Is More Really Better?

The Power and Paradox of Diversification

"People who hold undiversified portfolios, like people who buy lottery tickets, are gambling; they are accepting high risks without compensation in the form of high expected returns."[1]

Meir Statman, "The Diversification Puzzle"

Our experience advising high-net worth investors informs us that families tend to focus on the following criteria when managing their wealth:

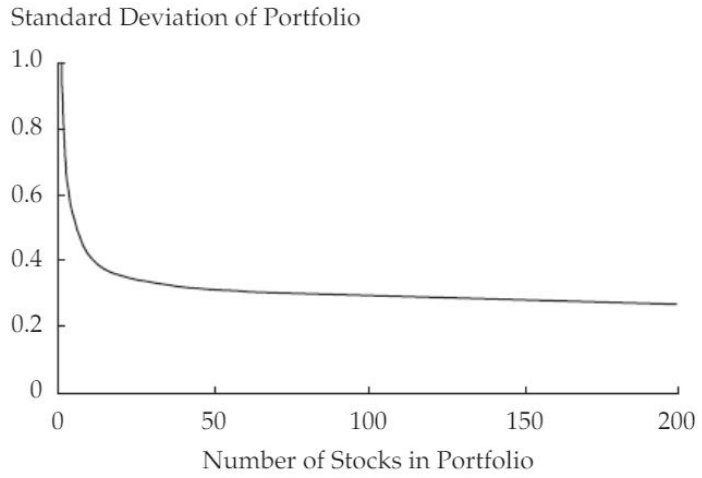
1. Protection from deep financial loss as a primary goal
2. Long-term investing with the expectation of holding investments for the rest of their lives
3. Lifestyle, charitable, or intergenerational goals that create specific withdrawal and capital requirements

In this way, private investors display similarities to institutional and pension fund managers who also focus on balancing risk, current withdrawals and longer-term liabilities.

How much diversification is enough?

Diversification is a marginal endeavour; the maximum benefit occurs early on and diminishes as more positions are added. For example, the reduction in risk between a portfolio with one stock and another with two stocks is massive. By adding a third stock, risk is further reduced but to a lesser degree. In this way, as more and more stocks are added to the portfolio, the advantages of diversification should eventually vanish. But how many holdings optimize diversification's benefits?

Graph 1: Decline in standard deviation with increasing diversification[1]



To help us answer the diversification question we look to three studies that indicate benefits achieved at different levels of equity holdings. While these studies indicate that we can be 90% confident that effective diversification can be achieved with 50 to 87 stocks, they also indicate that a 99% confidence requires investors to hold more than 160 stocks.

In a 1999 study looking at the 300 stocks in the Canadian S&P/TSX index, Cleary and Copp found that "...30 to 50 Canadian stocks are required to capture *most* of the benefits associated with

diversification" [emphasis ours].[2] While this may appear to indicate that effective diversification can be achieved with few securities, the authors also acknowledge that while 90% of the total risk reduction benefit as measured by volatility can be found using 50 stocks, to achieve more than 99% reduction in risk requires 200 stocks.[2]

In addition, a few important notes within this research indicate that employing greater diversification is prudent. For example, the Cleary and Copp methodology does not take into account securities that were removed from the index during their period of study, thereby reducing the benefits of diversification through survivorship bias. Furthermore, this study looked at just one 13-year time period (1985 – 1997) and did not include adverse market conditions such as the Dot Com bubble in 2001-2002 or 2008-2009 recession.

Survivorship Bias

Survivorship bias is the tendency to only look at success stories and in the process ignore failures. This can lead to a misunderstanding of the likelihood of success. An analysis that includes stocks or funds that have survived over a certain time period, but does not include companies that have gone bankrupt, skews previous outcomes and future expectations towards the positive.

A later study by Alexeev and Tapon makes up for these short comings. In "How many stocks are enough for diversifying Canadian institutional portfolios?", the authors review the time period from 1975 – 2011 and include all traded and delisted stocks in Canada[3].Their study appears to be particularly robust as they include multiple ways to measure risk, including methods that take into account extreme market events such as the 1987 and 2008 crashes. This additional risk analysis led them to recommend holding 64 to 87 stocks for well-diversified portfolios. However, their study once again focused on achieving just 90% confidence.[3]

Thankfully, another study combines long investment horizons with maximum confidence intervals. While this research is performed on the U.S. market, it provides some important guidance for Canadians. Firstly, the authors focus on a measure of risk that is very relevant for high-net worth investors known as shortfall risk. Secondly, the authors analyze two different 20-year periods to provide long holding period results (1965 – 1984 and 1985 – 2004). Lastly, they report their recommendation based on 99% confidence. What did they find? To ensure that an investor had a 99% chance of outperforming 20-year Treasury Bonds, an investor would need to have held at least 164 stocks.[4]

Shortfall Risk

Shortfall Risk is the possibility that an investment's return falls short of a minimum expected level. Within the realm of personal finance, this is the risk that an investor does not achieve a specific goal. As families typically have specific and essential investments goals, such as that assets will sustain one's needs throughout retirement, shortfall risk is a particularly pertinent measurement.

