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# The Paradox of Skill

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A couple of weeks ago I watched the 2012 Oscar-nominated movie *Zero Dark Thirty*, the decade-long hunt for al-Qaeda terrorist leader Osama bin Laden, for the second time. As it often happens, one tends to find some new clues and perspectives when watching a movie again. It was no different this time. I experienced a "finding-wisdom-in-unexpected-places" moment because it rang so true for us involved in financial markets and investment decisions in general.

In one particular scene top-notch CIA operatives convened to decide whether they should recommend to the President attacking a Pakistani compound where Osama bin Laden supposedly was hiding out, but without actual or clear evidence to support the theory. At the start of the meeting the deputy director stated: "We don't deal in certainty, we deal in probability". Then each person present at the meeting is asked for his or her estimates on the probability that Osama bin Laden is hiding out in this specific compound. Everyone seemed cautiously optimistic (60% chance), but the female operative that has been continuously tracking the trail for ten years was adamant she is nearly 100% sure that this is Osama bin Laden's hide-out. After the meeting ended, the CIA director asked one of his deputies what he thinks of the female operative. "She is very smart". Then the director replies as he steps into the lift: "We're all smart".

Both men, of course, were factually correct in their replies. The CIA appoints the brightest of minds, and it is actually very difficult to differentiate skill between the top operatives. Think about professional sport in very

competitive, interactive environments. What differentiate one team/player from the other? Pure skill, yes, initially it may be, but one can expect other top-notch teams/players to close the skill gap over time. Eventually luck (uncontrollable variables like the bounce of a ball, poor referee decisions, and injuries to key players) may have the final say in outcomes.

Likewise, in the financial industry we find very bright minds, typically highly-qualified and skilled individuals competing against each other to stake their claim as the best of the best. That is to say it is not easy to demonstrate skill differences between participants (all have more or less the same qualifications, experience, etc.), and differences in outcomes are more attributable to the relative weights of outperforming and underperforming stocks in portfolios at particular points in time. *Alas*, it is impossible to predict how stock prices will react over relatively short-term periods; for example, “expensive” stocks may become more expensive and “value” stocks will become even cheaper. Again, luck may play a “surprisingly” important role in deciding who the winners are and in the investment industry the winners attract the bulk of investors’ assets over time. Indeed, the stakes are high and the actual rewards are even higher.

But, of course, not all sports or competitive domains are the same. Skill does matter, especially when you are an athlete or chess player. Likewise, in some industries intellectual capital and assets are unique and not easily replaced or replicated. At the other end of the spectrum, lotto winners clearly do not require any skill to win.

The relative importance of skill and luck in the outcome of events in different competitive environments:


All-in-all, differentiating between skill and luck is often a blurry concept at best. There is, however, something to say about the investment process (investment discipline, what to buy when, etc.) followed by investment firms. A disciplined process improves one's chances of success over time, something akin to the mental preparedness and training followed by top sport teams/players that often give them the defining edge in tough, pressure-cooker situations.

This, in short, is the paradox of skill. The more competitive an environment has become (the stakes are high) then one can expect that all participants will improve their skill level all the time, and those that lagged previously are narrowing the skill gap. But eventually relative skills among participants will converge because of human or physical limits to absolute skill improvement (diminishing marginal improvements). Then, all else equal, luck will have a relatively bigger say in the outcome of events. Statistically, the concept can be expressed as follows:

*Variance (results) = Variance (skill) + Variance (luck)*

If the variance of outcomes will decrease over time due to competition, it can only be because the variance of skill declined over the same period. Luck, *per se*, has an expected mean of zero and it will remain constant over time. Note, it does not mean the absolute skill levels of participants declined. In fact, it probably increased, but it will increase for all competitors in so far that the relative skill differences between the leaders and the laggards will diminish over time. Alternatively, it can be said that the "easy money" in the trade has been made, new competitors with fast improving skill sets have entered the fray and effectively are closing down the wide profit margins.

The paradox of skill can be further illustrated by means of a simple, competitive game example, which I coined "closest to the pin". The game is as follows: On a par 3 hole a sizeable monetary reward is offered to golfers who can hit from the tee his or her golf ball closest to the pin. The prize money is pro rata distributed among the players according to the distance of each player's ball from the pin. But the players that end up in the top-half of the game win significantly more than those in the bottom-half. The game is open to everyone, a feeble entry fee is charged, and access is limited only by means of a random draw. Participants will include professionals, low-handicaps, mid-handicaps and not-so-regular golfers. One can expect the following "accuracy" statistics from each category of golfer:

| Players | Average distance from pin (meters) | Standard Deviation |
|---|---|---|
| Pro's | 3.00 | 100% |
| Low-handicap | 6.00 | 150% |
| Mid-handicap | 10.00 | 300% |
| High-handicap | 15.00 | 600% |

Note, this is not to say that a high-handicap player cannot win handsomely by chance, but obviously the odds are stacked against such players.

