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Equity Diversification:

Snow White Helps Answer the Question — Can You Really Have Too Much of a Good Thing?

Most investors agree that diversification plays an important role in an equity portfolio. However, the extent of that role can cause disagreement. Some investors believe that there is little downside to diversification — negligible cost for adding ever more stocks to a portfolio — because they believe that the primary benefit of diversification is the reduction of overall portfolio risk. In contrast with that view, I offer the first key point of this article:

Diversification reduces portfolio volatility more than it reduces portfolio risk.

Although some investors don't seem to recognize it, there is a difference between volatility and risk. Let's focus on this difference by first discussing the concept of diversification and how it reduces portfolio volatility. Then we'll discuss the nature of risk and discover how skillful investing can ultimately reduce risk more than diversification can.

A diversified equity portfolio contains a variety of stocks that react differently to external market forces such as interest rate changes, regulatory and technology shifts, and the emotional behavior of investors, among other factors. Simply put, the goal of diversification is to reduce the portfolio volatility that results from those forces. If an investor built a portfolio containing just one stock — his most promising — even though this stock might eventually provide an excellent return, its price would probably swing up and down more than the broad market fluctuates. On the day that the investor wants, or needs, to sell his stock, there is the risk that its value might be down — and that's a very good reason to diversify. Adding a second well-chosen stock would create some diversity, adding a third would diversify the portfolio further, and so on. In a broadly diversified portfolio, some individual stock prices would be up when others were down, thus netting less overall portfolio volatility. It's possible that the reduction in volatility caused by diversification may sometimes be enough to save the overall portfolio from a negative return. As I'll explain later, if a portfolio is well constructed, this is primarily a short-term benefit.

Investors sometimes feel nervous or uncomfortable about stock volatility and prefer that their portfolio not be more volatile than the overall market. In fact, there are investment managers who are more than willing to capitalize on investor nervousness by constructing portfolios with an eye toward limiting relative volatility.

> Equity portfolio volatility can be quantified using a measure known as beta (β). A portfolio with a β of 1.0 has volatility equal to that of the market; one with a β of 2.0 has twice that of the market, etc. Although the math involved may interest some readers, it's beyond the scope of this article.

Since diversification reduces volatility, it's a good thing, right? It certainly is, but as I mentioned earlier, some investors feel that reducing volatility reduces most types of portfolio risk. Before we agree with that conclusion, let's define risk. First, there is the risk of losing principal — the negative return we discussed above. Particularly in the short-term, a well-diversified portfolio is relatively more protected against a negative return than is an undiversified portfolio.

For the long-term investor, a common sense definition of risk is the possibility, or probability, of not achieving his desired return. In one case, that might mean that he realizes a lower return than anticipated — thus preventing him from meeting investment goals and objectives. In another case, it might mean that his return is less than the rate of inflation — purchasing power risk — meaning that his money won't go as far as when it was invested. Diversification does not necessarily reduce these types of risk, and it may even ***increase*** them.

Consider an imaginary world in which all stock choices have expected returns of 10%. In such a world, there is a practical limit to the amount of diversification that actually benefits a portfolio. Think about the extreme situation in which an investor owns every publicly traded stock. His portfolio ***is*** the market and thus has market volatility. It turns out that owning a surprisingly small number of uncorrelated (i.e., independently fluctuating) stocks significantly reduces portfolio volatility — especially in a simple world of identical expected returns. Consider the following figure:

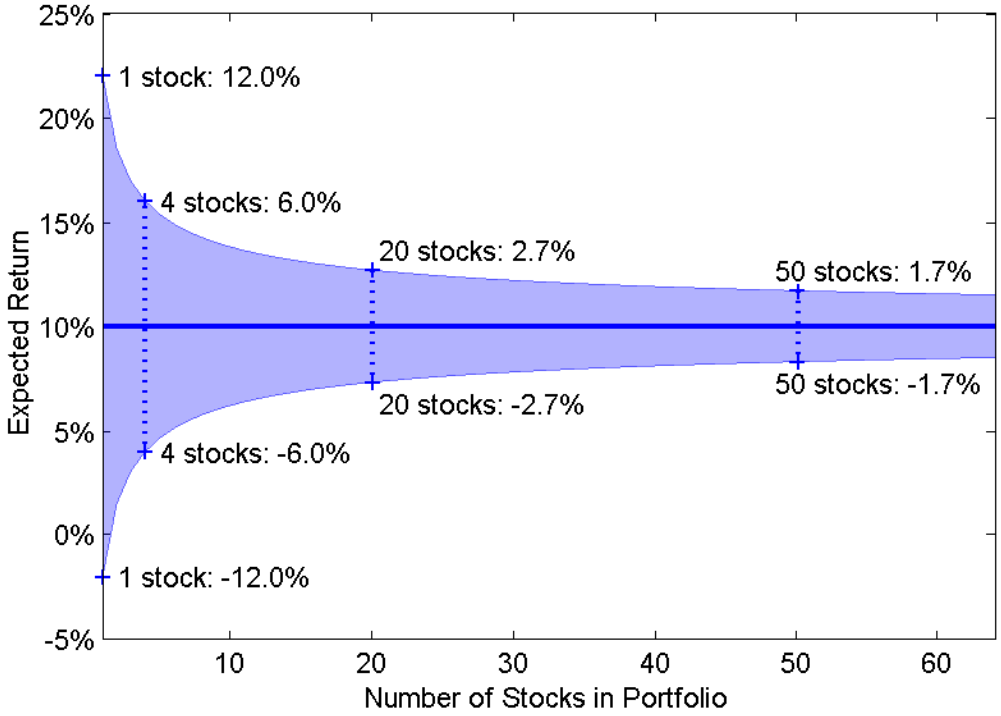

Figure 1: The Volatility Trumpet

Given an assumed ±12% range of return (volatility) for each stock, a portfolio of only one stock would clearly be the most volatile — with a return range between +22% and -2% (i.e., 12% above and below the expected 10% return). As shown by the trumpet-shape of the figure, the addition of only three more stocks cuts the range of volatility in half, and the investor would see it halved again by owning only 20 stocks — to between +12.7% and +7.3%. If we continue this analysis, you'll see that creating a portfolio of 20 stocks reduces volatility by 78% compared to owning only one stock, while including 50 stocks reduces volatility just slightly more — to 86%. It's important to understand that adding two and a half times more stocks results in only a relatively small additional benefit — shown on the right side of the trumpet in Figure 1.

In the real world, not all choices offer equal expected returns. This fact leads to the next key point:

The primary cost of diversification is lower expected return.

Figure 2 depicts the effect of increasing portfolio size — diversification — on both expected return and portfolio volatility.

