International Journal of Management, IT & Engineering
Vol. 7 Issue 7, July 2017,
ISSN: 2249-0558 Impact Factor: 7.119
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

PAIR TRADING STRATEGY WITH BETA DECOUPLING MODEL

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Abstract

Since 1987, pair trading has grown to be one of the most common and most researched strategies for market neutral returns. The strategy identifies stock that historically co-moved and forms a trading pair. To detect adequate pair different types of data analysis has been used. Here, we have used decoupled beta method for making trade. We have choosen ten different pairs from different industries for back testing. The most important finding of the study is that we found cyclical pair, perfectly correlated pairs and perfectly trending pairs. This type of portfolio can give handsome return in five years time period.

Keywords:

Pair Trading;

Beta Decoupling;

Correlation;

Co integration;

Spread.

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1. Introduction

Pairs trading strategy works by taking the arbitrage opportunity between prices of related assets which have long run equilibrium. We can then invest in a two assets portfolio where the overvalued asset is sold and the undervalued asset is bought. The trade is closed out by taking the opposite positions of these two assets after the assets prices have settled back into their long run relationship. The first extensive pairs trading examination was done by Gatev et al. (1998). They tested pairs trading strategy on Wall Streert with daily data over the period 1962 through 1977.
In the set-up of such a strategy, there are two distincts part: first one is what pairs we want to choose and second one is when/what sizes we shall trade. For the first part, we have used correlation and cointegration test. For the second part, answer of when is given by decoupled beta method and answer of what is given as price neutral strategy.

For the first part which suggests what pairs we want to choose, we have examined pairs with the help of correlation and cointegration. For the examination of correlation and cointegration, only those stocks are selected which are from same industries. Cointegration suggests a stationary pair from some linear combinations. Correlation suggests pairs are correlated or not.

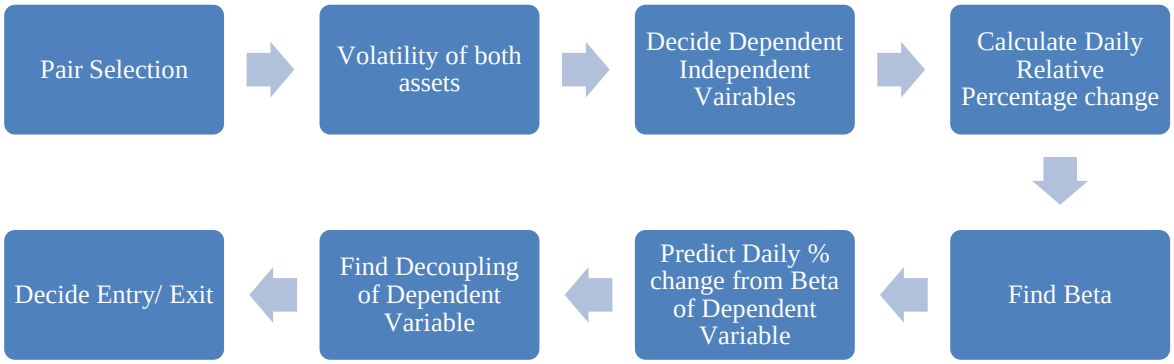
In our study, we are using beta decoupling method for designing pairs trading strategy. Beta measures the responsiveness of a stock's price to changes in the overall stock market or to particular stock. Decoupling is the occurrence of returns on asset classes diverging from their expected or normal pattern of correlation. Decoupling takes place when two different asset classes that typically rise and fall together move in opposing directions, such as one increasing and the other decreasing.

Basic steps for pairs trading are given as under…

- Find two stock prices of which have historically moved together.
- Wait till beta decoupled.
- Create a position when beta decoupled (Entry between ±1 to ±2).
- Gains earned when beta recoupled. (Exit when decoupling value is between -0.49 to 0.49).
- Free resources invested in risk free interest rate.

There will be some additional conditions to prevent loss on singal trade. In any condition, if beta does not recouple, we will use stop loss and close the position.

Chart 1. The summary of the process for developing beta decoupling model



For gaining knowledge about pair trading strategy and beta decoupling methodology, we have studied lots of research thesis and research paper. So, here we are reviewing those literatures which are used.

