Psychology of Successful Investing

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The problem of how to maximize growth of wealth was solved over half a century ago by Kelly and Breiman: maximize the expected value of the logarithm of wealth after each period. However, as living organisms we have evolved to maximize gene replication, not wealth.

Natural selection is a slow process, so our minds today are adapted to seeking our ultimate goal of reproduction in the *environment of evolutionary adaptedness* (*EEA*), which roughly coincided with the Pleistocene. In order to reproduce, or assist with the upbringing of close relatives, individuals are motivated to survive for as long as possible. Any living person may ruminate: I have survived thus far, everything that I have already experienced cannot be fatal because I am alive. For example, I have never eaten that berry before, and I have survived, so why should I risk eating it now? The most fundamental bias, therefore, is the *status quo bias* (also known as *conservatism*). The status quo bias can lead to another cognitive heuristic, known as *anchoring*, which describes the common human tendency to make decisions based on an initial 'anchor'. We prefer relative thinking to absolute thinking. Anchoring can cause the stock market to *underreact* to fundamental information.

The *endowment effect* is the phenomenon in which people value a good or service more once their property right to it has been established. Living in groups meant that respect for private property would have likely evolved as a Nash equilibrium, and the evolution of private property may well have given rise to the endowment effect. The idea of *loss aversion* is that losses and disadvantages have a greater impact on preferences than gains and advantages. Loss aversion and *risk aversion* are both consequences of the status quo bias/endowment effect. There is a further justification for risk aversion. Reproduction is a multiplicative process, so it is the logarithm of population that is additive. If one is risk neutral in terms of log(population), because the log utility function is concave, it follows that one must exhibit a small degree of risk aversion regarding population. In other words, it is better to have 4 offspring rather than (2 or 6), thus justifying risk aversion for gains. Further, as the subjective Bayesian de Finetti famously noted, 'probability does not exist', but we prefer to assign a subjective probability with ease. In other words, we also exhibit a preference for known risks over unknown risks. This is known as *ambiguity aversion*. Note

that the details of a descriptive account of decision making under risk are best accounted for by Kahneman and Tversky's *prospect theory*, their subsequent *cumulative prospect theory* and more recent developments such as the *transfer of attention exchange* model. My broader contention here is that risk aversion and loss aversion are merely artefacts of the status quo bias/endowment effect— we are simply conservative. For this reason, most investors seek a compromise between the optimal growth strategy and the security of holding cash.

A market is said to be *efficient* with respect to an information set if the price 'fully reflects' that information set, i.e. if the price would be unaffected by revealing the information set to all market participants. The *efficient market hypothesis* (*EMH*) asserts that financial markets are efficient. On the one hand, the definitional 'fully' is an exacting requirement, suggesting that no real market could ever be efficient, implying that the EMH is almost certainly false. On the other hand, economics is a social science, and a hypothesis that is asymptotically true puts the EMH in contention for one of the strongest hypotheses in the whole of the social sciences. Strictly speaking the EMH is false, but in spirit is profoundly true. *Modern portfolio theory*, which assumes that investors are rational and risk averse, and that markets are efficient, prescribes diversification, i.e. 'don't put all your eggs in one basket'. So, don't time the market, buy it.

Returning to the EEA, due to conflicts between predator and prey, group living, and competition for reproduction, deception evolved under natural selection; and as a consequence, so has the capacity to detect deceit. The easiest way of avoiding detection is to effectively lie to ourselves. This is known as *self-deception*. So, not only do we wish to appear (genetically) fitter than others (this has obvious advantages when it comes to mate selection), but we actually believe that we are. We will also attribute successful outcomes to our own skill but blame unsuccessful outcomes on bad luck, this is known as *self-attribution bias*. An apparently genuine belief that we can provide a rosy future is another trait that increases our fitness. Self-deception leads to *overconfidence* and *optimism*. To clarify the difference between optimism and overconfidence, consider the following contemporary example: if you believe that the stock market will rise, you are an optimist; if you believe that you can forecast the stock market with greater accuracy than you actually can, then you are overconfident. Economics is unique among the social sciences in that it starts from the premise that all individuals, regardless of sex, are created equal. The problem with such an egalitarian assumption is that scientific psychology shows that it is profoundly wrong. Due to sexual dimorphism vis-à-vis parental investment, men and women do not merely differ in degree, but differ in kind. In all species, the relative investment that is made by the male and the female in their offspring determines the degree of discrimination exercised by the individual when selecting a mate. In humans, females give birth to their offspring, whilst men do not, so females can be expected to be the more discriminating sex. Females limit the reproductive success of males, and men compete with other men for access to women. Men form a dominance hierarchy, whilst women exist in a more equitable social network. Men have little choice but to spend their lives competing for status in order to attain a high-fitness mate. The need for men to

