



*Foreign and Domestic Market Risk:  
Outlook from February 2007*

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One of the most important variables for portfolio planning is also one that most investors pay no attention to: volatility. I have written about this in a number of articles and it is time for an update. Given a range of investing alternatives, the probability that you will be able to draw a specific amount of income against your portfolio for the duration of retirement or that you will reach target portfolio values is strongly a function of how volatile your portfolio is. If you are getting 9% in average return with a portfolio standard deviation of 9%, your ability to reliably fund future income is much better than if the portfolio standard deviation is 15%. Similarly, your probability of reaching a specific wealth level by a certain age is substantially determined by portfolio volatility.

One of the principle sources of value obtained from using Monte Carlo simulation tools (such as *Quantext Portfolio Planner*) is the ability to account for the effects of portfolio volatility in your planning. This is especially important as investors seek to determine the right portfolio allocation. For an overview, see the following article:

<http://etf.seekingalpha.com/article/23512>

A major challenge in determining your best asset allocation plan is estimating the *future volatility* of the assets in your portfolio. If you build a portfolio that is too risky, you are likely to end up disproportionately running down your portfolio by drawing your income during a down period. A portfolio in which you are drawing during a major portfolio decline—selling into the declining market—may never recover. On the other hand, if you are too conservative in terms of taking on risky assets, you may simply not get the growth that you need to sustain your income and end up running out of funds. Alliance-Bernstein refers to these two sources of risk as *market risk* and *longevity risk*, respectively. For more details, see the article above. *Effective portfolio planning requires that you have a reasonable way to estimate the current and future risk in your portfolio, as well as a tool to calculate how these risks impact your plans.*

Like most investors and advisors, you probably pay no attention to volatility, but there is a good reason to start now. We are in the midst of a major (global) low in market volatility. There are many ways to see this, but the VIX index is the easiest to get:

<http://www.cboe.com/micro/vix/pricecharts.aspx>

VIX measures near-term implied volatility in options prices of the S&P500 index. The prices of options are largely driven by the volatility that market participants expect. VIX also closely reflects trailing historical market volatility because market volatility tends to change fairly slowly. For a discussion of this, see this article:

<http://etf.seekingalpha.com/article/11098>

It is simply an indisputable fact that we are in a major historical low in the volatility of SPY (the S&P500) and other major asset classes, including foreign indices (such as EAFE). When volatility is low, investors start to get more aggressive and, ultimately, get fearless. The longer it has been since a major market decline, the more investors believe that it will never happen again. This seems to be the case in the current market environment. Further, most investors assess the risk in their portfolios based on whether they are comfortable with recent swings—say over several years. After a period of significant losses, people tend to invest more conservatively and after a long period of low-volatility conditions, people get more aggressive. Neither of these tendencies is a good idea. The years just prior to and after retiring are the most critical in terms of avoiding substantial losses. A major portfolio decline in these years is at the worst possible time. I believe that there are many investors who are currently investing too aggressively because they are comfortable with the volatility in recent years, without understanding that we are in an unusually low period of volatility. *The Economist's* current issue (February 17-23) has an article that specifically discusses this issue (*Buttonwood: Before The Fall*, pp.77). This article cites a number of measures that suggest that this market is due for some heavy volatility.

If volatility returns to anything like the long-term average for the U.S. or foreign markets, many investors will discover that their portfolios get much more volatile than they have planned for. This could not happen at a worse time for Baby Boomers. This does not mean that I believe that older people should not invest in stocks—don't forget the longevity risk issue. I do believe that investors need to have a look at their portfolios

using reasonable estimates of future market risk and not simply rely on using trailing history.

