

Collective Wisdom, Financial Markets, and Investment Lessons from GoogleTM

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Can skilled investors outperform the market? What's the best way to achieve long-term investment success? The answers to these age-old questions become clear after taking a close look at how markets work, exploring the dynamics of group decision-making, and examining how the simple concept behind Google's search engine relates to personal investing.

Mission: Faster and More Accurate

In 1995, two Stanford University graduate students embarked on a mission to solve one of computing's biggest challenges: retrieving relevant information from a massive set of data. The massive set of data they were trying to make sense of was every piece of information contained on the Internet.

By now we know how their mission turned out; within a few years of founding Google, Larry Page and Sergey Brin's creation was the most frequently used search engine on the Internet. Close to half of all Internet searches performed are now done via Google's search engine.¹ The company name has become so widely used, it has been added to Merriam-Webster's roster of official words (as in "to Google" or "search for" information on the Internet). Since their August 2004 debut, shares of Google stock have surged more than seven-fold, making Page and Brin perhaps the world's first "Googillionaires."

So how does Google do it? Simply by doing a better job of finding the right web page more quickly than any other search engine. With each Internet search, Google is essentially asking the Web to "vote" for the pages containing the most correct and useful information. This information is sorted, indexed and continuously updated in order to ensure accuracy. As a result, the web page receiving the most votes tops the list. And more often than not, that web page, or the one immediately below it, is exactly the one you're looking for.

Markets Work

The world's financial markets, like Google's search algorithms, are also complex systems designed to aggregate massive amounts of data. In the stock market, information is communicated through orders to buy and sell securities. The

exchanges—such as the New York Stock Exchange—aggregate this information and match buyers and sellers at the market clearing price. At any moment, this market price should be the most accurate estimate of a security's true value, since all known, publicly-available information is embedded in that price. If anything more were known, someone would take advantage of it and the price would change.

The beauty of financial markets is how efficiently they work. Markets dynamically and accurately process an enormous amount of information. A group of investors, for example, may have opposing views about the “true” value of a stock's price, but their collective opinion as a group is most often the best estimate of a stock's value. Why? Because each investor's estimate contains some accurate information and some error. When the stock market's thousands upon thousands of transactions are processed and aggregated (thus turning private judgments about a stock's price into a collective decision by the market) the errors will tend to cancel out. Strip out the error and only information is left. And based on studies of the reliability of market-based decisions², this remaining information has been shown to be incredibly accurate.³

Google's success is built on the basic premise that collective wisdom is often very accurate.

Markets work when they possess 1) multiple agents of diverse and independent opinion, 2) an incentive for participation, and 3) some mechanism for aggregating information. All markets, whether for chewing gum on the school playground, for the future delivery of wheat or for *the information contained on the Internet*, operate under the same three conditions. The greater the number of agents, the more diverse their opinions, the greater the incentive for participation and the more advanced the aggregating mechanism, the better that market will function. The stock market is the consummate example. We can think of Google as the New York Stock Exchange of the Internet.

Collective Wisdom

The remarkable intelligence of groups when it comes to decision-making was first demonstrated in experiments conducted by sociologists and psychologists in the early part of the twentieth century. In a very simple study, students in a class were asked to estimate the room's temperature and an average of the guesses was taken. The group guessed 72.4 degrees, while the actual temperature was 72 degrees.⁴ A follow-on study asked two hundred students to rank various items by weight. The group's “estimate” was found to be 94% accurate, better than all but five of the individual guesses. The most classic test of group intelligence may have been performed by Jack Treynor (co-creator of the Capital Asset Pricing Model with Nobel prize-winner Bill Sharpe). Well known for his academic rigor and complex thinking, Treynor often used more simple methods to test collective wisdom. In one finance class, he asked his students to independently guess the number of jelly beans in a glass jar which contained 850 beans. Of the 56 students in his class, only one made a better guess than the group's average of 871.

To be sure, these studies would hardly stand up to scientific scrutiny. The point to be drawn, however, is not that the group *always* arrives at a better answer than the smartest individual member of the group. No, some individual members should be expected to do better than the group. This is a good thing, since the mere opportunity to outperform the group is what provides an incentive for people to do well, particularly in an environment such as the stock market (if the stock market worked perfectly, no one would have any incentive to uncover the information that becomes so quickly reflected in market prices). The point is this: while one or two students might outguess the group each time, it is highly unlikely to be *the same two students each time*. In fact, the best way to get a reliable estimate of the contents of the jar—time after time—is not to seek out the smartest individual, but to just ask the group.