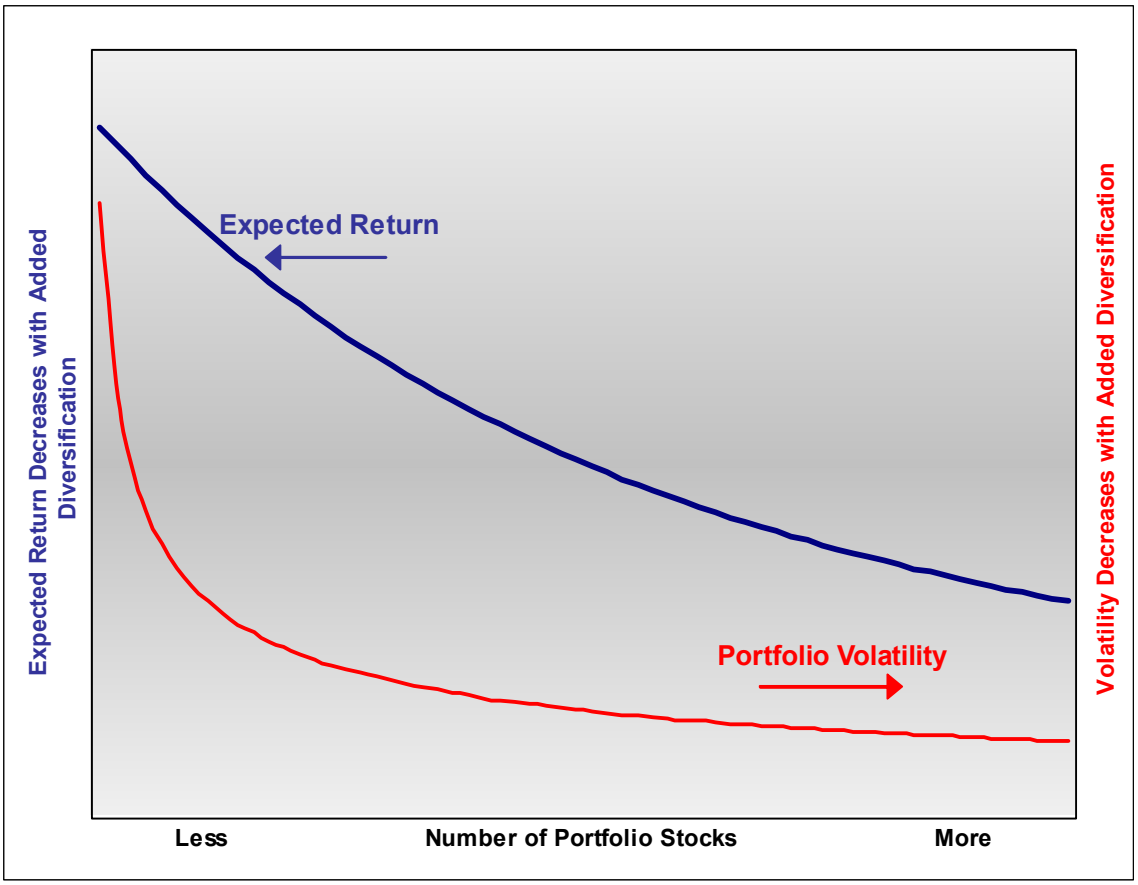

Figure 2

The reduction in portfolio volatility (red line) follows the trumpet shape that we just discussed, and Figure 2 reveals that expected return (blue line) also decreases with diversification. When you think about it, this makes sense. An investor wouldn't have 10, 20, or 100 equally promising stocks. More likely, he has one or two favorites that he expects will net excellent returns. He has more moderate hopes for his next few choices, and perhaps he has selected some stocks with lower potential that he'll consider adding in order to get more diversification. In other words, if he could create a portfolio of one stock to pursue his investment objectives, it would contain only his top pick. Since that one-stock portfolio would be volatile, he adds a second stock to reduce volatility — but because he expects less from that stock, he now expects less overall portfolio return. When he adds a third stock, expected return declines a little more, and so on. Now I've arrived at a third key concept:

At some point the benefit of additional diversification is outweighed by the cost of additional diversification — which is lower expected portfolio return.

Volatility reduction typically follows the trumpet shape — steep at first, then leveling off — while the rate at which expected portfolio return decreases depends on the expected return of each additional component stock. There will be a point that tips the scales for each investor — when adding more stocks increases his risk of disappointing returns more than it significantly reduces portfolio volatility. Legendary investor Peter Lynch referred to diversification of this sort as "di-worse-ification."

OK, so how many stocks is it? Well, you probably noticed the absence of numbers in Figure 2. That's rather annoying, isn't it? Why did I bother discussing the benefit and cost of diversification but not suggest how many independent stocks your portfolio should contain? The reason is that there is no definitive answer for all situations and all investors. For example...

Let's visit another imaginary investment world, where two investment managers live: Snow White and Rose Red. These managers work closely with their seven research analysts, Sneezy, Dopey and friends, to compile a list of stocks suitable for their clients' portfolios. (OK, I admit that it's getting a little weird here.) Let's assume that the stocks they've chosen tend to fluctuate independently, and although the managers expect equal volatility from each of the stocks, they don't expect equal returns. They rank each stock according to its expected return, from 18% down to 8%, as shown in the following figure:

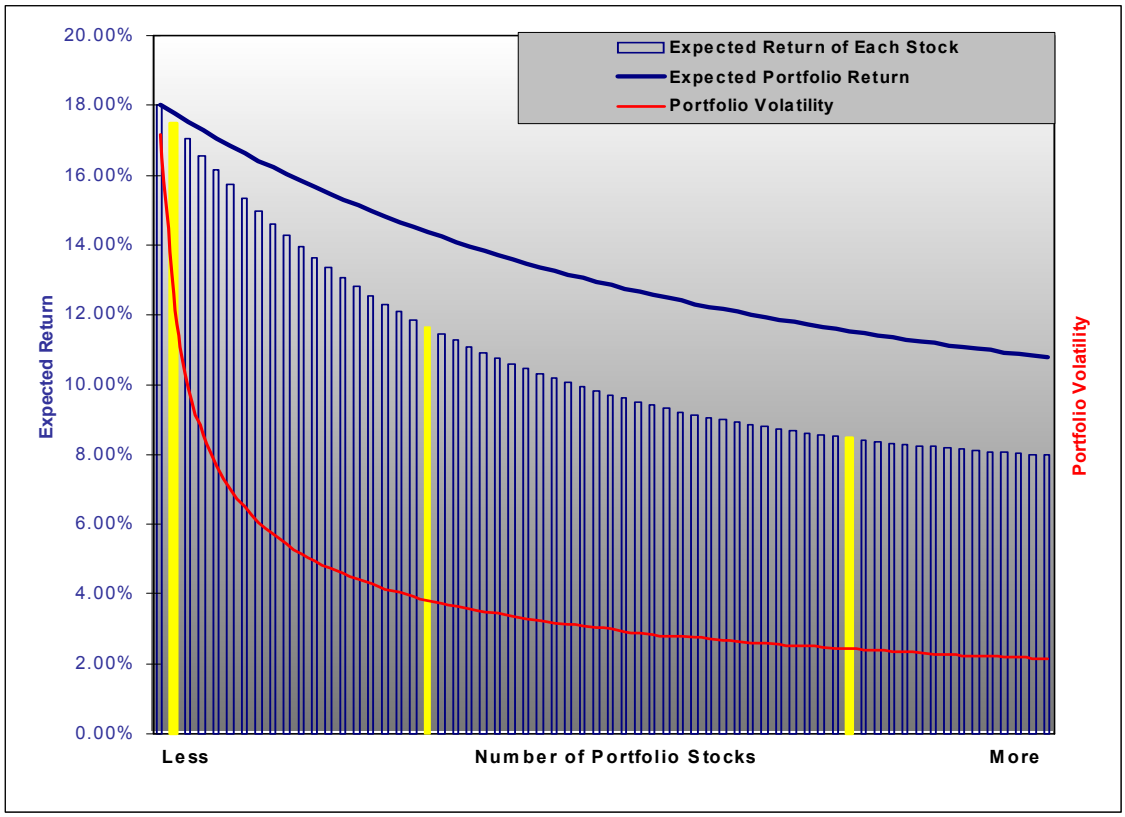

Figure 3

The blue line again represents the expected return and the red line shows volatility. Notice that expected portfolio return declines fairly steadily. In contrast, volatility decreases sharply with the addition of the first few stocks and then much more slowly — the diversification trumpet shape. The 2nd, 20th, and 50th stocks are shown in yellow to emphasize the relative changes in expected return and volatility.

Snow White and Rose Red must decide when ever-decreasing volatility reduction becomes outweighed by their unwillingness to accept lower returns for clients. It turns out that Snow White's long-term oriented clients tolerate a fair amount of volatility for the potential of higher returns, so Ms. White chooses only the top 20 stocks for their portfolio. Rose Red's long-term clients are a different kettle of fish, and they just can't sleep at night knowing that their portfolios might fluctuate much more than the market. As a result, Ms. Red buys 50 stocks for their portfolio — including many with lower expected returns.

> Let me make a point here: In the real world, ***expected*** returns and ***realized*** returns rarely match. Many factors, some unpredictable, contribute to actual portfolio performance. For the sake of our story, let's assume that Snow White and Rose Red live in a land where investment managers' stock selections are very likely to behave as expected.

The next figure depicts the performance of Snow White's portfolio along with the performance effect created when Rose Red included 30 additional stocks in her portfolio — something she did for the sake of diversification.

