Computer Models for Retirement Planning

Geoff Considine, Ph.D.

When the ***Pension Protection Act of 2006*** (PPA2006) was passed last year, many people (including myself) thought that the act would finally lead to expanded use of computer-based models to assist investors in making better portfolio planning and asset allocation decisions in their 401(k) plans and IRA's. The major hurdle, however, was making sense of the fairly vague language of the PPA2006 with regard to exactly what these computer models were supposed to do, and how they should be tested and validated. The goal of allowing or encouraging firms to provide computer-based advice retirement plan participants is to ensure that investors get objective and unbiased advice on how to build a well-diversified portfolio that is a good fit to their requirements. An objective model is particularly helpful in resolving potential conflicts of interest in advice. These are admirable goals, but as is so often the case, the devil is in the details.

The issues involved in setting standards for computer models for financial planning may seem abstract, but they are actually incredibly important for investors and advisors. There are many software tools available for assisting investors in thinking about asset allocation and planning. Any policy-driven initiative to standardize and benchmark these tools should have positive impacts across the industry. There is currently absolutely no consistency in the way that portfolio planning tools work. One widely-used computer model treats every domestic stock as though it tracks the S&P500, for example. Is this acceptable? Acceptability is a function of available technology, of course, but I would say that this level of approximation is not acceptable. The real test of 'reasonableness' is whether the tool gives results that can be rationally justified or validated against standards of practice. Does a model give answers that make sense in cases for which there is a broad consensus among experts?

When the PPA2006 was passed, I wrote an article in which I laid out a set of standards for what a computer model needed to be able to do to satisfy the broadly-stated needs laid out in PPA2006:

http://www.quantext.com/BestPractice.pdf

This document laid out what I believe are the 'best practices' for the technical capabilities that PPA20026 seemed to necessitate, as well as those that investors and advisors would

want in a computer model for asset allocation and portfolio planning. Most of the computer models that I have seen fail to meet some of the criteria in this list, but the better models are certainly worthy of consideration.

Perhaps the largest challenge in setting standards for these models is the 'forward looking' aspect. To be really effective, an asset allocation / portfolio planning computer model must generate forward-looking estimates of risk and return for all assets that might be included in a portfolio. There are quite a few of these computer models that simply use trailing historical data, however, which leads to portfolios that are over-weighted to the sectors that have recently been out-performing---and this is something users should be very careful of. Since writing the article on best practices (linked above), I have come to believe that there actually is some degree of consistency that is possible across a range of different model approaches:

http://www.quantext.com/RiskReturn2.pdf

The agreement that I found between our Quantext Portfolio Planner (QPP) and the research models developed by ***Ibbotson Associates*** was notable---particularly since the models were not developed from any common foundation other than portfolio theory. Remarkably, there has been very little written about forward-looking risk and return estimates in the discussion of computer models for application under PPA2006. I have worked on benchmarking and testing of portfolio management tools for almost a decade, and there are methods that are broadly accepted as standards.

There is a very wide gap between the testing and validation on institutional-grade computer models and the kinds of testing (if any) that is used to validate most retirement planning software tools. This gap is a bit shocking. Have a look at the model discussions by Ibbotson in this article, for example:
http://corporate.morningstar.com/ib/documents/MethodologyDocuments/IBBAssociates/Commodities.pdf

Considerable time and effort is put into the process of justifying the forward-looking parameters that drive the projected risk and return for various portfolios. Now, try to find validations that look anything like this for the models that are being proposed for use in

retirement planning. The explanation for this, of course, is that Ibbotson is writing about research models and writing articles for institutional clients. That said, more thought is needed about the level of reasoning required to motivate models that will be used in financial planning.

We have spent thousands of man hours testing ***Quantext Portfolio Planner*** (QPP) in a wide variety of ways. I am certainly open to the fact that there are differences of opinion as to how these models can be tested and benchmarked, of course, but clearly testing and validation is important. When I do a ***Yahoo!*** or ***Google*** search on a set of words like 'testing Monte Carlo retirement model' or 'benchmarking Monte Carlo retirement model,' I don't find much materially relevant information from model vendors—though a number of my articles do come up. What is the basis on which any person chooses to run a computer model, if not tests or validation studies?

Certification for Computer Models

The Department of Labor (DOL) solicited opinions on what was required for basic certification of computer models for providing investment advice under PPA2006. For a balanced take on what is required to determine the standards to be applied to computer models for investment advice, take a look at the opinion that the Securities Industry and Financial Markets Association (SIFMA) submitted to the DOL:

http://www.sifma.org/regulatory/comment_letters/41907024.pdf

The tests proposed by SIFMA are motivated on the basis of 'reasonableness.' Knowledgeable investment professionals who understand portfolio theory can fairly quickly test whether a computer model is generating reasonable results. It should be straightforward to look at the projected risks and returns associated with various asset classes in the models and to determine that they are consistent with an expert consensus---see the Ibbotson article, for example.

