A Rough Guide to Behavioral and Evolutionary Finance

Prof. Dr. Thorsten Hens
University of Zurich
September 11. 2003

Abstract

In the last 20 years or so, behavioral and more recently evolutionary finance has changed our understanding of financial markets. In contrast to traditional finance this new paradigm is not based on the rationality hypothesis but rather on the psychology of the investor. Following this new point of view, many asset market anomalies have found interesting explanations. Moreover, behavioural finance points to a large set of applications in portfolio management. As the recent field of evolutionary finance highlights, knowledge of behavioural finance is essential in the fight for market capital

Traditional Finance: Rational Randomness

As early as 1900 Louis Bachelier had claimed that stock prices are actually random. Comparing trajectories of random walks and stock prices, given the statistical methods of the time, Bachelier could not find a significant difference among the two. Economists were shocked by this finding. How could it be that even the best organized market, the market for shares, produces a random outcome? Does the market system lead to irrationality? To the contrary, was the surprising answer of Paul Samuelson some 65 years later. The rationality of the investors *implies* that stock prices have to be random. If in any point in time prices fully reflect all information then from one point to the next prices have to change randomly. Any non-random change would have been anticipated before. Moreover this *anticipation principle* is consistent with rational valuation, for example in terms of the discounted dividends model (DDM). In any period in time stock prices may well reflect expected future dividends and yet price changes are random. Finally, the anticipation principle implies Fama`s (1970) efficient market hypothesis which in turn implies that the best portfolio strategy is the *passive* strategy of holding the market portfolio. Any active strategy will eventually fall short of the market since it will only incur unnecessary trading costs.

Behavioral Finance: Market Anomalies and Their Psychological Explanations

Shiller (1981) was first in pointing out that stock prices show volatility in excess over the volatility of their dividends. Figure 1 from Shiller (1981) shows the deviations of the Dow Jones Industrial Average, deviating from the rational DDM-benchmark.

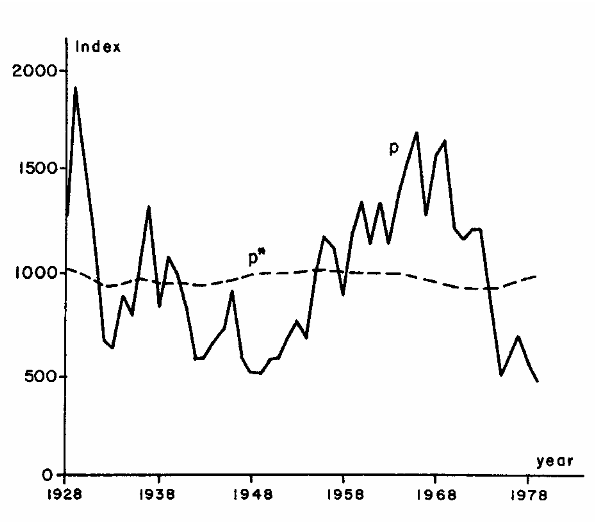

Figure 1:
Real modified Dow Jones Industrial Average (solid line p) and ex post rational price (dotted line p*), 1928-179, both detrended by dividing by a long-run exponential growth factor. The variable p* is the present value of actual subsequent real detrended dividends, subject to an assumption about the present value in 1979 of dividends thereafter.

An equivalent way of stating excess volatilty is that stock prices show short term momentum and long term reversal. To give a possible reason for excess volatility we consider the following example from Kahneman and Tversky (1979).

Example:
A fund manager is known to beat the market in 2 out of 3 years. Which of the following track records does most likely represent his performance:

a) BLBBB b) LBLBBB c) LBBBBB?

Here B means „Beat the market", and L „Lose to the market", respectively.

The typical answer in this example is track record b) is most likely the true track record. However, track record b) is identical to track record a) and the condition that initially the fund manager has lost to the market. This initial condition is however not certain, it only occurs with probability 1/3. Hence a) is more likely than the track record b). Yet, assuming that even in a small sample the proportion of the statistical law, which in this case is 2 out of 3, has to be reflected, most people chose b) because in b) the proportion of L and B resembles most closely 2/3. Kahneman and Tversky (1979) call this misjudgement the "representativeness bias".

To link the representativeness bias to short term momentum and long term reversal, imagine that a stock, or the market as whole, has recently produced a nice sequence of good (bad) returns. Then, even after a small period in time, investors prone to the representativeness bias tend to infer from this that the statistical law governing the returns of the stock has fundamentally change to the positive and hence stock prices will spur upwards (downwards). Supposing the statistical law did however not change, eventually more evidence is available and stock prices have to revert back.