Let us assume in game 1 the make-up of the competition is as follows:

| Players | Percentage of participants |
|---|---|
| Pro's | 15.0% |
| Low-handicap | 20.0% |
| Mid-handicap | 30.0% |
| High-handicap | 35.0% |

After game 1 has been played, the statistics will look something like this (I've developed a Monte Carlo simulation to run the game that, in total, involved 2,500 players):

Summary

| | |
|---|---|
| Median distance from pin | 9.12 |
| Variance of distance from pin | 34.97 |
| | |
| Better-than-median | |
| Percentage Pro's | 100% |
| Percentage Low-handicap | 98% |
| Percentage Mid-handicap | 37% |
| Percentage High-handicap | 16% |
| | |
| Worse-than-median | |
| Percentage Pro's | 0% |
| Percentage Low-handicap | 2% |
| Percentage Mid-handicap | 63% |
| Percentage High-handicap | 84% |

Next, in game 2, I changed the rules in so far that each participant must now pay a significant fare to enter the game; i.e. a player should carefully consider his chances of at least covering his/her expenses of playing the game (winnings less entry fee).

Players of game 2:

| Players | Percentage of participants |
|---|---|
| Pro's | 40.0% |
| Low-handicap | 30.0% |
| Mid-handicap | 20.0% |
| High-handicap | 10.0% |

Results of game 2:

Summary

| | |
|---|---|
| Median distance from pin | 5.26 |
| Variance of distance from pin | 20.10 |
| | |
| Better-than-median | |
| Percentage Pro's | 99% |
| Percentage Low-handicap | 30% |
| Percentage Mid-handicap | 6% |
| Percentage High-handicap | 6% |
| | |
| Worse-than-median | |
| Percentage Pro's | 1% |
| Percentage Low-handicap | 70% |
| Percentage Mid-handicap | 94% |
| Percentage High-handicap | 94% |

Finally, in game 3, a “professional” entry fee is charged. More likely than not, high-handicaps and even mid-handicaps won’t bother to apply, the initial fee (capital required) is simply too high.

Players of game 3:

| Players | Percentage of participants |
|---|---|
| Pro's | 75% |
| Low-handicap | 23% |
| Mid-handicap | 1% |
| High-handicap | 1% |

Results of game 3:

Summary

| | |
|---|---|
| Median distance from pin | 3.39 |
| Variance of distance from pin | 5.98 |
| | |
| Better-than-median | |
| Percentage Pro's | 65% |
| Percentage Low-handicap | 3% |
| Percentage Mid-handicap | 0% |
| Percentage High-handicap | 0% |
| | |
| Worse-than-median | |
| Percentage Pro's | 35% |
| Percentage Low-handicap | 97% |
| Percentage Mid-handicap | 100% |
| Percentage High-handicap | 100% |

The core principles of the paradox of skill are illustrated by the results of the above games:

- In an open competition with low barriers to entry (as in game 1) there are “low-hanging fruit” from which the really skilful players can profit. In fact, it is shown in game 1 that the skilful players will profit handsomely from the game as virtually all the skilful players performed better than the median distance from the pin. It is simply a matter of collecting their prize monies from the less skilful players.

- The “low-hanging fruit”, however, are disappearing as the game becomes more competitive and the stakes are getting higher. In game 3, a fair amount (35%) of professionals are actually performing worse than the median distance from the pin. Note that the professionals that underperformed have not lost their professional skill, but it is a matter of simple mathematics that a fair share of professionals will underperform (worse-than-median) if they represent the bulk of all the players in the game.

