Does mean reversion in stock prices work?

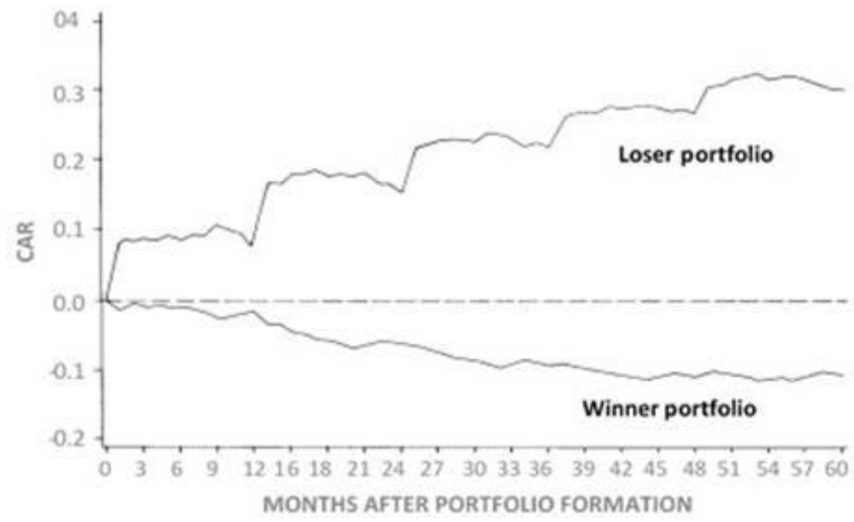
Sometimes, an academic paper can spur interesting spinoffs. We study the 1989 paper[1] by Richard Thaler (2017 Nobel Prize winner in Economics for behavioral economics) which highlights certain predictabilities of stock prices and try adapting it to Indian equities. Thaler's Nobel Prize work is said to have drawn significantly from this paper, which essentially cites many studies suggesting that the worst performing stocks in a period outperform in subsequent periods. Upon adapting it to India, we conclude that 1) mean reversion is not strong or consistent enough to exploit in practical conditions, and 2) momentum sustains much more in bottom performers than in top performers in a 3 year look-back and look ahead analysis but shorting them can be tricky.

We describe the main studies and arguments in the 1989 paper by Thaler and De Bondt, our approach to adapting these to Indian equities and testing for mean-reversion and finally, our findings in detail.

Highlights from "A Mean Reverting Walk Down Wall Street" by Richard Thaler and Werner de Bondt:

- Efficient market theory is much touted but there are quirks. Eugene Fama wrote two papers, one in which (in 1965) he says that past stock prices cannot predict future prices and then a 1980 paper where he says the opposite. But sample size was small and time period short.
- But if time period is lengthened, and more stocks (US market) included in sample, evidence of some predictability in the form of mean reversion (negative serial correlation, i.e. stock returns are in opposite direction in look back and look ahead period) emerges.
- Mean reversion rises in look-back and look-ahead periods of 18m and more, and all the way upto 5yrs. But beyond 5yrs it decreases. Extreme quintiles in look back period show mean reversion.
- Conclusions are true for other markets like Canada, UK and several other countries though not all. Similar strategies like buying low PER stocks can also yield outperformance. Thaler and de Bondt hypothesised that systematic investor overreaction (and recency bias) causes contrarian strategies to succeed.
- They tested 35-stock best/worst portfolios over 1-5 years over 1928-1982 period. Look back and look ahead period were equal.
- The worst and best 35 stocks from each 5yr period would be evaluated in the look ahead 5 yr period. It was seen that 1) worst 35 regularly outperformed index 2) the worst 35 delivered the bulk of the outperformance in January and 3) best 35 regularly underperformed, but by a lesser extent.

Figure 1: Cumulative excess returns for winner and loser portfolios (De Bondt and Thaler, 1985)



Source: 1989 Thaler and Bondt research paper.

[1] Anomalies: [A Mean-reverting Walk Down Wall Street.pdf]() by Werner F M De Bondt and Richard Thaler

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- In a follow up paper (1987) they found that even bottom quintiles during 4 year periods in 1966-83 outperformed by 25ppt. But these firms were small cap firms, and there are limitations in implementing such a strategy. They also cite another paper where large firms with more than 7.5/10/15pc price drops in a day thereafter reported excess returns of 2.84/3.95/6.18pc excess returns, implying strong short term serial correlation (but this held only for large losers in a day, but not large gainers).