What is amazing is that group intelligence is *so* smart. After all, the collective wisdom in these particular studies is simply an average of the decisions made by each participant. In many things, the average is second-rate. If you take a group of people and time their results in a 100-yard dash, for example, the average time will not be better than the fastest runners. It won't even be close. The opposite, however, is true with decision making: ask a group of one hundred people to solve a problem and the average answer will often be at least as good, if not better, than the answer of the smartest individual member of that group. With many things the average is mediocre, but with decision making, the average is often excellence.⁵ The same is true in investing.

Efficiency of Financial Markets

The idea that markets efficiently process information is nothing new. The concept of market efficiency has been rigorously discussed and researched in academic circles for over a century. In the late 1800's, it was observed that when "shares become publicly known in an open market, the value which they acquire may be regarded as the judgment of the best intelligence among them."⁶ Some years later, a young French mathematician named Louis Bachelier wrote his dissertation on the behavior of stock markets. After studying the French capital markets around the turn of the century, he concluded that "past, present and even discounted future events are reflected in market price."⁷ In the 1960's, a group of college professors and financial economists developed what later became known as the Efficient Market Hypothesis. The idea assumes that information is so rapidly reflected in the market that no single investor can consistently know more about stock prices than the market as a whole knows. The implication is not that markets *always* price assets perfectly, but rather they do so well enough that it's *exceedingly* difficult for any one investor to systematically beat the market.

Any investor willing and able to use this knowledge is the beneficiary of a reasonably efficient market. In such an environment, any investor buying a portfolio of index funds⁸ should obtain a rate of return as generous as that achieved by the experts, a point stressed by Princeton finance professor Burton Malkiel.⁹ If information is already reflected in security prices, professional money managers should not be able to

consistently earn above-average returns by analyzing financial information. Some will earn high returns just by chance. While this might surprise some readers (and irritate most, if not all, active fund managers) the market's history of delivering superior long-term returns is well documented in numerous academic studies. Despite these studies' conclusions, investors have not been able to resist the temptation of trying to beat the market. Close to 90% of all dollars invested in the capital markets are "actively managed" with the goal of exploiting whatever small and fleeting inefficiencies might exist.

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The Evidence

If markets were inefficient, that is to say if frequent and sufficient mispricing existed *and* could be systematically exploited, we would expect to find evidence that some skillful investors could consistently "beat the market." Little, if any, evidence exists. The world's most sophisticated investors—the professional mutual fund managers, large corporate pension plans and savvy hedge fund managers—certainly haven't provided it. On the contrary, their performance strongly suggests that, like Treynor's jelly bean experiment and Google's web searches, the collective wisdom of the market knows best:

- Through January 2008, the Vanguard S&P 500 Index Fund—which makes no attempt to pick attractive over unattractive stocks—outperformed 78% of all diversified U.S. large company stock funds over 15 years.¹⁰
- Professional managers of bonds fare even worse, with 80% of funds underperforming a broad fixed income index over the past fifteen years.¹¹
- A recent survey of hedge funds found the average fund delivered returns of 8.8% from 1995-2003, a period during which the S&P 500 Index returned 12.4 percent.¹²
- From 1988-2004, a simple portfolio comprised of 60% S&P 500 Index and 40% Lehman Brothers Aggregate Bond Index outperformed 75% of the nation's largest corporate pension plans, despite those plans' resources to hire the world's brightest investment minds.¹³

Fooled by Chance

In spite of the odds stacked against them, however, a few managers—just like the small handful of students in the bean-counting experiments—will outperform the market in any

given period. Some will even manage to do it over a seemingly long-enough period to convince investors of their skill. But is it truly skill, or is it simply luck? It's hard to know. After all, if we fill a stadium with people flipping coins and excuse them one-by-one after a flip of "heads," someone will remain as the only person to record a very long string of successive "tails." If we shove a microphone in that person's face, she might even indulge us with her "secret" to flipping tails, after which the coin-flipping world will crown her the Supreme Flipper-of-Tails. Just as it is exceedingly difficult to identify who this coin-flipper will be *in advance*, it is hard to know who will be next year's winning investment manager. The fact is, *someone* will be that winning manager. Thanks, of course, to their employer's marketing budgets, it will be easy to identify them *after the fact*.