If greater diversification provides greater certainty towards reaching one's long-term goals, why would investors ever choose less diversification?

Quite simply: cost and complexity. Each additional stock added to the portfolio adds an increase in trading costs and bid-ask spreads. In addition, adding more securities to a portfolio requires more and more time be spent on monitoring and re-balancing, as well as on other administrative tasks like voting on proxies. However, these costs may not have as much bearing on the benefits of diversification as investors may think.

Bid-Ask Spread

Bid-ask spreads represent the difference between the maximum price a buyer is willing to pay (the 'bid') and the minimum a seller is willing to accept (the 'ask'). This difference can create an additional cost on portfolios, particularly in situations where a seller may need to raise funds by trading a security and must move their asking price down to the available bid price. This can be particularly costly when a security is thinly traded.

In 2004, Professor Meir Statman attempted to better define the cost-benefit profile of diversification. In The Diversification Puzzle, he surmised that "...diversification should be increased as long as its marginal benefits exceed its marginal costs."[1] To quantify this trade-off, he compared the benefits of an increasing number of individual stocks to the Vanguard Total Market Index fund, which at the time held 3,444 U.S. stocks and cost 0.2% per year.[1] Through this analysis, Statman estimated that the benefits of diversification outweighed the costs only once a portfolio included at least 300 individual stocks.[1] This is clearly a much greater level of diversification than is typically used by individual investors or even most professional active investment managers. One of the key take-aways from diversification research, therefore, is that as competition drives brokerage fees lower and innovation develops more efficient solutions for investors, the costs of diversification are becoming less and less dissuasive.

It's not just about protection

To many, the primary reason that we diversify is to avoid catastrophe. Paradoxically, research also suggests that diversification increases the likelihood of positive returns for long-term investors. In his 2017 paper *Do Stocks Outperform Treasury Bills?*, Professor Hendrik Bessembinder reports that almost all of the net gains for the U.S. equity market through the period between 1926 and 2016 have come from just 4% of all listed companies.[5]

Treasury Bills

Treasury bills (often referred to as T-Bills) are short-term debts backed by the federal government. As short-term instruments they can range in length from a few days to up to one year. Unlike longer-term federal government bonds (known as Treasury Bonds), Treasury bills do not pay regular interest but instead are sold at a discount and then mature at full value. The difference between the purchase price and the value at maturity is the investor's return. As Treasury bills are backed by the strength of the federal government, they are considered to be extremely secure and liquid short-term investments.

In other words, a very small number of companies do very, very well over time and if investors do not own these companies, they risk only matching the risk-free returns found in Treasury bills.

How is it possible that just four in 100 companies provide equity wealth over time? Professor Bessembinder used data from the Center for Research in Securities Pricing (CRSP) and analyzed the period from which a stock entered the CRSP database until it left. With this data, he calculated the wealth created over the stock's lifetime. His findings are incredible[5]:

- 25,300: The approximate number of past and present companies traded on U.S. markets from 1926 to 2016
- $35 trillion: The net increase in value created by those companies, over and above the interest that could have been received from one-month Treasury bills.
- 4: The percentage of top-performing companies that accounted for all of the $35 trillion in net wealth creation over 90 years.
- 96: The percentage of the 25,300 firms that only matched one-month Treasury Bill returns over their lifetime

Professor Bessembinder's research has significant relevance for long-term investors. Although the U.S. stock market has experienced tremendous growth over the past 90 years, the vast majority of stocks over their lifetime had not provided high returns. In fact, the probability is high that poorly diversified portfolios had underperformed as a result of missing the market's few "home runs".

Of course, the opposite could be considered true as well: the ability to pick the four out of every 100 stocks that outperformed would provide superior investment returns. Bessembinder concludes his paper on this thought and addresses it in a wonderfully understated way:

"...the key question of whether an investor can reliably identify in advance such 'home run' stocks, or can identify a manager with the skill to do so, remains."[5]

Increasing exposure to winning securities

The Bessembinder study shows clearly that over long periods, diversification can increase the opportunity of capturing the small number of individual stocks with higher returns. Taking this realization one step further, we see that securing exposure to winning securities can come through diversification across countries, industry types, company size, and asset type.