Adapting Thaler and de Bondt to Indian market

In our attempt to adapt Thaler's conclusions to the India equity market, we did the following:

1. Consider the universe as BSE 100 in any year for last 14 years (2005-2019). BSE 100 is a fairly stable universe and we took the composition in each year as it was then, so the group of stocks studied changed year to year, and it was not a constant composition stock list.

2. Rank stocks based on Total Return performance in last three years. This was because some stocks in the index such as utilities and at times IT gave significant dividends hence taking only price appreciation would have been wrong.

3. Select the 10 worst stocks and evaluate average for that group of 10 worst in the last historical 3 years.

4. Evaluate the performance of these 10 stocks in the next 3 years.

5. Evaluate performance of Nifty in next 3 years also on Total Return basis.

6. Hence compare worst 10 and Nifty in next 3 years. There are 12 such periods.

7. Repeat 1. to 6. for the best 10 stocks for 3 years.

8. Repeat 1. to 7. after removing the 2 worst performers in worst 10 and 2 best performers in best 10, for 3 years.

9. Repeat 1. to 8. for 1 year look back and look ahead periods. There are 17 such periods from CY05 to CY21 including both.

Note that the Worst 10 in a 1 year time frame can be a different set of stocks than the Worst 10 in a 3 year time frame. Similarly for Best 10.

The results of our exercise are summarized below.

Figure 2: Comparison of worst BSE 100 performers in a 3yr period with Nifty in subsequent 3yr period – mean reversion does happen, but not outperformance

Current Period		Top10 - 3yr CAGR (%)				Worst10 - 3yr Cagr (%)				Nifty Return (%)
From	To	Top10	Ex top 2	CAGR – Next 3yrs	CAGR – Next 3yrs – Ex top 2	Worst10	Ex Worst2	CAGR – Next 3yrs	CAGR – Next 3yrs – Ex Worst2	3yr period
31-Dec-05	31-Dec-08	78.8	53.9	2.0	8.0	-28.3	-26.0	15.2	3.3	16.0
31-Dec-06	31-Dec-09	80.2	67.6	-16.8	-19.7	-23.8	-22.0	-8.9	-10.8	4.3
31-Dec-07	31-Dec-10	48.3	40.2	12.5	15.1	-37.7	-35.1	-21.6	-16.8	0.9
31-Dec-08	31-Dec-11	70.2	64.1	36.8	37.1	-24.2	-21.9	12.8	16.3	21.4
31-Dec-09	31-Dec-12	39.9	36.9	14.9	13.6	-27.3	-24.8	-7.6	-9.5	10.4
31-Dec-10	31-Dec-13	31.3	28.9	4.9	4.2	-28.4	-26.3	-7.0	-4.7	9.1
31-Dec-11	31-Dec-14	57.0	53.1	11.6	14.1	-8.4	-4.1	5.4	5.3	8.3
31-Dec-12	31-Dec-15	65.0	56.9	12.2	12.3	-21.0	-17.7	11.5	12.3	11.0
31-Dec-13	31-Dec-16	59.7	54.7	2.8	-5.7	-19.7	-15.7	-10.9	-9.1	14.1
31-Dec-14	31-Dec-17	54.0	47.3	-6.6	-8.3	-10.8	-9.4	-15.4	-16.6	9.9
31-Dec-15	31-Dec-18	44.8	41.2	21.5	21.5	-18.8	-15.0	10.3	15.4	16.9
31-Dec-16	31-Dec-19	44.8	40.1	22.8	23.3	-21.2	-16.9	-0.6	-2.4	12.0
	Average	**56.2**	**48.8**	**9.9**	**9.6**	**-22.5**	**-19.6**	**-1.4**	**-1.4**	**11.2**

Source: Bloomberg; IIFL Research

Figure 3: Comparison of worst BSE 100 performers in a 1yr period with Nifty in subsequent 1yr period – mean reversion more significant but in last 13 periods*, O/P insignificant

