Is Reversion Statistical?

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Abstract

There is no disagreement regarding the statistics of mean reversion. What goes up comes down and vice versa. Campbell and Shiller (1988) said that the simple theory of mean reversion was basically right. Fama and French (1989) also suggest that valuation ratios forecast five-year returns with quantifiable accuracy. It is the failure of reversion (divergence) that has not been reconciled with the expression of reversion. Why is the society so keen to accept reversion as statistical, but its failure as behavioral? John Bogle's (2001), Star, Comets and the Sun analogy to the idea of reversion around investing styles reinforces the idea, that all failure of reversion is an error while reversion is a statistical reality. The reason Bogle suggests not to focus on investing styles, as markets are anyway going to recoil back to the statistical mean. Thaler (1999), goes a step further explaining reversion failure as driven by behavioral errors. How strong is the behavioral case? Should reversion and diversion both be statistical?

Reality of Reversion

'Stock Price, Earnings and Expected Dividends, John Y. Campbell, Robert Shiller, 1988'

"The research suggested that a <u>long moving average</u> of real earnings <u>helps to forecast</u> future real dividends, which in turn are <u>correlated with returns on stocks</u>. The idea is to take a long-term average of earnings (typically 5 or 10 years) and adjust for inflation to forecast future returns. The long-term average <u>smooths out short-term volatility of earnings and medium-term business cycles</u> in the general economy and they thought it was a better reflection of a firm's long-term earning power…despite all the evidence that stock returns are hard to forecast in the short run, <u>this simple theory of mean reversion is basically right</u>….Thus, it seems natural to give at least <u>some weight to the simple mean-reversion theory</u> that when stock prices are very high relative to these indicators, as they have been recently, then prices will <u>eventually fall in the future to bring the ratios back to more normal historical levels</u>. Both Siegel and Glassman– Hassett emphasize that stock returns have historically had a lower risk at long horizons than at short horizons. This is a <u>manifestation of the same mean-reversion</u>…Graham and Dodd recommended an approach that…shifts the original point of departure or basis of computation, from the current earnings to the average earnings, which should cover a period of not less than five years, and preferably seven to ten years."

"Index dividend yields and cyclically adjusted P/E ratios (CAPE's), among the other aggregate variables can predict future equity returns. High dividend yields and low CAPEs tend to predict above-average future returns. Conversely, low yields and high CAPE's signal below average returns at some point of time. In Campbell and Shiller, 1987b that both real dividend growth and the log-dividend price ratio follow the stationary stochastic process so that they have fixed means."

Shiller CAPE spectacularly forecasted the carnage of the 2000 tech because it looked at the historical CAPE average and expected reversion. The idea of expensive or inexpensiveness being tied to the extremity of a ratio and its reversion around the mean. The science of predicting trends and allocating

investments based on extremities, which in turn are based on limited social or market history seems naive. Especially if we change our focus to understanding the reversion and diversion process in conjunction.

Moreover, there are assumptions in CAPE and in its interpretation. First; CAPE as a measure is good and will predict; Second; Extremes in CAPE are bound to reverse; Third; Extremes though subjective should work objectively, and work as a timing indicator annually. Are the fundamentalists and behavioral experts behaving like longer trend anticipating cyclists? The indicator has reached an extreme, and it should turn now, bringing in underperformance.

Using P/E as a way to value the stock market is of limited value if research has showcased P/E to be a proxy of size. And size could itself could be a proxy as explained in the Size Proxy (Pal, 2015).

Robert Shiller's Paper on 'The Volatility of Stock markets Prices' published in 1987 uses dividend data and real interest rates to seek evidence that true investment value changes through time sufficiently to justify the price changes. His paper concluded that most of the volatility of the stock market prices appears unexplained. Shiller volatility or fluctuations prove that behavior of markets is not normal. Non-normal distribution series is a widely followed proof of inefficiency in prices.

The rate of change in dividend values, interest rates, and market price in Shiller's data can be used to isolate temporal changes (time durations) defined in days. Though on one side the time duration data illustrate a non-normal distribution and confirms Shiller's non-normalcy finding within the value (fundamental data) and market data, it opens a larger debate suggesting temporal changes to be the reason for market volatility and inefficiency. This should not be surprising considering the significant debate around intertemporal choices acknowledged by Adam Smith (1776) and researched later by John Rae (1834).

Eventuality of Reversion

'The Stock Market UniverseStars, Comets, and the Sun, John Bogle, 2001'