Marc Schurer and Pavel Lisev prepared master thesis on "Evaluation of Profitability and Risks on the Swedish Stock Market" (27th May, 2015) and submitted to department of economics, Lund University, Sweden. They studied whether a pairs trading strategy based on the cointegration approach generates excess returns on the Swedish equity market or fails to meet initial expectations.

Gopal Rao Madhavaram prepared research report on "Statistical Arbitrage Using Pairs Trading with Support Vector Machine Learning" (26th August 2013) and submitted to Saint Mary's university. He studied the performance of statistical arbitrage and to validate the results with the help of a novel machine learning approach known as Support Vector Machines using Pairs trading Strategy.

Matti Karvinen prepared research paper on "Statistical Pairs Trading & Analyst Recommandations" (23rd May 2012) and submitted to department of Finance, Aalto University. He studied relations by studying analyst recommendations which have been shown to be related to both stock price movements and information events, but have not been previously studied in connection to statistical pairs trading.

Heny Puspaningrum prepared research report on "Pairs trading using cointegration approach" (14th January 2012) and submitted to the school of Mathematics & Applied Statistics, University of Wollongong. He studied approaches that are used to implement pairs trading strategy. From all approaches, he focused on Cointegration approach.

Sandro C. Andrade, Vadim D. Pietro and Mark S. Seasholes prepared research paper on "Understanding the profitability of Pairs Trading" (15th February 2005) and submitted to UC Berkeley Haas School. He studied uninformed demand shocks with the profits and risks of Pairs trading. They also measured pairs trading profits represents a succinct way to quantify the costs of liquidity provision.

2. Research Method (10pt)

For our study, we have selected eight pairs which are highly correlated, highly cointegtrated and from same industry. We have collected daily closing prices of all pairs from January 2012 to May 2017. These data are adjusted from dividend and split effects. Selected data represents from future contacts for one month expiry. Data are collected directly from www.nseindia.com website.

After fulfilling all conditions of pairs trading strategy and beta decoupling model, selected eight pairs are…