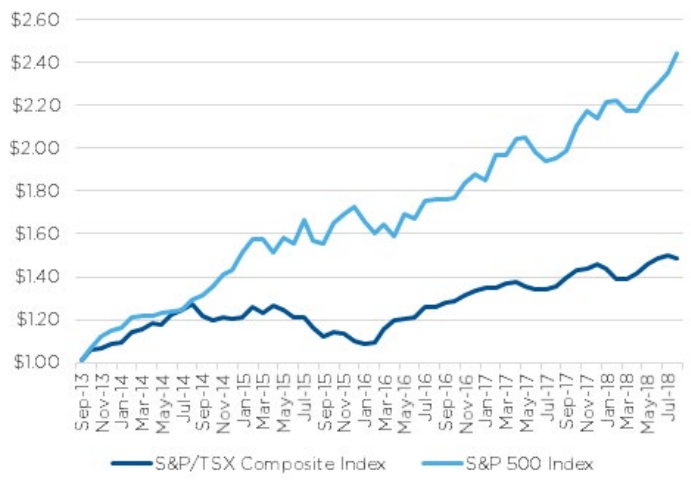
The Pavilion Investment House approach to diversification

At Pavilion we take diversification very seriously. We also believe that there are rewards to going beyond the 300 stock portfolio as suggested in the research referenced above. While including a few hundred stocks is the first step to diversifying a portfolio, we want to deepen the benefits of this concept by owning as many different types of investments as possible.

Diversification by country

To do this, we look to both the developed and emerging markets when constructing our portfolios. With the globe as our diversification strategy, we have been able to pick up returns from many different types of markets. A key recent example of the power of spreading your money around is the United States. Over the last five years alone, the S&P 500 has outperformed the Canadian S&P/TSX Composite index when measured in Canadian dollars by more than 95%.[6] Again, diversification is not just about protection.

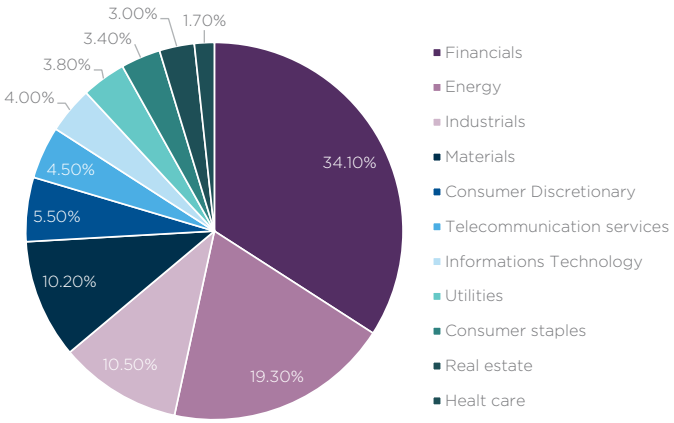
Graph 2: S&P 500 vs S&P/TSX Growth of Wealth



Diversification by industry

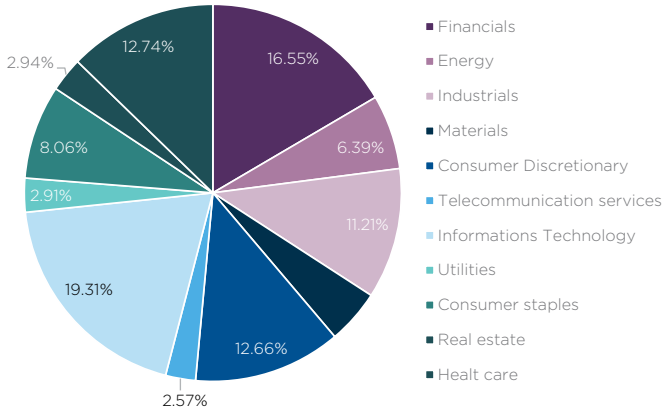
Diversification allows for controls over industry concentration as well. Industry concentration is especially pertinent for Canadian investors as our Canadian economy is dominated by two major industries. As of August 31, 2018 the top two industries, represented by Financial and Energy companies, were holding 53.4% of the overall weight. By comparison, when we look at the combined equity weight of these two industries across the globe, they only totalled to 22.9%.[7,8]

Graph 3: Sector weights - CANADA



Based on GICS® sectors.
The weightings for each sector of the index are rounded to the nearest tenth of a percent; therefore, the aggregate weights for the index may not equal 100%.
As of August 31, 2018

Graph 4: Sector weights - GLOBAL



Diversification by company size

We are very interested in holding smaller and medium sized businesses to pick up the higher expected return from owning these sizes of companies. In order to do this effectively, we add hundreds of smaller companies into our globally orientated equity portfolio.

Diversification by asset class

To broaden our diversification further, we are very interested in holding assets that do not show the same return pattern as equities. This is for both protection purposes and for growth purposes. For this reason our standard advice is to hold some level of fixed income investments, real estate, infrastructure and potentially other asset classes that can tilt portfolio exposures towards greater diversification.

Conclusion

While some investors may prefer to gamble on picking the 4% of stocks that provide home run returns, research indicates it is prudent to employ a structured, diversified approach to investing. In particular, holding equity securities in the many hundreds or thousands is an optimum solution for investors who:

1. Place a high importance on the certainty of achieving a specific financial goal, such as a level of education funding, lifestyle or inheritance; or
2. Have a multi-decade investment horizon, such as would occur with an individual's working career, multi-generational family wealth, or a pension fund.

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