Two well known standouts of the last thirty years are Peter Lynch of Fidelity and Legg Mason's Bill Miller. Peter Lynch is widely considered one of the greatest investment managers of all time. During his thirteen year tenure managing the Fidelity Magellan mutual fund, he outperformed the annual return of the S&P 500 Index eleven times. Lynch became the subject of numerous articles, appeared on the cover of magazines and even wrote his own book, which eventually became a best-seller. When he retired as manager of the fund in 1990 and became a director of Fidelity, one of his primary roles was to find his successor—the next Peter Lynch. Apparently, his good fortune picking stocks did not extend to picking stock-pickers: since 1990, four different managers have taken the helm at Magellan and, collectively, they have delivered returns which have lagged the S&P 500 Index by about 1% per year. If Peter Lynch can't find the manager who can outperform the market, what chance does the typical investor have?

More recently, Bill Miller attracted attention after amassing a streak of besting the S&P 500 for a truly impressive 15 consecutive years.¹⁴ Like a lot of streaks, the longer Miller's extended the more attention it received and the more dollars flowed into his fund (unsurprisingly, major inflows did not begin until 1997, the seventh year of the streak¹⁵). In 2006, however, the streak came to a crashing halt as the Legg Mason Value Trust gained only 5.8%, trailing the S&P 500 by 10%. 2007 was not much kinder: for the full year the fund posted a negative return of 6.7%, lagging the market by over 12%. Investors attracted by the "sure bet" implied by Miller's past record must surely be disappointed.

When it comes to the fleeting nature of outperformance in investing, Bill Miller and Fidelity Magellan are not alone in the investment game. Consider the results of all the best-performing equity mutual funds over the ten years from 1983 to 1993: of the top twenty funds in that period, sixteen failed to even match the market return in the subsequent decade—that's an 80% failure rate.¹⁶ Over the long-run, it seems the world's smartest investors are not beating the market, the market is beating them.¹⁷

Recipes for Investment Success

The best way to minimize the risk of getting clobbered by the market is to simply capture the market's return via a low-cost, tax-efficient index fund. It was perhaps with this understanding that the creators of Google seized the opportunity to educate their employees on *what is* important in investing. As described in a well-written San Francisco Magazine article¹⁸, Google founders Page and Brin facilitated a series of investment lectures to their legion of employees prior to Google's historic 2004 public stock offering. With the usual sharks of Wall Street circling—hoping to sink their teeth into the hundreds of soon-to-be multimillionaires—the Google founders instead brought in the most revered names of financial academia to teach the company's brilliant engineers, programmers and web-geeks the art and science of personal investing.

First to arrive was 1990 Nobel Laureate Bill Sharpe. Rather than dazzle the crowd with the finer points of portfolio optimization or his Capital Asset Pricing Model, Sharpe instead offered a simple recipe for a lifetime of investment success: Don't try to beat the market. Instead, put your savings in a few diversified index funds and let capitalism and the efficient market work for you. The following week's lesson was taught by Burton Malkiel, finance professor at Princeton and author of *A Random Walk Down Wall Street*. Don't try to beat the market, he said, and don't believe anyone who says they can—not a friend, a broker with a hot stock tip, or the latest magazine touting the most recent outperforming fund.

Now, to a group of some of the world's brightest 20-year olds—most of whom grew up watching tech stocks double overnight—this somewhat sobering advice came as a surprise. But one week later, the message was the same. This time the wise sage at the podium was Jack Bogle, founder of Vanguard. Wall Street, he said, is more about salesmanship than stewardship. The brokers hovering at the door are here for one reason and one reason only: to take your money through high fees and transaction costs, the majority of which are hidden from your view. Ignore them all and invest in an index fund.

“Brokers exist for one reason and one reason only: to take your money through high fees and transaction costs.”

When the brokers of Wall Street were finally allowed to enter the walls of Google, they were surprised at—and discouraged by—their reception. They were peppered with questions about low-cost investing using index funds and pressed to explain the high fees and costs associated with the get-rich schemes they were offering. Founders Page and Brin and Google President Eric Schmidt felt they had done a good job at helping to prepare their employees. By offering them a free education from the brightest minds in economic finance, they spared them the large “tuition bills” typically paid by those who choose, instead, to learn at the hands of Wall Street's croupiers.

The Lesson from Google

It should come as no surprise, but rather be expected, that the brilliant minds who brought the world Google also preach the virtues of index funds. After all, the technology which has fueled Google's success is based on the concept of collective wisdom and the idea that markets work.

By utilizing index funds, the educated investors at Google, Inc. allow the intelligence of the market to work for them. At the same time, they avoid the fees, expenses *and risks* associated with trying to outguess the crowd. By following Google's example, everyday investors may also find the investment success for which they've long been searching.