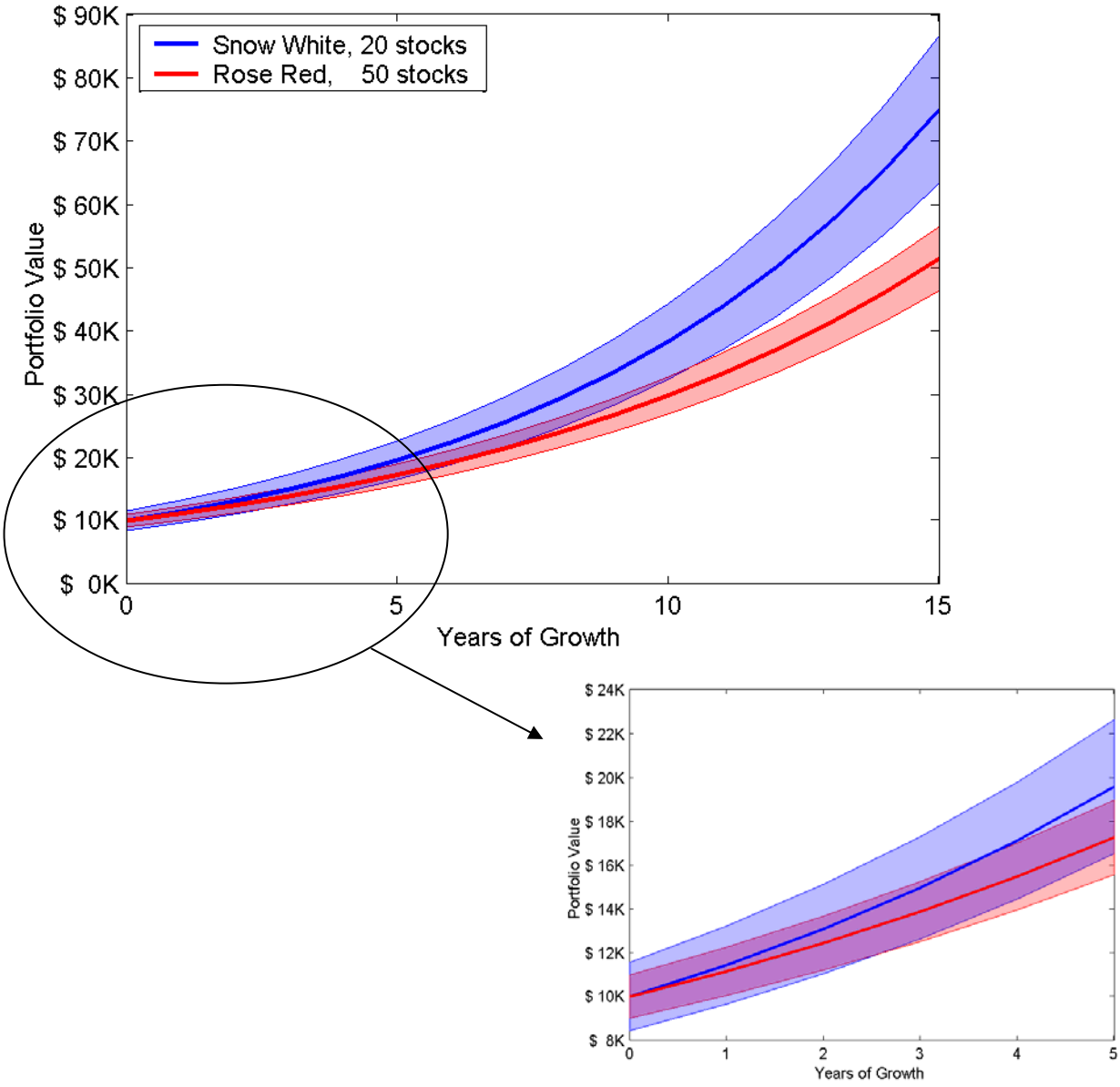

Figure 4
Long-term performance and
Magnified view of short-term performance

The center lines in the blue and red channels represent expected portfolio return. The shaded areas surrounding each of these lines enclose the predicted ranges of return. Remember, a 20-stock portfolio will be more volatile — shown as wider shading — than a 50-stock portfolio.