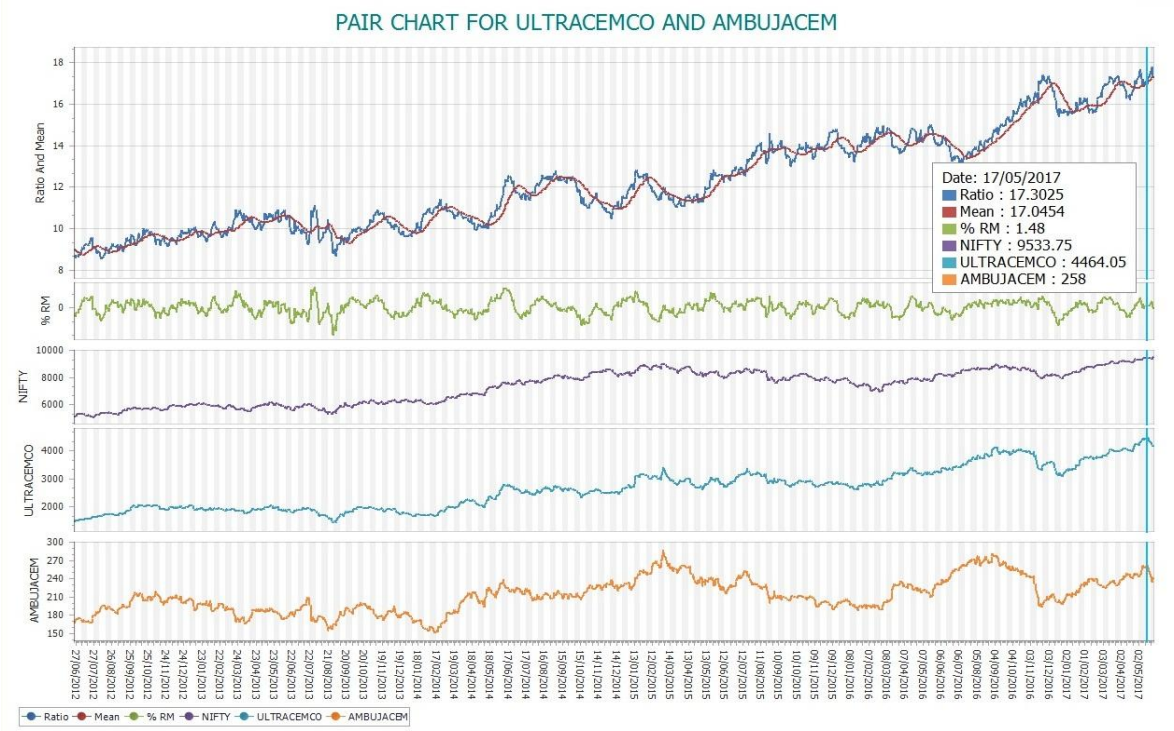
Table 1. List of selected pairs

Nifty & Bank Nifty	Tata MTR DVR & MNM
Kotak Bank & IndusInd Bank	Sunpharma & Cipla
Ultratech Cement & Ambuja Cement	HDFC Bank & IndusInd Bank
IOC & Petronet	Godrej Ind. & Dabur

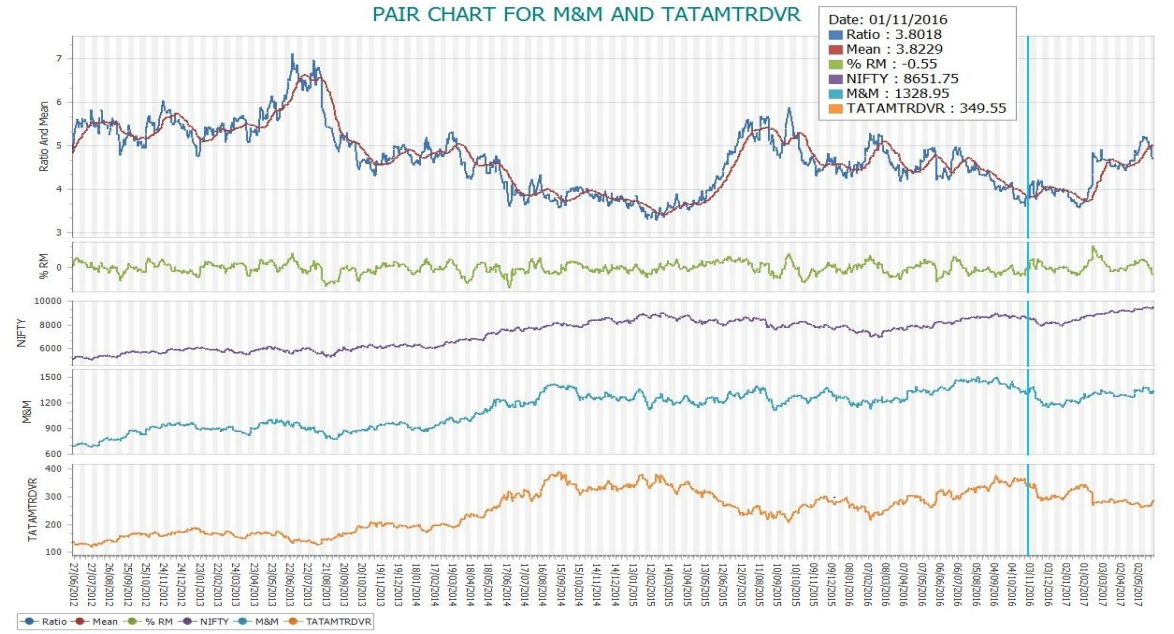
After selecting pairs, we have collected data from mentioned source. Then we have made entry and exit as per rules and prepared master table. Master table gives the information of correlation, cointegration, overall percentage return from January 2012 to may 2017, yearly return, total trade, profitable trade, loss beared trade, Profit probability (Positive), loss probability (Negative), maximum profit percentage and maximum loss percentage from January 2012 to may 2017.