The harder issue for certification of these models is the way that they represent specific securities and sectors. Utilities, as an asset class, for example have certain very positive

features for investors who are concerned with stable income and want to limit their exposure to the gyrations of the broader market. Utilities exhibit low correlation to many other equity asset classes. A computer model that cannot capture unique properties of a specific sector, for example, will be of limited usefulness for portfolio planning. Dr. Bill Sharpe (founder of FinancialEngines.com) has documented that the technology underlying FinancialEngines.com models does not capture this effect:

http://www.stanford.edu/~wfsharpe/art/sa/sa.htm

Reading Dr. Sharpe's article motivated a test that showed that Quantext Portfolio Planner was capturing these effects:

http://www.quantext.com/TrueDiversification.pdf

There has been essentially no discussion of this level of issue for the 'certification' of computer models for 401(k) plans. The first cut at these sorts of standards could be accomplished by a 'reasonableness' standard, but more quantitative tests would be better.

Computer Models for IRA's

This summer, the Department of Labor (DOL) held hearings on whether computer models for asset allocation and portfolio planning were realistically capable of providing the sorts of guidance envisioned within PPA2006 for IRA's. A range of testimony was presented by different groups. If you want to get a sense of how hard it is to create meaningful policy, all you have to do is read the testimony. Tom Anderson, the president and CEO of PENSCO Trust (which administers over $2 Billion in assets) provides an interesting summary of the proceedings:

http://www.tomandersonblog.com/2007/08/15#a90

Similarly, an article from ***Investment Advisor Magazine*** gives the sense that there are some major hurdles to get across before a reasonable solution is found:

http://www.investmentadvisor.com/article.php?article=8104

One of the issues that received considerable attention in the DOL hearings is whether computer models exist that can evaluate all of the possible investment alternatives available to investors with IRA's. The point here is that IRA investors have a vast array of possible investment choices (as opposed to 401(k) plan participants who typically have

a very limited universe of options). There is no way to certify that any computer model can properly automatically evaluate every investment alternative available to IRA's---the universe is effectively infinite. With the help of an advisor, this is possible but not on a standalone basis.

The Big Picture

Over the past couple of years, I have gotten to talk with a large number of investment advisors and active individual investors. There are plenty of people in both groups who are looking for better ways to design portfolios. Many grasp the key concept that a model can help you to see how your investments work together as a whole. Many understand the importance of forward-looking models (as opposed to looking at historical performance) and that a computer model can help. When I read about the debates on the use of computer models in PPA2006, I cannot help but feel that they have gotten off track.

We know that a large percentage of individual investors are radically under-diversified in their retirement plans. A survey by Hewitt Associates, for example, showed that one third of plan participants hold only one or two asset classes in their plans and the average employee who held any company stock had 41% of their total portfolio invested in company stock:

http://www.hewittassociates.com/_MetaBasicCMAssetCache_/Assets/Articles/2005_benchmarkhighlights.pdf

Employer stock is overwhelmingly the largest single holding. The average plan participant holds four funds in his/her portfolio. All of these statistics suggest that retirement plan participants are making enormous errors in planning. The most crucial first step is to show these investors that being massively concentrated is not a good idea. A fairly rudimentary computer model can accomplish this. At the next level of sophistication, a computer model needs to show investors how to manage a desire to hold

a concentration in company stock with a well-diversified portfolio. To accomplish this second step, the computer model must be capable of modeling individual securities---a relative rarity, although ***Quantext Portfolio Planner*** does this. Use of computer models that satisfy these first two requirements would get investors a long way towards better retirement planning. It appears to me that the debate on policy is focusing on finding some 'perfect model' that can evaluate all possible investment alternatives, as opposed to a more modest goal of a computer model that will help in correcting these two most common and damaging portfolio planning mistakes.

One of the major lessons that the industry has learned time and time again is that most 401(k) plan participants do not have the requisite level of financial education to make good asset allocation decisions. A good computer model can help, but the asset allocation decision process cannot (in my opinion) be fully automated. For the investor who simply wants to be completely passive with regard to retirement planning, target-date funds are probably the best choice. Good computer models can be used in conjunction with education to empower investors to make better decisions—and this has high value—but the technology itself is not enough.

Better computer models and the debate on standards for these models represent a major opportunity for professional advisors and self-directed investors. Advisors and investors can have access to computer-based portfolio management tools (such as Quantext Portfolio Planner) that help in developing objective portfolio plans. A forward-looking computer model is essentially required if advisors and investors are to extract the most benefit from diversification---and such models are available. Whether the government will be able to develop effective policy for the criteria used for selection and certification of these models remains to be seen. Good computer models can radically improve asset allocation and long-term financial planning. These models are used routinely in institutional research. Advisors and educated investors are increasingly using these tools. Government policy can help in setting standards that will make these computer models available to the far larger population of investors who will otherwise never have access to this powerful and valuable technology.

Quantext Portfolio Planner *is a portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at* [*http://www.quantext.com*](http://www.quantext.com)

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