Although Snow White's portfolio will always have a higher ***expected*** return, in the early years her portfolio's greater volatility could temporarily result in a lower ***actual*** return (shown as the bottom blue wedge in the Figure 4 magnification). As the years go by, there will be a decreasing probability that Snow White's portfolio will have the lower value — particularly since

both portfolios will be swimming in the same market river and will be buffeted by similar market forces. After about 10 years, Snow White's portfolio will have only a slight chance of realizing a lower actual value than Rose Red's, and the portfolio's expected value will be considerably higher. Therein lies the true risk of excessive diversification — Ms. Red ***di-worse-ified*** the portfolio of her ***long-term oriented*** clients, which leads to another key point:

The dominance of return requires a long-term investment horizon.

Now let's trade fairy tale for reality and focus on "focus." In the investment business, the term focus typically refers to the extent to which portfolio assets are concentrated in a relatively small number of securities — somewhat the opposite of diversification, although the concepts are not mutually exclusive. The following table shows the relationship between portfolio focus and long-term performance for a number of prominent mutual funds.

Portfolio focus of some successful mutual funds				Portfolio diversification of some underperforming funds			
Mutual fund	Assets ($ bill)	Top 20 focus	10 yr performance vs. S&P 500*	Mutual fund	Assets ($ bill)	Top 20 Focus	10 yr performance vs. S&P 500*
Legg Mason Value	14.4	76.42%	+5.44%	Putnam New Opportunities	8.1	22.37%	-3.88%
Longleaf Partners	8.1	74.58%	+2.67%	MFS Emerging Growth	4.7	26.76%	-3.73%
Mairs & Power Growth	1.5	71.91%	+6.12%	Oppenheimer Main Street	12.3	29.33%	-2.02%
Ariel Appreciation	2.8	68.65%	+3.40%	T. Rowe Price Growth & Inc.	1.9	30.75%	-1.96%
Clipper	6.9	67.37%	+4.80%	AIM Constellation	7.3	32.21%	-3.99%
Third Avenue Value	3.3	62.73%	+2.97%	Value Line	0.2	33.19%	-4.83%
FPA Capital	1.4	59.31%	+5.92%	Vanguard 500 Index	96.0	33.37%	-0.07%
Weitz Value	4.3	57.18%	+5.33%	MFS Research	3.1	36.04%	-2.82%
Dodge & Cox Stock	35.7	41.25%	+4.11%	Neuberger Berman Partners	1.6	37.38%	-1.46%
Average		63.31%	+3.66%	Average		37.55%	-2.75%

* Annualized results: 9/1/94 through 8/31/04.

Figure 5

Although this is not an exhaustive sample, the mutual funds in the left column are among the better performers in the industry, while those on the right fared less well. Notice the Top 20 Focus in each column — the percentage of each portfolio invested, or focused, in its top 20 holdings. The most focused fund in this sample, Legg Mason Value Trust, concentrated over 76% of its assets in only 20 stocks, and it outdistanced the S&P 500 by an annualized 5.44% over a 10-year period. The other funds on the left are also highly focused.

Near the bottom of the right column is the Vanguard 500 Index Fund — which replicates the S&P 500. Its top 20 positions comprise only about 33% of its assets, which reveals two things. First, the S&P 500 is not nearly as focused as the better performers in the left column and second, the S&P 500 is not evenly diversified across all of its 500 companies. Clearly, a number of the more successful portfolio managers have diversified only to the extent that additional diversification doesn't pose too great a threat to superior returns. Adding one more stock beyond that point to achieve less volatility just isn't worth it to them. This data suggests that the portfolio focus of these successful managers appears to be about 20 stocks for the lion's share of their portfolios.

I want to return to Snow White and Rose Red in order to revisit the concept of risk. Let's say that these two investment managers haven't spoken for years due to employee issues. Rose Red felt that trained, experienced analysts would be more capable of finding good investments than seven dwarfs were. Go figure. In any case, suppose that in this story both women construct diversified portfolios of about 20 stocks, but while Rose Red is a talented stock picker, Snow White is not — and she's stuck with the advice of seven dwarfs. As a result, the two portfolios have comparable volatility but not comparable expected return.