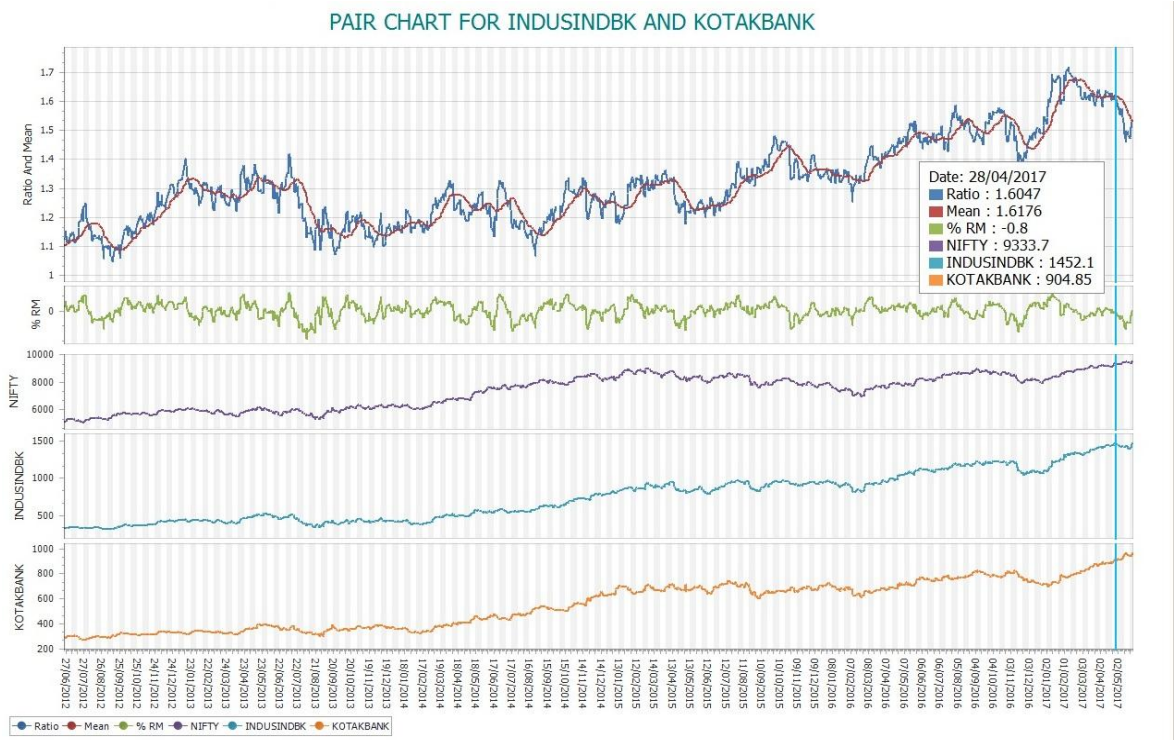
Table 2. The summary of trade result of pairs trading

Pair	Correl.	Coint.	Total Return (%)	Yearly Return (%)	Total Trade	Positive	Negative	Profit Chances (%)	Loss Chances (%)	Max. Profit (%)	Max. Loss (%)
Ultratech Cement vs Ambuja Cement	0.84	0.95	55.58	11.12	59	37	22	62.71	37.29	16.21	7.69
Tata Mtr Dvr Vs Mnm	0.81	0.75	68.04	13.61	74	44	30	59.46	40.54	13.16	9.87
Kotak Bank vs Indusind Bank	0.97	0.85	90.08	18.02	101	71	30	70.3	29.7	11.18	7.15
Sun Pharma vs Cipla	0.88	0.65	135.41	27.08	69	52	17	75.36	24.64	21.04	13.2
Nifty vs Bank Nifty	0.8	0.7	26.54	5.31	56	41	15	73.21	26.79	10.02	11.65
HDFC Bank vs Indusind Bank	0.98	0.95	70.58	14.12	72	49	23	68.06	31.94	11.59	8.33
IOC vs Petronet	0.94	0.9	10.52	2.1	55	34	21	61.82	38.18	12.5	12.26
Godrej vs Dabur	0.82	0.85	119.72	23.94	56	38	18	67.86	32.14	12.45	12.39
Average			**72.06**	**14.41**	**68**	**46**	**22**	**67.35**	**32.65**	**13.52**	**8.24**



