

AUSTIN VALUE CAPITAL

Know Your Graph

April 2, 2012
Reformatted October 25, 2013

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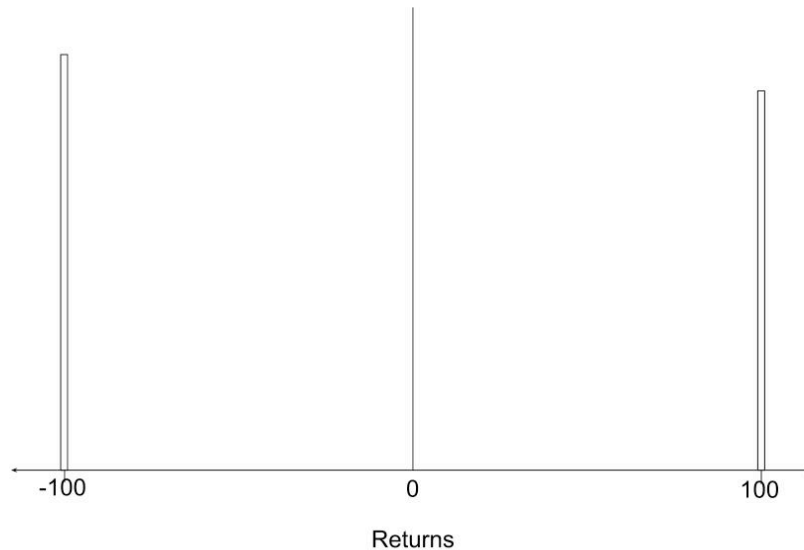
Risk has been on my mind a lot over the past year—particularly understanding the fundamental nature of risk as well as evaluating it, both before and after the results are known. My thinking has been greatly influenced by Howard Marks in his book *The Most Important Thing* as well as his memos. Marks provides a great deal of insight on the lack of correlation between performance and the risks undertaken to achieve that performance. In contrast, most investing texts focus on methods for mitigating risk, rather than understanding its fundamentals. The most famous risk mitigation strategy, of course, is Benjamin Graham’s “margin of safety”. This concept, combined with conservative numerical estimates and relatively accurate qualitative judgments, is able to avoid capital loss for the substantial majority of investments. Further checklists and risk mitigation strategies are also typically discussed, such as inversion (e.g., considering “what can go wrong?” rather than the potential gains), focusing on consistent earnings over a lengthy period of time, emphasizing strong balance sheets, etc. Thus, while providing a number of methods for mitigation, these investing texts do not generally provide an effective conceptual framework for understanding risk. However, I believe understanding risk and its relationship with performance is important for both individuals (e.g., in selecting a manager) and managers themselves.

Understanding Risk

Evaluating risk may be particularly useful when attempting to determine the investment quality of a fund or manager. The typical process for judging a manager involves comparing his results against a benchmark or a set of peers over some length of time. Over short periods, the results may be almost meaningless. For example, high returns, and particularly exceptional returns, can be caused by luck or undertaking high risk rather than following a sound investment philosophy. Similarly, in the short term, poor or mediocre returns may be the result of bad luck or may be indicative of a period in which the manager is being conservative, which may later turn out to be the prudent course (such as when analyzing performance of managers in 2007). A better approach is to evaluate the manager over at least a complete business cycle, including both bullish and bearish periods. This process is especially valuable when the business cycle includes a significant crisis—as Buffett says, “You only know who is swimming naked when the tide goes out”. **However, as discussed below, even this measure does not truly indicate the risk undertaken by the manager in the current cycle or if his investment philosophy will be effective over the next business cycle.**

Accordingly, I believe understanding the fundamental conceptual framework of risk may be useful. Risk is generally understood to be the potential for an undesirable outcome, which serves as a fair, but broad definition. On a more fundamental level and with respect to investments, **risk should be understood as the likelihood of capital loss within the set of all possible outcomes.** In other words, for any investment, whether it be an individual equity, a managed fund, or in any monetary undertaking, all possible outcomes should be considered. As such, **the risk for that investment can be defined as the probability of the set of outcomes that falls below a tolerance threshold** (e.g., 0%, inflation, a benchmark, or some other threshold). For example, the following graph illustrates all the possible outcomes of betting “black” for a European roulette wheel, having slots for numbers 1-36 (half black,

half red) and a green “0”. Here, the horizontal axis represents total returns (doubling or losing your money), and the vertical axis represents number of instances or frequency (19 on the left and 18 on the right).