So, how do we generate a reasonable forward outlook of market volatility? The best standard of practice in finance is to value options using your portfolio planning tool. A Monte Carlo model is driven by its estimates of future volatility. If you can value options using a Monte Carlo tool, you can compare the options prices generated by the Monte Carlo model to the prices at which these options are trading in the market. If the options prices from the Monte Carlo are consistent with the prices at which options are trading in the market, you have some confidence that your model projections of volatility are consistent with what the market ‘thinks’. This does not make your projections right, but it does provide a sanity check. Academics have studied whether the options markets’ embedded estimates of volatility are reasonable predictions and the conclusion is that options pricing has meaningful information about future volatility, as this article discusses:

<http://etf.seekingalpha.com/article/15585>

This approach is, as I mentioned, a standard practice in corporate risk management. For an example of how this issue is framed in professional applications, see the following:

<http://www.math.nyu.edu/faculty/avellane/harcourt.pdf>

This presentation focuses on trading options (rather than portfolio planning) but it has explicit discussions of historical implied volatility and realized volatility since the 1980’s, as well as noting that we are in a period of anomalously low volatility. If you read nothing else in this article, at least read pages 4-6 and then look at VIX levels on Yahoo! Finance:

<http://finance.yahoo.com/q/bc?s=%5EVIX&t=my>

Quantext Portfolio Planner (QPP) values call options and put options and I wanted to benchmark the default parameters in QPP for future volatility to see if they were in line with the current options markets for both the S&P500 (SPY) and for the developed

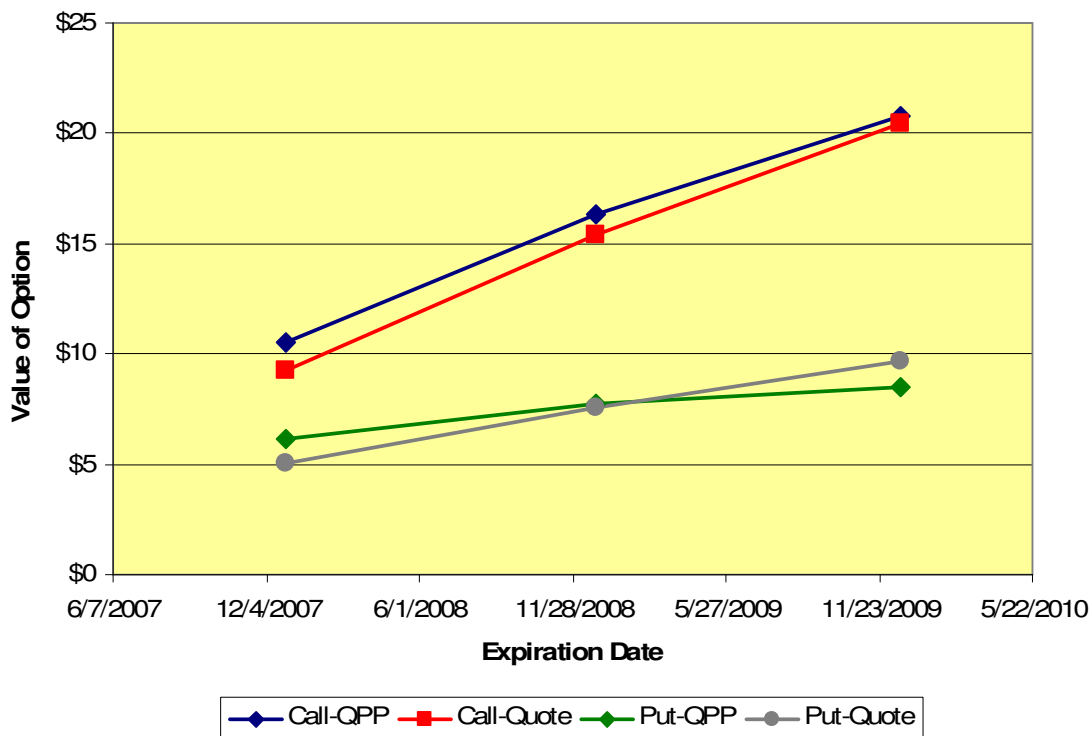
foreign markets index, EAFE (captured in EFA). The options quotes are easy to obtain from a range of sources, such as *Yahoo! Finance*:

<http://finance.yahoo.com/q/op?s=SPY>

<http://finance.yahoo.com/q/op?s=efa>

You can see the prices at which options are trading at a range of strike prices and expiration dates. Without going into too much detail, here is what these terms mean. A call option gives you the right to buy a share of a stock at the strike price, while a put option gives you the right to sell a share at the *strike price*. You purchase options by paying the *option premium* (this is the price of the option) and the option is in force until a specific future date called the expiration. Understand that I am not saying that individual investors should trade options, but rather that investors can gain valuable information about future market volatility simply by looking at the prices at which options are trading.