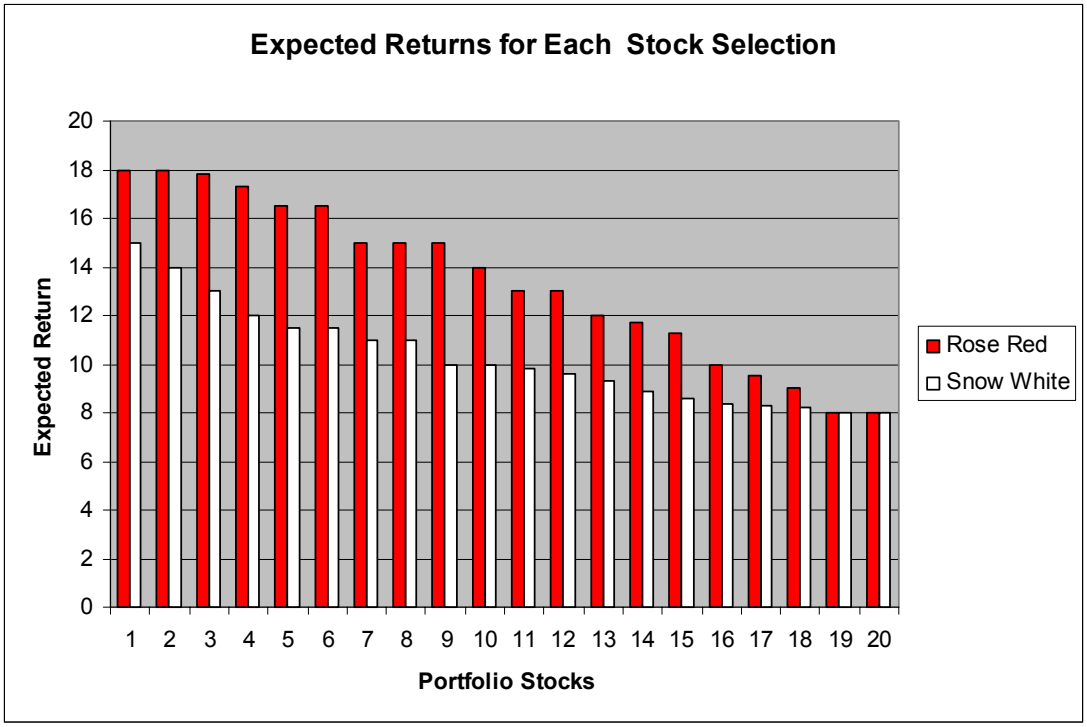

Figure 6

As you can see in Figure 6, Rose Red has found several stocks from which she expects very good returns, others that deserve fairly high expectations, and so on. In contrast, Snow White has found fewer top stocks, and each additional stock looks less appealing. By including her top 20 picks, Ms. Red reduces volatility without seriously compromising expected return. In contrast, Ms. White achieves the same diversification benefit but at significant cost in expected return. In this story, the combined performance outlook for Snow White's top 20 picks is significantly lower than for Rose Red's top 20. And so we come to the final moral of our story:

Reduce volatility by diversifying wisely.
Reduce risk by choosing wisely.

I'd like to point out that this discussion has been a simplification — though not a fairy tale. The intelligent investor will consider many other factors that influence portfolio volatility and risk. For example, in our complex world investors sometimes panic and make emotional and/or irrational decisions, creating market stress. In times of such stress, securities that are typically unrelated suddenly move in synchrony — resulting in far more portfolio volatility than expected. During the international currency crisis that occurred in late 1998, the Long Term Capital Management hedge fund collapsed because its portfolio managers didn't anticipate the increased correlation of their investments when markets were stressed. The riveting story of this collapse is told in the book When Genius Failed.

I'd like to finish by summarizing the five key points that we've discussed:

- *The primary benefit of diversification is lower portfolio volatility.*
- *The primary cost of diversification is lower expected return.*
- *At some point, the benefit of additional diversification is outweighed by the cost of additional diversification.*
- *The dominance of return requires a long-term investment horizon.*
- *Wise diversification reduces volatility. Wise choices reduce risk.*

Prudent investors understand the benefit of diversifying a portfolio, yet they also consider the cost of di-worse-ifying one. In the pursuit of superior returns, J. V. Bruni and Company ***diversifies*** wisely to limit portfolio volatility and ***chooses*** wisely to limit real long-term risk.

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