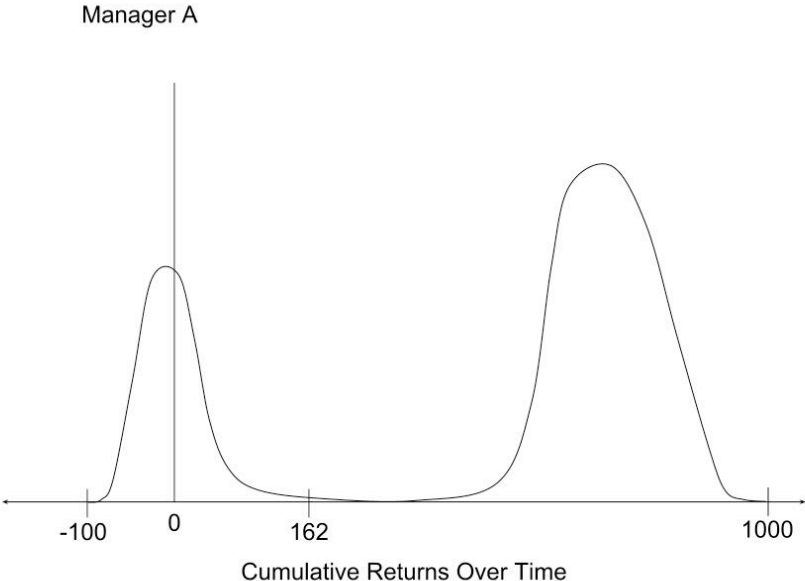


As shown, there are only two peaks: losing 100% of invested capital (corresponding to all “red” and the “0” outcomes), or gaining 100% (corresponding to all “black” outcomes), with odds of 51.4% (19/37) and 48.6% (18/37), respectively. Thus, from this graph, it is easy to visually understand the risk being undertaken—it is the portion of the possibilities corresponding to the complete loss of capital and its probability of occurrence is 51.4%.

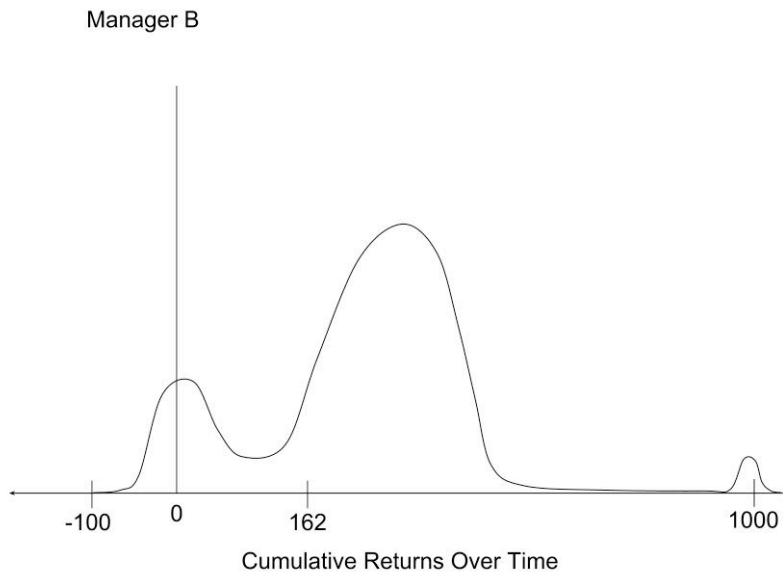
While the above example is extremely simple, it serves as a starting point for understanding more complex scenarios, such as the one presented in the following thought experiment. In this thought experiment, we will consider the theoretical performance of a manager over an entire business cycle. First, to properly understand his risk, we must consider all possibilities for his results over the business cycle. **To be clear, this set of possibilities includes every conceivable set of events within the same business cycle, with each set of events having a single performance result (return).** Note that this is exactly the same as the roulette example above, except that there are dramatically more possibilities and corresponding returns.

From this theoretical set of possible returns, we first remove all Armageddon scenarios. For example, a meteor hitting the earth and wiping out humanity is not useful for this thought experiment—after all, in such scenarios all other investment choices are equally meaningless. Similarly, we remove those scenarios where the manager dies or is impaired. The resulting set of possibilities includes those worth considering. **From this set, there should be some distribution of investment returns, and that distribution should be sufficient to define the risks undertaken by the manager.**