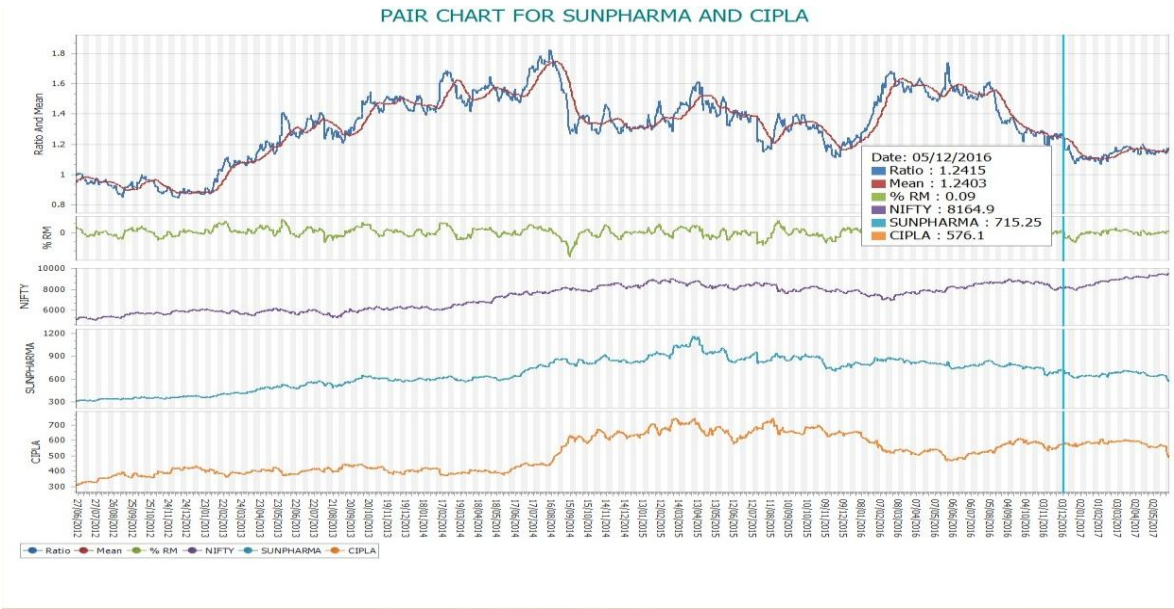
Frequency for ULTRACEMCO and AMBUJACEM Pair														
15.42-15.57	15.58-15.73	15.74-15.89	15.90-16.05	16.06-16.21	16.22-16.37	16.38-16.53	16.54-16.69	16.70-16.85	16.86-17.01	17.02-17.17	17.18-17.33	17.34-17.49	17.50-17.65	17.66-17.81
5	18	9	3	9	8	4	6	5	15	14	13	4	2	3