maximize their rank in the dominance hierarchy led to greater overconfidence (via self-deception) in men than women. So how does overconfidence manifest itself in the modern day investor? Overconfidence causes individuals to overestimate how well calibrated they are, investors fail to realize that they are at an informational disadvantage and make bad bets, and they also trade too frequently. In 2001 Brad Barber and Terrance Odean found that men trade 45 per cent more than women, which reduced men's average net returns by 2.65 per cent a year as opposed to 1.72 per cent for women.

Recall from your school days that the finite frequency theory of probability defines the probability of an outcome as the frequency of the number of times the outcome occurs relative to the number of times that it could have occurred. In the EEA a quick count of the number of predators approaching was likely to be a useful heuristic for survival, which may explain why we make fewer errors when dealing with relative frequencies than when we are faced with (Bayesian) probabilities. Fast and frugal frequency-based probability, rather than Bayesian methods, evolved. This leads to failing to take sufficient account of, or even ignoring, prior probabilities, which is known as *base rate neglect*. Base rate neglect combined with overconfidence can lead to decisions being made based on how representative a given individual case appears to be independent of other information about its actual likelihood. This is the cognitive heuristic known as *representativeness* (or *similarity*) and is essentially stereotyping. Representativeness, via underweighting the base rate, is likely to cause overreaction. In contrast to the underreaction caused by anchoring mentioned above, a series of good or bad news can cause the stock market to *overreact*. Studies have identified overreaction at very short horizons, say less than one month, momentum possibly due to underreaction for horizons between three and twelve months and overreaction for periods longer than a year.

Technical analysis is the art of inferring market prices by means of the analysis of data generated by the process of trading. Technical analysts rely on the assumption that markets discount everything *except information generated by market action*, ergo, all you need is data generated by market action. If the weak form of the EMH holds, then technical analysis has no value. Conversely, for technical analysis to work requires that the weak (and therefore the semi-strong and strong) forms of the EMH are false. Why, then, is technical analysis so popular? People often predict future uncertain events by taking a short history of data and asking what broader picture this history is representative of (independent of other information about its actual likelihood). This is representativeness; technical analysis is representativeness.

Does technical analysis work? There is evidence in support of the usefulness of moving averages, momentum, support and resistance and some patterns; but no convincing evidence in support of Gann theory or Elliott wave theory. Chart patterns work better on stock markets than currency markets. Nonlinear methods work best overall. This is not at all surprising in light of the non-linearities found in markets. Technical analysis works best on currency markets, intermediate on futures markets, and worst on stock markets. There are theoretical reasons why this makes sense. Because investors are risk averse,

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as compensation for the time value of money and systematic risk, they demand a positive expected return from a risky portfolio. In long-only markets, like a stock market, this implies a positive upward drift. In symmetric markets where traders are as likely to be long as they are short, like futures and foreign exchange markets, the implication is that one would expect the price to be predictable to some degree. Furthermore, government intervention in foreign exchange markets may provide a positive sum game for other participants in the short-term.

There are other psychological explanations as to why a large number of people have a strong belief in technical analysis. *Communal reinforcement* is a social construction in which a strong belief is formed when a claim is repeatedly asserted by members of a community, rather than due to the existence of empirical evidence for the validity of the claim. *Selective thinking* is the process by which one focuses on favourable evidence in order to justify a belief, ignoring unfavourable evidence. *Confirmation bias* is a cognitive bias whereby one tends to notice and look for information that confirms one's existing beliefs, whilst ignoring anything that contradicts those beliefs. It is a type of selective thinking. *Self-deception*, as described earlier, is the process of misleading ourselves to accept as true or valid what we believe to be false or invalid by ignoring evidence of the contrary position. A pertinent and common question is 'is technical analysis self-fulfilling or self-destructive?' A priori, I hypothesize that if one conditions on price, then technical analysis is self-fulfilling; and if one conditions on time, then technical analysis is self-destructive. The evidence for the former includes the reported success of support and resistance, and the evidence for the latter includes the documented erosion of the two most important calendar effects, the weekend effect and the January effect.