Current Periods	Top10 cagr (%)				Worst10 cagr (%)				Nifty Return (%)	Next period	
	Top10	Ex top 2	Next yr	Next yr – Ex top 2	Worst10	Ex Worst2	Next yr	Next yr – Ex top 2		From	To
CY06	128.4	116.7	59.5	46.9	-29.5	-25.6	139.3	156.9	54.8	31-Dec-06	31-Dec-07
CY07	386.3	320.1	-74.4	-75.7	-18.0	-15.7	-50.2	-44.4	-51.8	31-Dec-07	31-Dec-08
CY08	-7.7	-14.5	66.2	67.2	-83.6	-82.2	145.0	157.0	75.8	31-Dec-08	31-Dec-09
CY09	319.5	300.7	22.1	21.5	-3.1	3.1	4.7	10.9	17.9	31-Dec-09	31-Dec-10
CY10	63.8	60.1	-14.6	-16.0	-34.5	-32.4	-56.5	-53.2	-24.6	31-Dec-10	31-Dec-11
CY11	15.3	12.3	36.2	35.6	-63.4	-61.3	76.7	73.0	27.7	31-Dec-11	31-Dec-12
CY12	115.7	94.7	-8.5	-15.6	-5.2	-3.8	-1.2	-11.7	6.8	31-Dec-12	31-Dec-13
CY13	69.1	60.8	24.4	21.6	-42.5	-39.8	36.4	41.0	31.4	31-Dec-13	31-Dec-14
CY14	121.6	103.5	14.5	9.7	-23.8	-17.9	-16.6	-9.6	-4.1	31-Dec-14	31-Dec-15
CY15	50.3	45.1	6.6	10.2	-44.3	-40.8	24.0	13.1	3.0	31-Dec-15	31-Dec-16
CY16	72.5	60.3	47.9	47.9	-33.4	-28.1	50.2	56.1	28.6	31-Dec-16	31-Dec-17
CY17	125.2	109.8	-20.7	-15.5	-14.6	-9.1	-15.7	-21.2	3.2	31-Dec-17	31-Dec-18
CY18	36.9	33.9	18.7	14.8	-48.2	-44.4	-13.7	-5.9	12.0	31-Dec-18	31-Dec-19
CY19	55.0	51.4	19.5	12.3	-41.9	-35.6	-1.5	9.4	14.9	31-Dec-19	31-Dec-20
CY20	128.7	80.7	21.0	20.2	-24.8	-22.3	30.2	30.8	24.1	31-Dec-20	31-Dec-21
CY21	194.5	161.5	10.2	-4.4	-11.8	-7.7	-3.0	-2.2	-6.2	31-Dec-21	18-Jul-22
Average	**117.2**	**99.8**	**14.3**	**11.3**	**-32.7**	**-29.0**	**21.8**	**25.0**	**13.3**		

Source: Bloomberg, IIFL Research; *Most of the outperformance of Worst 10 has happened in 2 years out of 17, which are CY06 and CY08. Excluding these two years, the outperformance is modest.

Figure 4: The summary of both the calculations is presented below.

Average for all periods	Top10 Historical	Top10 ex-top2 Historical	Top10 Next period	Top10 ex-top2 Next period	Worst10 Historical	Worst10 ex-Worst2 Historical	Worst10 Next period	Worst10 ex-Worst2 Next period	Nifty - Next period
3 year periods	56.2	48.8	9.9	9.6	-22.5	-19.6	-1.4	-1.4	11.2
1 year periods	117.2	99.8	14.3	11.3	-32.7	-29.0	21.8	25.0	13.3

Source: IIFL Research

Conclusion: 1) mean reversion is not strong or consistent enough to exploit in practical conditions, and 2) momentum sustains in bottom performers in a 3 year look-back-look ahead analysis but shorting them can be tricky.

1. We can see from the above tables that in a 3 year time span (both look back and look ahead periods), the reversion to mean is pronounced but not good enough – neither do the previous period winners register a pronounced underperformance nor the losers outperformance in the next period.

2. The best 10 stocks don't offer much by way of either consistent U/P or O/P in either a 1 year or 3 year time frame…so it is really the losers in any period where the potential may lie.

3. In the losers, there is a large divergence between the results in 1 year and 3 year time frame. But remember, the group of worst 10 stocks in the last 3 years is different from the worst 10 in the last 1 year.

4. In a 1 year time frame, at first glance there is such a strong u-turn that the worst 10 stocks outperform the Nifty over a 17 year period by 8ppt and if worst 10 ex- worst 2 is considered, then by 12ppt. But most this O/P is derived from only 2 years, CY06 and CY08. For the post CY08 period, the extent of U/P or O/P in the worst 10 stocks narrows to less than 2ppt (even if worst 2 are excluded).

5. In the three year analysis, the losers deliver a large U/P. In theory one can short this basket vs the Nifty and hold for 3 years for a high return with 90% probability. But interim movements will test the liquidity threshold. If positions are closed out upon becoming out of the money, the strategy would get diluted, so this is a practical constraint. Further the stocks are likely to be smallish in mcap (at times lower in mcap than even midcaps) and there could be a rollover loss.

Hence in conclusion, simplistic strategies which may have been found to work when practical constraints have been removed may not be implementable in Indian equities. We would prefer a more fundamentals-influenced quant approach where a mix of factors including growth, profitability, cash flows and multiples are considered.

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