Excess volatility and the representativeness bias are just one example of market anomalies that may have psychological explanations. Other such examples (see for instance Shefrin (2000) or Montier (2002) include

1) Short term momentum of stock prices after positive earnings surprises which can be explained by the inability of investors to correctly update a prior on the arrival of new information.
2) Increasing volatility of asset returns when prices fall which can be explained by "get eventis", i.e. the tendency of investors to take excessive risks after incurring losses.
3) Co-movements of assets with the market in which they are listed rather than with their identical twins in other markets (e.g. Shell Transport and Trading and Royal Dutch Shell) which can be explained by "mental accounting", i.e. the tendency to structure portfolios into too narrow asset classes.
4) The puzzle that closed end funds are priced far from their net asset values which can be explained by the preference investors have for the delivery of regular payments rather than for regularly "dipping into capital", i.e. realizing capital gains.
5) Excessive trading volume in stock markets which can be explained by "overconfidence", i.e. the effect that far more than 75% of the traders think they are more clever investors than the average trader.

Evolutionary Finance: Survival of the Fittest at Wall Street

As we have argued above the market is not as rational as believed by traditional finance. Hence it is possible to beat the market if one knows well the market anomalies and their explanations. DeBondt and Thaler (1985) for example, pointed out a rather simple way of exploiting the representativeness bias. A portfolio of „Past time Losers" outperforms a portfolio of „Past-time Winners" and hence the simple „contrarian strategy" of buying past time losers beats the market.

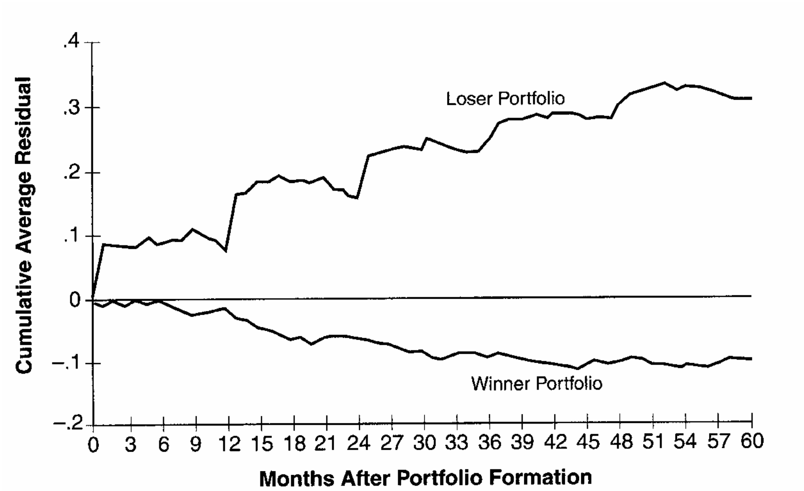

Figure 2: Cumulative Average Residuals for Winner and Loser Portfolios of 35 Stocks (1-60 months into the test period).Cumulative abnormal returns for two portfolios, one consisting of past losers and the other consisting of past winners. Past losers subsequently outperform, while past winners subsequently underperform.

Evolutionary finance provides a systematic analysis of active asset market strategies, as for example those performed by behavioural hedge funds trying to outperform the market. This most recent field of finance is based on biological models reminiscent of Charles Darwin. The stock market is seen a market selection mechanisms in which some active strategies gain capital at the expense of other active strategies. Moreover, there is an ongoing process of innovation of strategies leading to unforeseen and rapid changes of the pool of existing strategies and also generating ever new market anomalies. In our first results (Hens, Schenk-Hoppe and Stalder (2002)) we were able to show that seemingly rational strategies like mean-variance optimization can do very poorly against seemingly naïve strategies like a division of the portfolio in equal parts. Moreover, in that paper we show that portfolios based on behavioural finance initially do very well as compared to those based on traditional finance, yet in the long run a simple value strategy, dividing the portfolio according to relative dividends, will eventually outperform all other strategies. This approach has more interesting results in storage which need to be found and explored.

References:

BACHELIER, L. (1900): „Théorie de la Spéculation“, Annales Scientifiques de l'Ecole Normale Supérieure, 3rd. Ser. 17: 21-88. Translated in „The Random Character of Stock Market Prices“; edited by Paul Cootner (1964), Cambridge, Mass., MIT-Press.

DEBONDT, W. AND THALER, R. (1985): "Does the Stock Market Overreact?", Journal of Finance, 40: 793-805.

HENS,T.,SCHENK-HOPPE, K.R. AND M. STALDER: "An Application of Evolutionary Finance to Firms Listed in the Swiss Market Index, Swiss Journal of Economics and Statistics, Vol 138(4), pp. 465-487.

FAMA, E. F. (1970): "Efficient Capital Markets: A Review of Theory and Empirical Work", Journal of Finance, 25: 383-416.

KAHNEMAN, D. AND TVERSKY, A. (1979): "Prospect Theory: An Analysis of Decision Making Under Risk", Econometrica 47, No.2: 263-291.

MONTIER, J. (2002): *Behavioral Finance*, John Wiley&Sons, LTD.

SAMUELSON P. (1965): "Proof that properly anticipated prices fluctuate randomly", Industrial Management Review, 6: 41-49.

SHEFRIN, H. (2000): "Beyond Greed and Fear", Harvard Business School Press.

SHILLER, R.J. (1981): "Do Stock Prices Move too Much to Be Justified by Subsequent Changes in Dividends?", American Economic Review, 71: 421-436.