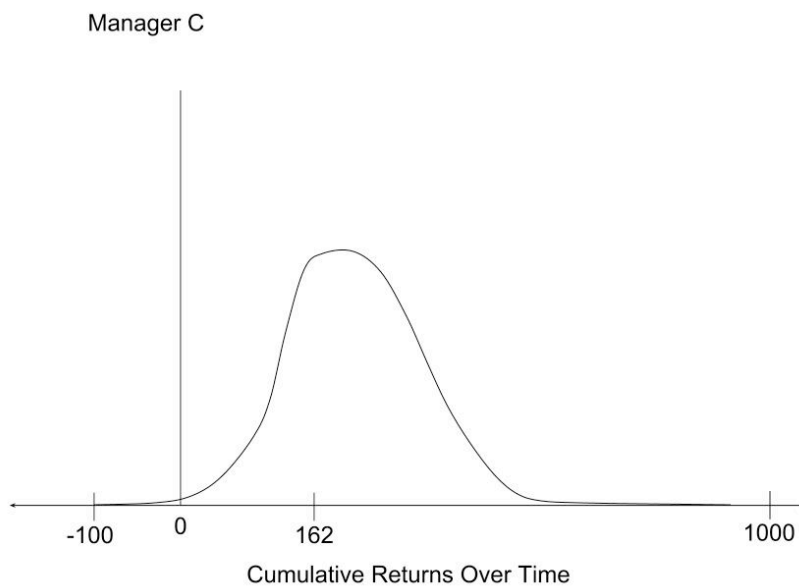
Now, let's extend this thought experiment to three different managers: A, B, and C, operating in a business cycle of 10 years and with a benchmark having 162% cumulative returns (corresponding to a 5% annual compounding rate). The following graph represents the set of possible returns, excluding Armageddon and impairment scenarios, for Manager A.



Clearly, from the bimodal distribution in the first graph, and more particularly the left portion indicative of capital loss, Manager A undertook significant risk over the 10-year period. While this manager was likely to achieve exceptional results, the undertaken risk was extremely high, in many cases losing most of the invested capital over the 10-year period.



The second graph, for Manager B, shows significantly less risk than that of Manager A. In this graph, the majority of the outcomes are above the benchmark (middle cluster), but there are a substantial number of possibilities below the benchmark (left cluster), including long-tail possibilities of losing a significant portion of the invested capital. Finally, there is a small possibility of extremely large returns (right cluster, e.g., similar to holding credit default swaps on mortgage backed securities in the 2008 crisis).



Finally, the third graph, for Manager C, illustrates a fairly simple distribution¹. As shown, almost all the returns are above the benchmark, but the average is much closer to the benchmark than for Manager A and somewhat closer to the benchmark than Manager B. Additionally, there is virtually no possibility of extremely high returns, unlike the previous two managers; however, this manager has kept risk extremely low, with only very small percentages of possibilities resulting in capital loss.

So Now What?

Based on the above graphs, I believe the managers should be rated in the following order: C > B > A, as managers A and B undertook significant risk. In particular, while it is true that Manager A would be the best overall over a long enough time period (since the average return of Manager A is higher than the rest), the variance is much too high for the average case to be assumed, since an investment lifetime would only include a few separate business cycles. **In other words, compared to Manager C, there is a much higher likelihood of capital loss in any given 10-year period.** Such risk of capital loss can be devastating, particularly if it occurs at the end of an investment lifetime.

To further illustrate this point, let's consider a few possible returns for the managers in our thought experiment and compare our initial ranking to the complete business cycle evaluation technique originally introduced. **To be clear, in these cases, a single return is selected for each manager from the entire set of possible returns shown in the corresponding graph above.** Note that this is exactly what happens in reality, since only one actual return can occur regardless of how likely or unlikely that possibility is.

Case 1 – Probable Outcomes:

<i>Manager</i>	<i>Returns</i>
A	500%
B	200%
C	180%

In Case 1, probable outcomes are provided for the managers. In this case, using the returns over the 10-year business cycle, one might very easily assume that Manager A is far better than Managers B and C. Further, one might also conclude that Managers B and C are both mediocre and equivalent. However, as we have shown above, Manager A undertook significant risk (essentially acting as a weighted roulette wheel) to achieve those gains. Additionally, although the results happened to be similar, there is a large difference between both the risks undertaken and the possible outcomes of Managers B and C. More specifically, Manager C took much less risk to achieve similar results as Manager B². Thus, these single points of data (returns) have provided very little information regarding the risk undertaken.

Case 2 – Positive Outcomes:

<i>Manager</i>	<i>Returns</i>
A	800%
B	970%
C	240%

¹ We'll call this one the Howard Marks' graph—I think he would approve.

² though Manager B could have returned higher results

In Case 2, positive outcomes are assumed for each of the managers. In this case, Manager A has achieved astounding results within the upper distribution of possible returns. Additionally, Manager B's unlikely bet has paid off and returned even higher results, and finally, Manager C handily beat the market, but was nowhere near the results of Managers A and B. Using the 10 year performance ranking initially discussed above, I would rank the managers $B > A > C$. Again, the risks of Manager A would be unknown based on the results alone. Further, there would be no way of knowing that the results of Manager B were an extreme outlier from his most probable returns. **In other words, assuming this result in perpetuity (e.g., for the next business cycle) would be a mistake, as it is likely that Manager B would never again have such phenomenal results.** Again, similar to Case 1, the risks that Manager B undertook would be unknown. Finally, Manager C was able to achieve good returns while taking on little risk.

