312
Standard Error	0.035665
Median	-0.03788
Mode	
Standard Deviation	0.216944
Sample Variance	0.047065
Kurtosis	-0.984
Skewness	0.048878
Range	0.795849
Minimum	-0.41626
Maximum	0.379587
Sum	-1.59543
Count	37

**Table 4: Descriptive statistics for Companies Excluded from Nifty**

Mean	0.005445
Standard Error	0.067093
Median	0.049166
Standard Deviation	0.391215
Sample Variance	0.153049
Kurtosis	1.446922
Skewness	-0.74225
Range	1.84913
Minimum	-1.11589
Maximum	0.733244
Sum	0.185136
Count	34

**Table 5: t-Test: Two-Sample**

	Variable 1	Variable 2
Mean	-0.04312	0.005445
Variance	0.047065	0.153049
Observations	37	34
Hypothesized Mean Difference	0	

(Continued)

df	51	
t Stat	-0.63915	
P(T<=t) one-tail		0.262792
t Critical one-tail		1.675285
P(T<=t) two-tail		0.525584
t Critical two-tail		2.007584

## Conclusion

An average return of shares excluded is  $\sim +1\%$  (0.005) and shares which were included in the Index generated return of  $\sim -4.3\%$  (-0.04312). The t-test suggests that returns of portfolio of shares excluded / portfolio of shares included are not significantly different. Mean values suggests that shares which have been excluded have done better than the shares which have been included in the CNX Nifty. On 28th September, 2015, NMDC was excluded and Adani ports was included in the Nifty. NMDC's closing price (as on 28th September, 2015) was Rs. 93.45 and Adani Ports was at Rs. 307.2. Price as on 31st October 2015 of NMDC was Rs.100.25 and that of Adani was at Rs.296.25 and this highlights the behavioural bias. NMDC which was excluded has given a return of +73% and Adani ports which was included has generated return of -38% (returns for the period are annualized on the basis of 365 days in a year). The findings are similar to the findings of Cai and Houge, 2008.

When a stock is announced to be included in the Index it attracts attention and the prices starts moving upward. NSE declares in advance the name of stocks which are to be excluded and included and this news gives time to the market to react accordingly. Such news spreads quickly, making the stock to be 'included' overvalued and hence the future returns are poor. Similarly, when a stock is not doing well and is not likely to do well, its share prices start falling and so does the market capitalization. Investors start expecting lower returns on the stock and so investors either sell them or have lower expectations. Hence, after exclusion, it is undervalued and hence generates better returns in future.

Some institutional investors who track the index also like to rebalance their portfolio and would buy the incoming stock and sell the outgoing one. The end result of all this activity is that the stock which is included in the index is at a premium valuation and this premium valuation limits its future potential. Hence, the returns of shares included are not better than the shares excluded. If we consider CNX Nifty return of 11% since inception as a benchmark, 32% of shares which were excluded generated higher return whereas only 24% shares which were included could meet the benchmark returns.

For higher returns, investor should focus on picking quality stocks from the list of companies which are excluded from the Index.

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### *Authors' Profile*

**Ruzbeh Bodhanwala** is associated with FLAME University, Pune, India as a Professor. He has also worked for HSBC equity research where he was leading the training initiative and trained more than 500 equity analysts. His academic contributions include research papers published in national & international refereed journals. He has also authored four text books for post graduate students, published by Taxman Publishers and Prentice Hall of India.

**Shernaz Bodhanwala** has over 12 years of experience in industry, teaching and training. Her teaching interests include advanced accounting and cost accounting. Her industry experience include a stint as a Senior Associate Vice President at Amba Research India (Pvt) Ltd, Bangalore, involved in credit research on high yield companies covering sectors like marine transportation, oilfield services, real estate and airlines. Her credit research work involved detailed credit modeling, covenant analysis and report writing for the clients of large investment banks and broker houses. She is well-versed in applying S&P and Moody's methodologies on credit rating. She has also been instrumental in team handling and delivering training. She began her career as a practicing chartered accountant; with extensive experience in the field of audit and direct tax. She has been affiliated to various academic institutions like ICAI Business School, M. J. College, etc. on visiting faculty assignments.

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