"*Will the valuation ratios revert to their historical means? One should think of the P/E ratio as a stochastic process that will continue to cycle, but within a higher range. Thus, substantial fluctuations in valuation ratios - albeit around a higher mean. In each decade, the top-quartile funds tumbled sharply - and rather consistently - in terms of their excess returns over the S&P 500 Index. One reason the top quartile funds fall back to only slightly behind the market while the rise of the bottom quartile funds usually fails even to return them to the market's return is that top-quartile funds have below-average operating expenses and bottom-quartile funds have above-average operating expenses. While gross performance reverts to the mean, fund expense ratios do not. So funds with lower expenses garner the advantage in net performance. Clearly, reversion to mean (RTM) rules the mutual fund seas…Despite this powerful, self-evident pattern of mean reversion, the mutual fund industry both revels in it and panders to it. Why? Because past performance attracts investor attention and investor assets. The industry aggressively promotes past fund returns—but only when they have been extraordinary. The net result is that money pours into a high-performing (i.e. hot) fund only after the performance is achieved. To make matters worse, when the seemingly inevitable reversion to the mean (and usually well below it) takes place, investors' illusions are shattered, and the money flow first dries up and then turns negative, as investors depart the sinking ships….Money cannot flow into or out of technology stocks, for each purchase of a technology share by one investor must represent a sale by another. But in the mutual fund industry, not only can cash flows exist from one style to another, they can be accurately measured. So it is easy to observe money pouring into growth funds and out of value funds, or vice versa. And pour in and out it does!…Speaking for myself, I have the ability to forecast neither how much of this recent reversion to the mean in favor of Value remains, nor when it will end. If you are smart enough to know, please be my guest and act accordingly. Good luck!"*

Bogle claims to lack the ability to forecast. All his argument is around reversion to mean. Don't bother about value or growth, be with the low-cost market… take beta and be happy..no point of heading into new research…timing Value or growth is impossible…smart beta is an illusion.

Divergence

Relying on behavioral explanations to explain diversion (anomalies, failure of reversion) did not further the cause of behavioral investing. The case for what causes inefficiency, what explains it has been simplified by the behavioral economists, using behavioral reasons for anomalies (cases of inefficiency). Unfortunately, this has lead to the subject becoming more of a subjective discourse rather than something objective. Ideas like anomalies are here to stay, markets can't be predicted, but some forms of extreme anomalies can be profited from lead to the idea of behavioral funds. Adjusted for risk, behavioral funds were tantamount to value investing. Behavioral finance fund performance proved that anomalies can't be identified and exploited on a persistent basis. The behavioral model also accepts it's temporal limitations.

'End of behavioral Finance, Thaler, 1999'

The five aspects Thaler points out in his paper 'End of behavioral finance' (a term he confidently used to suggest that behavioral finance will be the only form of finance left) are 1) The equity premium puzzle, 2) Predictability, 3) Dividends, 4) Volatility and 5) Volume myth. All of these five aspects can be explained as mean reversion failures.

First; the equity premium puzzle is that the undue premium equities get over treasuries are more than justified by the inherent risk in equities. So, the question behavioral finance is asking here is why equity premium (above the risk premium) does not revert to the mean (vanish), or why don't equities erase the respective premium vs. treasuries over a certain period.

Second; behavioral finance suggests that predictability in markets is a factor of mispricing. When value gets mispriced versus glamor, it invariably corrects and delivers abnormal returns. Here behavioral finance suggests that because a mispriced asset reverts to mean it delivers returns. This again is a case of a mean reversion failure followed by a regular mean reversion.

Third; dividends, i.e. why do most large companies pay cash dividends? And why do stock prices rise when dividends are initiated or increased when companies can make their taxpaying shareholders better off by repurchasing shares rather than paying dividends? Here behavioral finance seems to be questioning why dividend stocks earn a premium when they shouldn't. Or, in other words why dividend premium should not revert to a mean value (vanish)? Fourth and fifth; volatility and volume are other cases of mean reversion failure. Both volatility and volume are unexplained, exhibit extreme behavior and don't adhere to any standard models.

'Are behavioral finance equity funds a superior investment?, Goodfellow et al. 2013'
Journal of Asset Management 14, 111-119 (April 2013)

"U.S. behavioral funds outperformed during bull markets but underperformed in bear markets. The funds don't outperform passive benchmarks; they do outperform active funds in general. Either stock markets are more efficient, or fund management is worse than behavioral funds advertise. Adjusted for risk, behavioral funds were tantamount to value investing. There was no clear evidence of outperformance on a risk-adjusted basis. Behavioral finance fund performance proved that anomalies can't be identified and exploited on a persistent basis and costs could be a partial contributor."

If behavioral funds are like fundamental funds where does this lead us? This tells us that anomalies that behavioral finance is trying to exploit are like deep value. And for fundamentalists this means that value has something to do with behavioral biases. The idea of reversion in value also becomes a commonality for both fundamentalists and behavioral finance. Both fundamentalists and behavioral finance underplays

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the idea of reversion. They have chosen to accept reversion and ignore divergence as a behavioral error or simply an error.

If the behavioral model was correct and it had moved beyond temporal limitations or shown excess returns above benchmark there would have been no debate regarding divergence (reversion) being driven by behavioral errors, but behavioral finance has failed to challenge the market efficiency theories. Shiller's argument only strengthens the case of reversion more than the one for CAPE. Bogle's relying on reversion is a weak case against factor investing. This brings back home the argument that researchers can not chose to explain reversion as natural phenomenon and divergence as something based on behavioral errors or irrational exuberance. If reversion and divergence are natural phenomenons that can be explained statistically then we could look beyond behavioral errors to systems where failure of reversion and reversion are both statistical in nature.

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