Case 3 – Negative Outcomes:

<i>Manager</i>	<i>Returns</i>
A	-60%
B	25%
C	163%

In Case 3, negative outcomes are assumed for each of the managers. Here our thesis finally plays out—the risks of A and B have come to haunt them, underperforming the benchmark gains and even losing invested capital in the case of Manager A. The relatively negative outcome of Manager C, on the other hand, is still able to match the market. However, even with the very poor results of Managers A and B, it is still unclear whether the returns were due to extremely unlikely events or whether they were indicative of poor risk management. Thus, again, the returns do not provide us very much information regarding the undertaken risk³.

There are very many other possibilities for these Managers and many are worth further consideration. However, I believe these three cases are informative enough to convey both the conceptual framework for understanding risk as well as the fundamental basis as to why, in a finite period of time, returns do not correlate to risk. **Thus, it is clear that a single point of data (in this case, cumulative return) does not provide enough information to evaluate a manager's risk, even over an entire business cycle⁴.**

Additionally, while these graphs are fictitious and potentially exaggerated, this framework can be extended to evaluation of real funds and managers and even individual investments. For example, the graph of Manager A could correspond to a high risk/reward investment and the graph of Manager C could correspond to an excellent “buy and hold” investment.

³ However, in this case, the poor returns were actually somewhat probable, given the graphs for each manager above.

⁴ I like to think of these graphs as similar to probability distributions in quantum mechanics—there is a wave function (the set of possibilities) that collapses to a particular measurement (the single return of reality). Even further, the possibility graphs could be considered actual realities in the Multiverse, but I digress.

Know Your Graph

So how is any of the above useful? I think it is important for individuals and managers (those investing their own money and the money of others) to know their graph, both current and ideal, and use that knowledge to shape their investments.

A manager should consider the graph of his portfolio and, more importantly, his underlying investment philosophy at all times. The key point to remember is that the graph represents the true reality—both of the possible risks and rewards. **Moreover, if a poor graph is applied repeatedly, particularly one with substantial probability of extensive capital loss, it is extremely likely that the capital loss will occur at one point or another.** For example, taking the roulette wheel as an extreme example, it is virtually assured that all of the capital will be lost over even a small number of turns of the wheel. Further, as Buffett says:

“And the simple rule stands supreme—any compounding sequence multiplied by zero is zero. 99 years worth of stellar returns, capped by a year of default, is a zero”; and

“A small chance of distress or disgrace cannot, in our view, be offset by a large chance of extra returns”.

Indeed, an exemplary conservative strategy graph, such as that shown for Manager C, is virtually assured to have an excellent long-term record, even though any particular year (and perhaps every year) may not be considered exceptional. Over the long run, I would argue that the risk undertaken when constantly “swinging for the fences” is almost assuredly unsustainable compared to a low risk philosophy with consistent, moderate returns.

While it is clearly impossible for the manager to know every possibility, as in the hypothetical examples above, the upside and downside of his investments and portfolio can be analyzed and estimated. For example, the manager can assign a probability and magnitude to both his upside and downside for individual investments and entire portfolios, revealing a crude approximation of his graph. Moreover, even simply considering the underlying risk model or striving for a particular type of graph may have a positive impact on long-term results and undertaken risk.

Individuals, on the other hand, should 1) understand what graph they are comfortable with, and 2) at least attempt to find a manager who implements a similar graph. The former (1) may depend on how much of the individual's net worth is being invested as well as the outlook of the individual himself. For example, I would choose a graph similar to that of Manager C every time, and would not even consider a graph similar to Manager A. However, others may be willing to put a portion of their net worth with a high reward manager, despite the risks. The latter (2) is a very hard problem to solve given that long-term returns over one or even several business cycles are not necessarily indicative of manager quality. Accordingly, it may be prudent for an individual to interview the manager and even consider asking the manager to draw their graph, though it may take a while to explain it. **At the very least, an individual should examine the potential manager's underlying investment philosophy, combined with his long-term results, to determine whether a potential match exists.**

Summary

- 1) Investment results represent only one possible outcome for any given period and are therefore unlikely to indicate the undertaken risk;
- 2) The graph of all possible returns indicates the probability of capital loss and is applied at every investment;
- 3) The shape of the graph determines long-term results; and
- 4) Investment decisions should be tailored to match the desired graph!

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