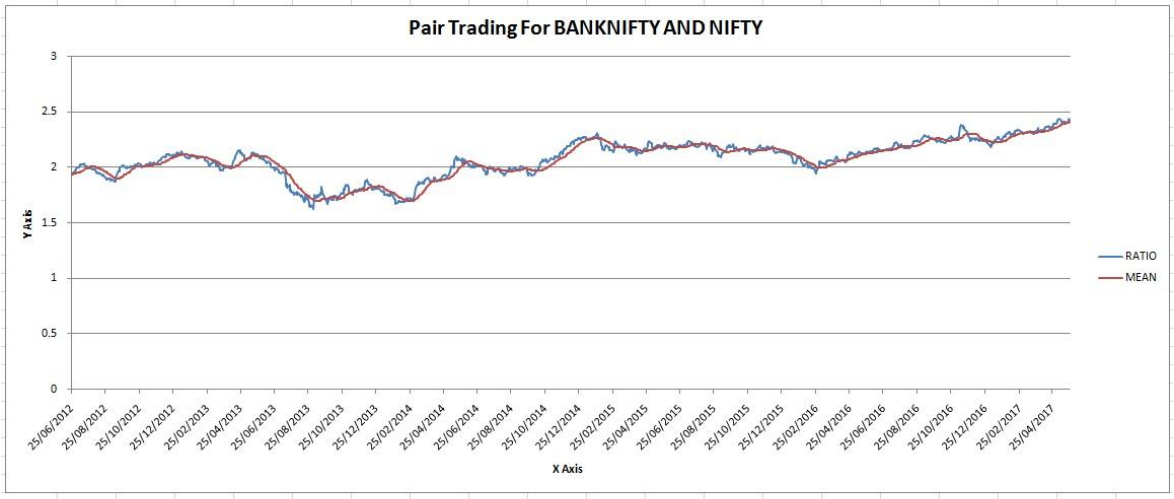


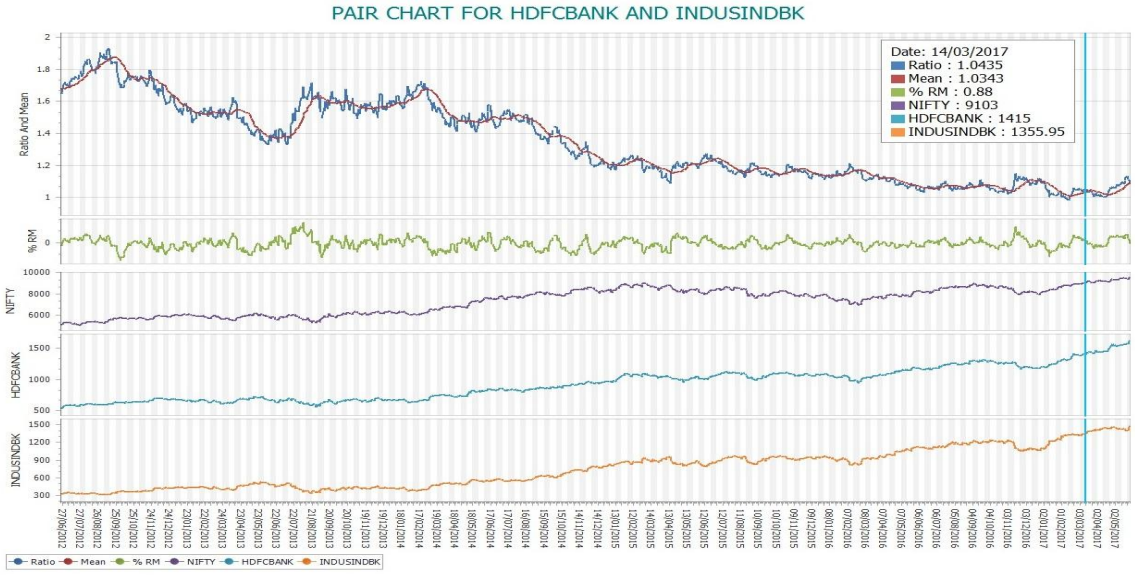


Frequency for INDUSINDBK and KOTAKBANK Pair

1.06-1.09	1.10-1.13	1.14-1.17	1.18-1.21	1.22-1.25	1.26-1.29	1.30-1.33	1.34-1.37	1.38-1.41	1.42-1.45	1.46-1.49	1.50-1.53	1.54-1.57	1.58-1.61	1.62-1.65
20	54	93	94	110	90	117	75	32	34	67	35	26	23	20