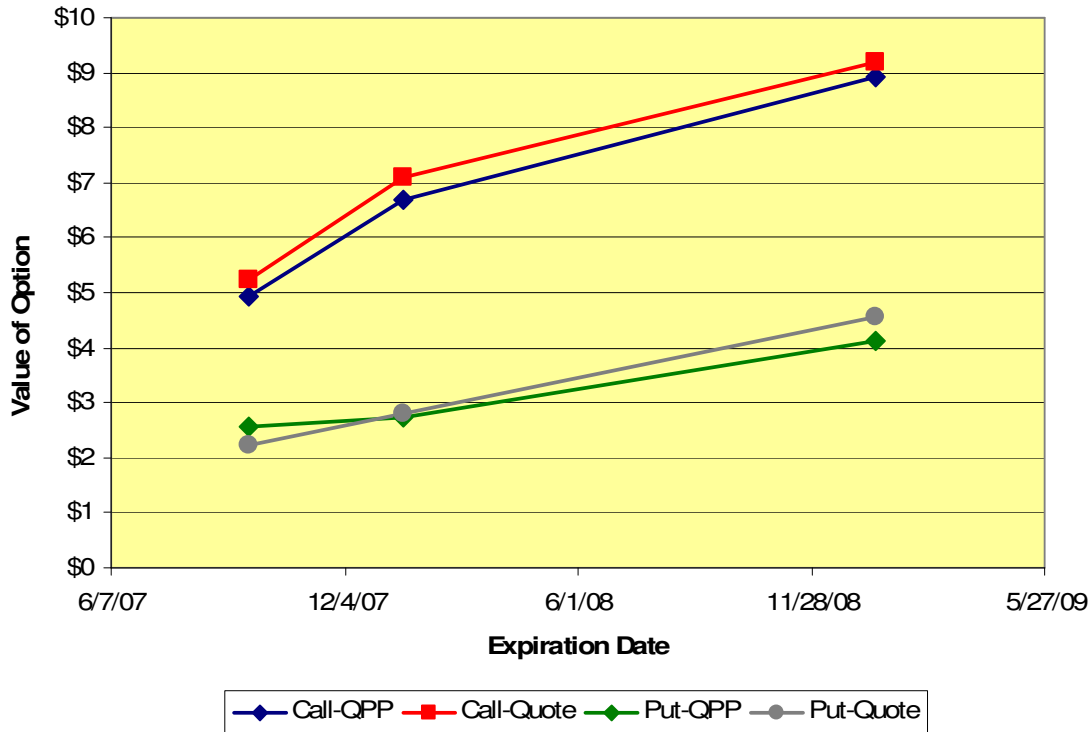
When you are looking at options prices in this application, it is a good idea to use options with strike prices that are close to the current price of the underlying—the stock or ETF price. These are called ‘at the money’ options. As of this writing (February 14, 2007), SPY was trading \$145.65, so I looked for options with a strike price of \$145. Because my goal is to test projected volatility for years into the future, I chose to look at options expiring in December 2007, December 2008, and December 2009. Using the baseline projections in QPP, I got the following results for the Call and Put options on SPY:



***Call and Put Option Values for SPY with a Strike of \$145***

There are several things to note in this chart. First, there is very good agreement between the projected options values. Notice that the December 2007 options (the left-most points on the chart) as valued by QPP are slightly more expensive than the current market quotes. This means that QPP disagrees with the market in the near-term. This is entirely to be expected. QPP’s projections assume that the market volatility will be much closer to long-term history than recent years. It will take time for volatility to ‘mean revert’ so we fully expect that our volatility projections will be a bit aggressive in the near term. The overall close agreement between QPP projections and the market prices of these options suggest that our baseline projections for the S&P500’s volatility are reasonable. The volatility that QPP projects for SPY is about twice the volatility that we have seen in the S&P500 over the past several years. **The options markets agree with QPP that the S&P500 will see much higher future volatility.**

Now let's look at volatility in large foreign stocks, via the EAFE index in the form of the EFA ETF. The price of EFA at the time of this writing was \$76.2, so we look at options with strike prices close to this.



***Call and Put Option Values for EFA with a Strike of \$75 or \$74***

In this case, we are looking at September 2007 options with a strike of \$75, January 2008 options with a strike at \$74, and January 2009 options with a strike at \$75. We used the \$74 strike for Jan 08 options because there were no quotes at a strike of \$75. Further, we cannot go out as far into the future because there were no quotes going out this far. Once again, there is very good agreement between QPP and the market prices for these options. If any clear disagreement is seen here, QPP is tending to slightly under-price the call options and the long-term put options. This means that QPP is projecting a slightly lower volatility than the options market implies. This is notable because **QPP is projecting a major increase (about a doubling) in volatility in EFA from the most recent three years.**

I periodically benchmark QPP's baseline volatility projections as a way to make sure that QPP's Monte Carlo simulations are driven by good estimates of future volatility. This is a major driver of the results from a Monte Carlo analysis, so it is very important to perform this kind of validation. This level of agreement between QPP and the options markets should make users of QPP more confident in the validity of the numbers that they are getting out.

At this point, we have shown that QPP's projections for both domestic and foreign markets (tracked via SPY and EFA) suggest much higher volatility than we have seen in recent years. These projections are consistent with historical levels, the implied volatility in options markets and with other projections generated by leading institutional advisors such as Bridgewater (see Chart 1 in this article):

[http://www.bwater.com/PDFs/engineering\\_targeted\\_returns\\_and\\_risks\\_pmpt\\_060215.pdf](http://www.bwater.com/PDFs/engineering_targeted_returns_and_risks_pmpt_060215.pdf)

**If we see a market reversion to these levels of volatility, the results could be financially devastating for many people — especially those near or at the start of their retirement years.** I do not believe that it is practical to try to time the mean reversion of market volatility because it often happens abruptly, triggered by some sort of event that swings investors from complacency to fear. I am also not advocating a flight into bonds—that will simply reduce *market risk* by increasing *longevity risk*. I believe that investors, especially those who do not have another twenty years to 'ride out' a surge in volatility, should stress test their portfolios in a framework that includes projections of volatility that are consistent with solid financial standards of practice. This is a large part of what Quantext Portfolio Planner does, and this is why we benchmark QPP's volatility projections. I am personally almost entirely invested in equities, with a modest allocation to bonds and cash, but I have designed a portfolio that will be able to ride out a higher volatility environment, as quantified using QPP. In this context, I will note that I am 37 years old—I have a long investing horizon. As an interesting note, when we analyzed Berkshire Hathaway's equity holdings using QPP, they appear to have been engineered to be able to do well in a higher-volatility environment:

<http://financial.seekingalpha.com/article/17192>

I am very concerned that there is so little public discussion and that so few articles are being written to alert investors about the importance of planning in light of the potential for a substantial surge in market volatility. It is possible that markets have somehow changed in some fundamental way to be less volatile, but that is not a bet that I would be willing to make. If you take the time to examine the array of evidence that supports reversion to a higher level of market volatility, it is hard to make the case for complacency. The best solution is to analyze your portfolio using forward-looking tools to ensure that you will have a workable asset allocation if market volatility returns to historical levels.

Disclosure: the author has an allocation to an S&P500 index fund in his portfolio

*Quantext Portfolio Planner is a Monte Carlo portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at <http://www.quantext.com/gpage3.html>*