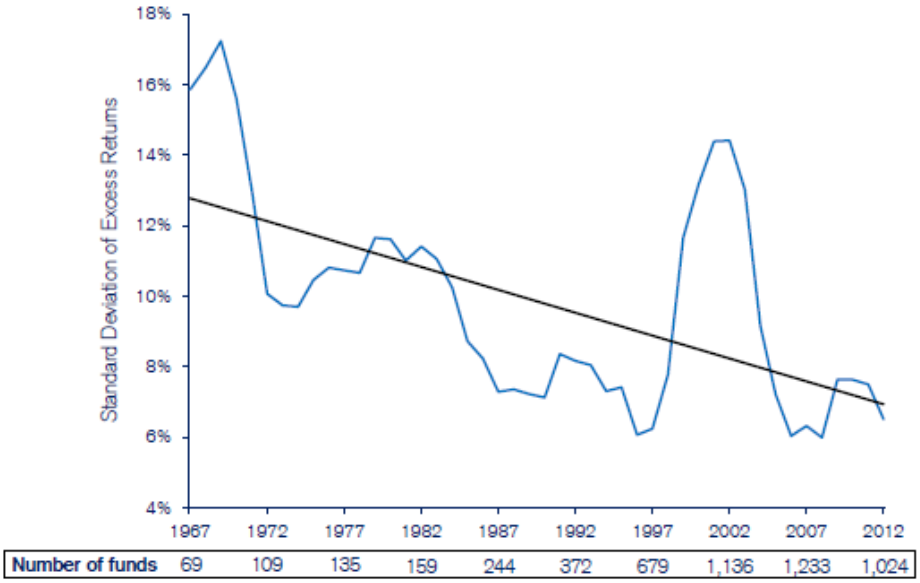
- Overall, the median distance from the pin decreased considerably as the game progressed towards game 3. Thus, the absolute outcome of the game improved, but on a relative basis the variance in outcomes decreased significantly. That means the variance in skill exhibited in the games decreased (luck is a constant).

- As a side note, the fundamental case for index investing is illustrated by these examples. Imagine that in my game ordinary golf players are offered the median distance from the pin as their performance measure. In exchange for not actually playing, and accepting the median distance, they have to pay a small entry fee. With the passing of time one will expect that predominantly professionals will fight it out to claim their stake as the winners of the game. The ordinary golfers that accepted the median distance instead of playing the game themselves, gain as the efficiency of the game improves (the median distance from the pin is decreasing).

- The ordinary golfers also could have paid certain professionals to win prize monies on their behalf. And if those professionals are performing well the ordinary golfers are doing better than merely accepting the median distance. Yet, with increasing competition the odds are getting smaller the chosen professionals will always end up in the top half of the game. Luck, which is unpredictable, becomes an important factor in the outcome of the game.

What about real-life investment markets? Are there any resemblances to the “closest to the pin” game described above? Indeed, Michael Mauboussin showed in his latest book, *The Success Equation*, how the increased skill in the investment industry has reduced the amount of excess returns (“alpha”) claimed by active managers as more and better competition has narrowed the level of outperformance.

Decline in standard deviation of excess returns for U.S. large cap funds:




*Source: Mauboussin & Callahan, 2013*

Then, of course, most professional investment firms are struggling to beat their market benchmarks (indices) over time. Professional investors dominate the market scene (akin to my game 3 example above). Thus, the fact that professional investment managers underperform the benchmark is not really surprising.

Why well more than 50% of professional active managers, and very often up to 80% and more, underperform the market is not a mystery either, simply because of the costs involved to actively manage investments. The net gain of all active investors in the market is zero. That means the outperformance of one group is at the expense of the underperformance of another group. But investment management costs must be subtracted from returns, thus the average net return must be lower than the market benchmark. In addition, given the influence of luck and structural issues (e.g. fund flows and sizes) in

the performance equation it is not always the same investment managers that will end up at the top of the performance charts. Thus, there is no guarantee that a good-performing manager today will still be a performing manager five to seven years from now.

Fierce competition is a fact of life in the professional investment management industry. What should investment managers do to improve the odds in their favour?

Besides a disciplined investment process that I mentioned earlier, it is about identifying in which market segments the manager has the upper hand relative to competitors. The investable opportunity set (market breadth) plays an important role because it is unlikely that a manager can really excel in a narrow or over-crowded market. Moreover, a specific investment strategy that yielded good outcomes in the past may not work that well in the future because it is likely that other competitors are replicating the same strategy and thus limiting profitable opportunities. For example, a number of lower-cost, enhanced index (“smart beta”) investment strategies have been introduced in recent years that essentially are replicating popular investment strategies followed by active managers in search of excess returns (“alpha”).

Above all, it is really about trustworthiness. Even if a manager may under-perform for periods of time, which is expected, happy clients will remain loyal to the manager. It is about investors believing that the manager is always putting their interest first and not pursuing cheap marketing strategies only to gather more assets under management (stewardship versus salesmanship). And when things do go wrong, like making bad investment calls, one will find clear communication to their investors and openly admitting their mistakes. Likewise, when the investment manager is riding the waves of prosperity, humbleness in their feats will be appreciated instead of boasting about their abilities for superior stock-picking and predicting future prices.

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