Technical analysis doesn't work as well as it used to. As transaction costs decrease, available computing power increases and the number of market participants increases, one would expect markets to become increasingly efficient and thus it is not surprising that the efficacy of technical analysis should diminish. There is money to be made marketing and selling books and courses on technical analysis. If there is gold out there, why are so many people selling shovels rather than digging? Caveat emptor.

Do newspapers and other media reporting news create a bias? News, by definition, is unpredictable (otherwise, it would have been reported yesterday). If we cannot predict something, it will be a surprise. So news is surprising, and the most likely to be reported news, therefore, is the most surprising. This means that rare events, such as a man being killed by a shark, are likely to be heavily reported. Whilst, for example, a man dying of diabetes is much more common, but goes unreported. In other words, the media creates a biased impression of the world around us. Our ancestors lived without the luxury of the media, and the ease with which they remembered an event would have been more representative of the probability of it recurring. Of course, 'extreme' events have always been more memorable than mundane events, but in the EEA, one would only experience or witness events (whether surprising or mundane) taking place within the environment of one's own tribe, so it made sense to remember

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the extreme or important events. To summarize, modern man is far more likely than his ancestors to recall events that he is unlikely to experience (such as an aeroplane crash). I hypothesize that this is how availability (or saliency) evolved. *Availability* is a cognitive heuristic in which we rely upon knowledge that is readily available, rather than examine other alternatives or procedures. That is, we make decisions based on how easily things come to mind (which is usually something that is likely to be newsworthy). One study found that stocks with high levels of press coverage underperformed in the subsequent two years.

The aforementioned biases can affect individuals in isolation; in contrast, the following bias concerns an individual's response to their peers, so addresses group behaviour. There is both greater safety and improved efficiency with task sharing in numbers, so human beings have always tended to live in groups. The size of social groups was likely to have been constrained by the information-processing capacities of the brain, with 150 people being a good average. This led to the type of conversation that helped our ancestors, such as conveying information about food sources, dangers, or other people (gossip was of great importance from an evolutionary perspective)—tips and recommendations. Today, due to faster and wider means of communication, such behaviour can lead to *information cascades* and create *herding* (the *crowd effect*) with many people behaving in a similar manner, all following the *trend*. Herding can lead to bubbles and crashes in markets.

There is an aspect to the performance measurement of hedge funds that investors should be aware of. The *Sharpe ratio* is the most popular performance metric. It makes implicit assumptions which stem from the capital asset pricing model (CAPM): it assumes either 1) normally distributed returns *or* 2) mean-variance preferences. Both assumptions are suspect: 1) the returns generated by most hedge funds exhibit negative skewness, and 2) in addition to the mean and variance, people also care about skewness (they like it positive) and kurtosis (they don't like it), and higher moments matter too. Because the Sharpe ratio is oblivious of all moments higher than the variance, it is prone to manipulation by strategies that can change the shape of the probability distribution of returns. Mathematically, maximizing the Sharpe ratio is a standard quadratic programming optimization problem with the constraint that the mean excess return is fixed. The solution produces a reversed lognormal distribution with a truncated right tail and a fat left tail leading to extreme negative skewness. The optimal strategy for maximizing the Sharpe ratio involves selling out-of-the-money calls (to remove the right tail of the distribution) and selling out-of-the-money puts (to enhance the left tail) in an uneven ratio. Such a strategy would generate a regular return from writing options, but would have a large exposure to extreme negative events. In other words, a manager with no special information can improve his Sharpe ratio in such a way that the distribution of returns exhibits *negative* skewness. As mentioned above, most investors prefer *positive* skewness, therefore, although a high Sharpe ratio is good thing, a high Sharpe ratio *strategy* is a bad thing.

What attributes does a successful investor possess? One study found that

mutual fund managers who attended higher-SAT undergraduate institutions have systematically higher risk-adjusted excess returns, whilst another found a negative relationship between the tenure of a hedge fund manager and hedge fund returns. This implies that intelligence helps investors, but experience does not. What lessons should we take from this article? Modern portfolio theory dictates that the only free lunch in finance is diversification, so be sure to take it. For reasons of market efficiency, the question of whether to invest in an index fund, an actively managed fund, a fund of funds or a hedge fund depends on your risk profile. There is little evidence that timing the market is possible—and 70%–80% of day traders lose money—so don't waste time and money trying. The single most important lesson is to try and avoid being overconfident.