



MELFA WEALTH MANAGEMENT

1500 West Park Drive
Westborough, MA 01581

264 Beacon St.
Boston, MA 02116

Phone: 508.366.6040
Fax: 508.870.5582
www.melfawm.com

Phone: 617-292-0300
Fax: 617-292-0301

Trade-off between Long-term risk and return for investors

By Dr. Eric Jacquier

A psychology model¹ predicts that investors in a more positive mood tend to make bolder investments. We could verify this by comparing decisions taken by New England and Seattle investors as we bask in Super bowl glory. As with all empirical studies, we may not get a clear answer, because of extraneous mood-altering factors, such as the four feet of snow Boston recently received.

In any case, those of us from the Bay area should be careful not getting carried away, and make sure to keep an eye on fundamentals. It is all about (expected) return and risk after all. I just wanted to introduce this column with a helicopter tour of these issues. We will have plenty of time to refine the details that interest you most.

What return can we expect from the stock market, say a diversified portfolio of equities? The return we care about is the market return minus that on a short term Treasury, the so-called *excess return* or *equity premium*. It is the relevant benchmark because the market must provide an expected return higher than the riskless Treasury bill. Or else why would we, risk averse investors, want to invest in it? So we may ask:

[What return can we expect from the Stock market for 2015?](#)

Will the Ukraine crisis affect markets? Will there be a second Ebola outbreak? What is the next installment of the Greek Saga? Will the European QE be effective? Will deflation continue in Europe? Will savvy Germany consent to some growth inducing policies in the Euro zone, and will the markets like it? Are we done with the Swiss Franc shocker or are we going to learn that a number of European cities, and local governments hold Franc denominated debt? The 4th quarter GDP growth was disappointing; is the recovery for real? Unemployment is down, but will wages finally climb back up as they should in a recovery? Will Oil stay low or has it bottomed out? Will the feared Chinese real estate crash occur? How about these underfunded pension funds? Nobody talks about this anymore.

¹ Social Mood and Financial Economics John R. Nofsinger, Department of Finance
Washington State University



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With the answers to these questions, we may have a shot at a semi-decent forecast of the 2015 stock market. And not to forget the always possible congressional budget antics.

Forecasting the stock market return – known as *Market Timing*, is the hardest thing in the world. It is even more elusive than delivering performance based on active security selection. If we give up on the Crystal ball, we need to settle for a less exciting but more realistic question.

What can we expect from the Stock market ... on any given year.. in the long run?

Between 1926 and 2000, the US market earned an average 13% per year, nearly 9% more than the riskless Treasury bill.² This 10% number was so ingrained in the minds that it was used in standard textbook exercises and considered an entitlement to the market investor.

Can we expect to earn a reliable annual 9% more than a T-bill over the next, say, 10 years? For several reasons, this is grossly optimistic. Stock markets are very volatile and even an average computed over 75 years bears uncertainty. To add insult to injury, Fama and French 2001 showed that the 1951-2000 period was completely at odds with fundamentals; it was a protracted anomaly. Finally, I study another problem with Alan Marcus and Alex Kane in a 2005 article. In a hypothetical situation, all of this put together, it is more reasonable to expect a long-term market return of **no more than 5%** above the Treasury bill. This new norm came as a shocker in the early 2000, even before the crashes of 2001 and 2008.

5% per year, and what is the risk?

We often hear that markets are very “volatile these days”, especially since the 2008 crisis. Are they? Let us get some numbers. We need the *volatility* (aka standard deviation) of the stock market. We will see that we can use it to assess the chances of large Stock market moves. With a simple back-of-the-smartphone calculation.

² The explanation is based on the research of Dr. Jacquier, Alan Marcus and Alex Kane.



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From 1926 to 2000, the US stock market volatility was about 20% per year.³ That number too was so ingrained in the minds that it was the standard number for textbook exercises. Over the Eighties and Nineties, volatility went down to 15%. In fact, average volatility had **steadily decreased** since the Fifties, prompting a number of academics to study the phenomenon. This was part of a global pattern of low volatility called “the great moderation” by economists. At least until the 2001 and 2008 crashes! Since 2001, volatility is back around 16% on average. A good number for volatility, on average and when we don’t have a crash, is around 15%. So...

[What does it mean to me that “the stock market volatility is 15% per year”?](#)

With volatility we can assess the chances of losing money if we hold the market. Here is the back-of-the-smartphone computation: Approximately, the market has 60% chances to return within one volatility around its expected return, ...**20% chances to dip more than one volatility below** expected return, **possibly up to 4% chances of returning two volatilities or more below expected return**. Say we own a basket of US stocks. Nothing happens and we get our expected 5%. But *nothing* never happens! We have 20% chances of losing more than 10% (expected 5% minus one volatility down: - 15%), up to 4% chances of losing 25% (5% minus two volatilities), on any given year.

Used this way, the volatility number, gives us an intuitive feel for our portfolio risk. I may not have a good intuition of what 15% volatility means, but as an investor it is my responsibility to ponder:

[About 1 in 5 chance of losing 10% or more,](#)
[Up to 1 in 25 chance of losing 25% or more,](#)
[... on any given year.](#)

³ From Dr. Jacquier’s research



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If I can handle this, mentally and financially, I may consider full investment in the market. If this feels too much like Cyclone at Coney Island, I should allocate a fraction of my portfolio to safer investments. That is easy to benchmark because of the following rule:

Portfolio volatility is simply proportional to the fraction allocated to the stock market

If I allocate 60%(column A) in the stock market and 40% in a cash equivalent account, my portfolio volatility is now 60% of the stock market volatility, 9%(column C) instead of 15%. And now for the bad news:

... and the expected return is also proportional to the allocated fraction

I can't have my cake and eat it too. Being only 60% in the market, I can only expect to earn 60% of the equity premium, here 3% (column B) instead of 5%. I now have 20% chances of losing more than 6% (3-9) (column D), up to 4% chances of losing more than 15% (3-18) (column E).

Try to find the highest fraction in the market which still feels comfortable. You may feel OK with 100%. The asset allocation decision is personal, there is really no universal right or wrong. The results are summarized below for some typical asset allocations and 15% volatility. To be extremely cautious, you could replicate this with a 20% average volatility.

Allocation, annual expected return over the money market and volatility, and annual shortfall probability

Table with 5 columns: A (Fraction allocated to the Market), B (Premium expected), C (Annual Volatility), D (20% chances of losing more than), E (Up to 4% chances of losing more than). Rows show allocations from 40% to 100%.



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And these daily market moves, should we worry about them?

How to deal with and understand short-term volatility is a topic in itself which we will visit later. In a nutshell, short term volatility can swing around, high for a period, low for another. Daily market swings of up to 1.5% are quite common. How to predict and exploit these swing is crucial for short to intermediate term risk management. Passive long-term investors however are more directly concerned with the long-run average volatility we just discussed. However, we would be concerned if (1) having to liquidate a position within a short horizon, and (2) current volatility was high. It would make the liquidating value more uncertain.

Based on the examples above, and to summarize, long term asset allocation requires us to input 1) what we expect in the long run, probably no more than 5% excess return per year, and 2) the long run average risk, typically 15% maybe up to 20% for the very cautious. , and a daily volatility of about 1% to 1.3%, to track whether markets are abnormally agitated, with the caveat that short term volatility is...volatile.

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