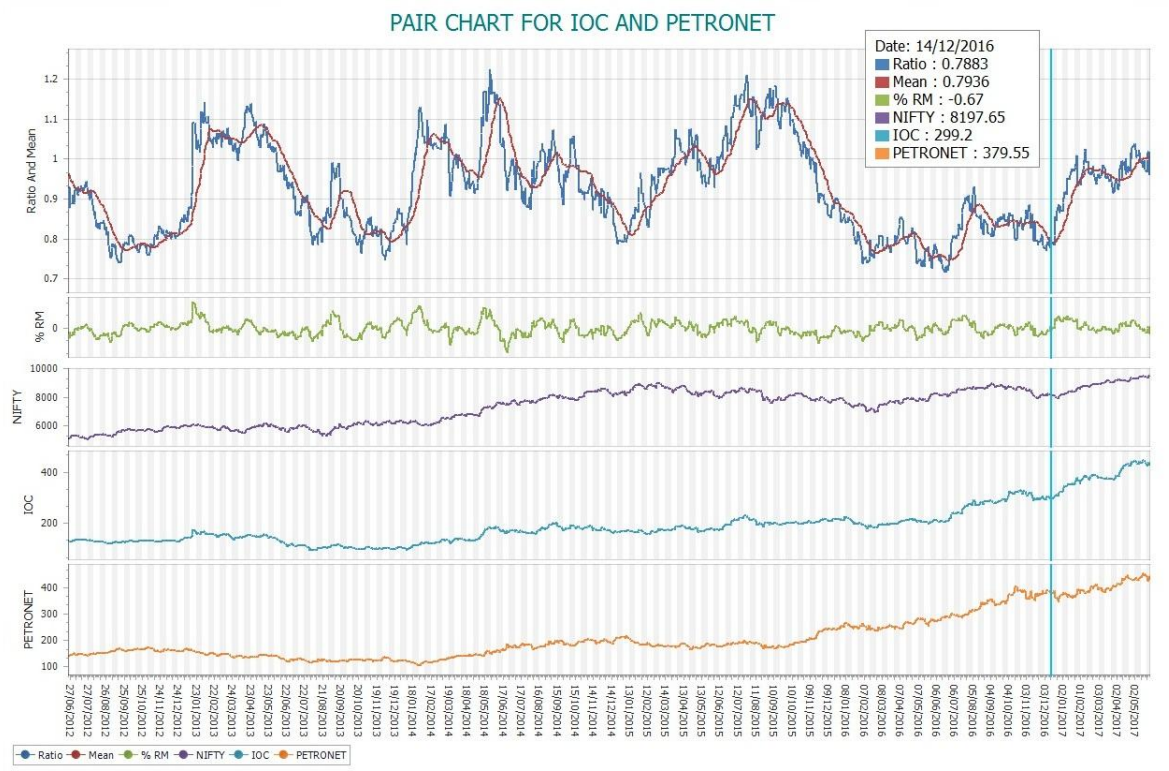




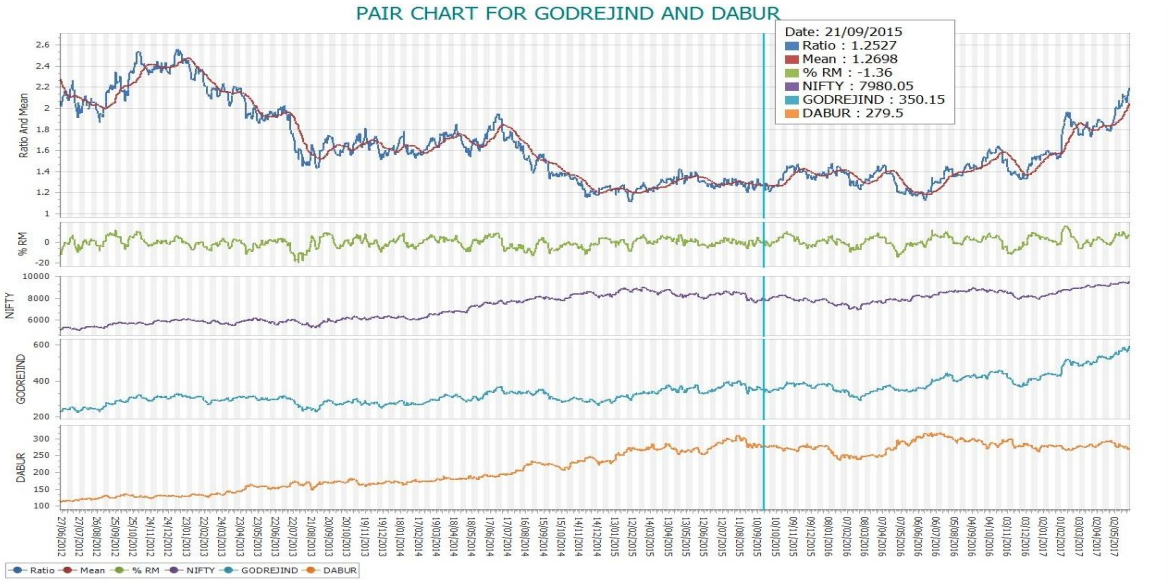


Frequency for HDFCBANK and INDUSINDBK Pair

0.99-1.04	1.05-1.10	1.11-1.16	1.17-1.22	1.23-1.28	1.29-1.34	1.35-1.40	1.41-1.46	1.47-1.52	1.53-1.58	1.59-1.64	1.65-1.70	1.71-1.76	1.77-1.82	1.83-1.88
66	146	139	127	47	20	45	44	89	110	66	49	49	14	20



Frequency for IOC and PETRONET Pair														
0.73-0.75	0.76-0.78	0.79-0.81	0.82-0.84	0.85-0.87	0.88-0.90	0.91-0.93	0.94-0.96	0.97-0.99	1.00-1.02	1.03-1.05	1.06-1.08	1.09-1.11	1.12-1.14	1.15-1.17
26	40	92	70	77	54	68	65	75	52	62	33	28	29	19



Frequency for GODREJIND and DABUR Pair													
1.34-1.39	1.40-1.45	1.46-1.51	1.52-1.57	1.58-1.63	1.64-1.69	1.70-1.75	1.76-1.81	1.82-1.87	1.88-1.93	1.94-1.99	2.00-2.05	2.06-2.11	2.12-2.17	2.18-2.23
3	2	5	20	5	0	7	12	19	11	2	4	4	4	1

3. Results and Analysis

After back testing all selected pairs, we have found results for all respective pairs which are given as under…

3.1. Ultratech Cement vs Ambuja Cement:

Pair ratio of Ultratech cement vs Ambuja cement is totally trending upside for given time period. It suggests opportunity for profit for this pair is higher from long side than short side.

3.2. Tata MTR DVR vs MNM:

Pair ratio of Tata MTR DVR vs MNM is trending more to downside for given time period. It suggests opportunity for profit for this pair is higher from short side than long side.

3.3. Kotak Bank vs IndusInd Bank:

Pair ratio of Tata Kotak Bank vs IndusInd Bank is trending upside for given time period. It suggests opportunity for profit for this pair is higher from long side than short side.

3.4. Sun Pharma vs Cipla:

Pair ratio of Sun Pharma vs Cipla is trending more to upside for given time period. It suggests opportunity for profit for this pair is higher from long side than short side.

3.5. Nifty vs Bank Nifty:

Pair ratio of Sun Nifty vs Bank Nifty is trending more to upside for given time period. It suggests opportunity for profit for this pair is higher from long side than short side.

3.6. HDFC Bank vs IndusInd Bank:

Pair ratio of HDFC Bank vs IndusInd Bank is trending downside for given time period. It suggests opportunity for profit for this pair is higher from short side than long side.

3.7. IOC vs Petronet:

Pair ratio of IOC vs Petronet is trending cyclical for given time period. It suggests equal opportunity for profit from long and short both side for this pair.

3.8. Godrej vs Dabur:

Pair ratio of Godrej vs Dabur is trending more to upside for given time period. It suggests opportunity for profit for this pair is higher from long side than short side.

4. Conclusion

From the above results & findings, we can conclude that proper understanding of beta decoupling model leads to earn a handsome profit from pairs trading. Cyclical pairs like IOC VS

PETRONET, this pair will not generate higher profit but not also a higher loss. So, always make sure to find out their average cycle period. ULTRATECH CEMENT VS AMBUJA CEMENT, these types of pairs must be included in portfolio because pair ratio is perfectly trending from starting to end in one direction. So, pair always follows your profit loss trigger point. For being successful pairs trader, we have to follow correlation, cointegration and pair ratio trend because these parameters are useful to decide stop loss.

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The main references are international journals and proceedings. All references should be to the most pertinent and up-to-date sources. References are written in APA style of Roman scripts. Please use a consistent format for references – see examples below (9 pt):

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