Vista Capital Partners, Inc. is a fee-only investment advisor based in Portland, Oregon. We specialize in managing globally-diversified portfolios of low-cost, tax-efficient index funds for individual clients with more than \$1 million to invest. Call us at 503-772-9500 or visit www.vistacp.com



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¹ www.searchenginewatch.com, July 2006

² Wolfers, Justin and Zitzewitz, Eric. "Prediction Markets." *Journal of Economic Perspectives*, Spring 2004.

³ The results of prediction markets are one way to test the accuracy of market-based decisions. Prediction markets are markets in which participants trade contracts, the payoffs of which are tied to the outcome of future events. Prices in these markets can be interpreted as market-aggregated forecasts. Their results suggest that market forecasts are as good, if not better, than the predictions made by individual experts. For example, The Iowa Electronic Markets, which allow traders to buy and sell futures contracts based on political election results, have yielded predictions which have outperformed large-scale polling organizations. The contracts traded on Intrade in 2006 predicted (accurately) that Democrats would take over control of the Senate even while the "experts" on major TV stations were predicting Republicans would retain control. An internal prediction market at Hewlett-Packard produced more accurate forecasts of printer sales than the firm's internal experts. Google has also experimented with internal prediction markets to forecast product launch dates.

⁴ This example, and others in this paragraph, are taken from James Surowiecki's *The Wisdom of Crowds*. New York: Random House, 2004.

⁵ Surowiecki, James.

⁶ Gibson, George. *The Stock Exchanges of London, Paris and New York*. New York: G.P. Putnam's Sons, 1889.

⁷ Bernstein, Peter. *Capital Ideas*. New Jersey: John Wiley & Sons, 2005.

⁸ An index fund is simply a basket (portfolio) of stocks—hundreds, if not thousands, of stocks. By owning all the stocks in a particular market or market sector, an index fund mimics the performance of the market (or sector). A well-known example of an index fund is the Vanguard S&P 500 Index Fund, which tracks the performance of the S&P 500 Index, comprised of the 500 largest publicly-traded companies in the United States. In the management of an index fund, no attempt is made to pick "attractive" over "unattractive" securities or to time the market. The goal is to earn the collective return of all 500 stocks. By minimizing costs (low expense ratios) and managing tax-efficiently (infrequent trading) index funds are able to consistently deliver the returns of the market.

⁹ Malkiel, Burton. "The Efficient Market Hypothesis and Its Critics." CEPS Working Paper No. 91. Princeton University, 2003.

¹⁰ Morningstar Principia and Vista Capital Partners.
Performance of all 98 diversified large cap U.S. stock funds, with more than \$10m in assets, over fifteen years ended January 31, 2008.

¹¹ Morningstar Principia and Vista Capital Partners.
Performance of all 125 intermediate-term U.S. bond funds, with more than \$10m in assets, over fifteen years ended January 31, 2008



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- ¹² Malkiel, Burton and Saha, Atanu. "Hedge Funds: Risk and Return." *Financial Analysts Journal*, November/December 2005.
- ¹³ Dimensional Fund Advisors, Basic 60/40 Balanced Strategy vs. Company Plans 1987-2003. FutureMetrics, 2004.
- ¹⁴ Bill Miller's employer, Legg Mason Capital Management, claims the Legg Mason Value Trust to be the only mutual fund to have outperformed the S&P 500 for 15 consecutive calendar years. Assuming active management is a zero-sum game and that in any given year half of all active managers outperform the market and half underperform, the odds of Bill Miller beating the market in 15 out of 15 years are 1: 32,768. When his streak ended, however, Miller had managed the Legg Mason Value Trust for 24 years. The odds of a fund beating the market for 15 consecutive years in any 24-year period are 1:5,000. In the U.S. alone, there were over 4,500 stock mutual funds at the end of 2006 (and more than 60,000 funds worldwide). The odds tell us we should probably expect a Bill Miller every 24 years. Legg Mason says there has never been another Bill Miller in the history of mutual funds. Investors would be better served asking not "Who is the next Bill Miller," but rather "Why haven't we seen more Bill Miller's?"
- ¹⁵ Bogle, John C. *The Little Book of Common Sense Investing*. New Jersey: John Wiley & Sons, 2007.
- ¹⁶ Lipper Analytical Service; Top 20 U.S. equity funds 1983-1993 and subsequent 10 yr performance.
- ¹⁷ Ellis, Charles. *Winning the Loser's Game*. New York: McGraw-Hill, 2002.
- ¹⁸ Dowie, Mark. "The best investment advice you'll never get," *San Francisco*, December 2006.

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