



Robo-Advisors Are In The Spotlight: How Did We Get Here and Is Robo Right For Your Practice?

Part 1 - How Did We Get Here

Robo-advisors seem to be everywhere if you read financial advisor news or attend industry conferences. We are still early in the game, but it won't be long before these platforms will be very familiar to your clients and especially to your younger future prospects. Robo outfits like Wealthfront, Betterment and others have collectively raised hundreds of millions of dollars in VC money, most of which will be spent on advertising. I live in NYC where Betterment is running its pilot advertising program. It is hard to go anywhere without seeing their advertising – even yellow cabs are now pitching robos.

Currently only about 20% of investors are even aware of robos, but don't let this fact lull you into complacency. As the VC money propels advertising and news flow, your clients will hear about robo services. Moreover, most of the advertising messages will have you, the financial advisor, in their cross-hairs, e.g., you charge too much for too little, you collect your fees for being a golfing buddy, etc.. They will find some creative ways to get your clients and prospects scratching their heads. Speed matters. Your clients will have questions and you'd better be prepared with answers. The purpose of this paper is to be a resource for those answers. It will provide you with an understanding of the following:

1. Theoretical and technical foundation on which robo advisors are built
2. Major weakness in that foundation
3. How to determine whether a robo platform is right for your practice
4. Key criteria for selecting a robo for your practice

Note that even if you believe your practice can do without the robo-advisor right now, it is still highly beneficial to understand #1 and #2. This is especially true if you want to be the expert on the financial industry that your clients expect you to be.

1. Robo-Advisor Theoretical Foundation

First, let's settle on a definition. 'Robo advisor' is a shorthand for a type of service that offers automated account opening and personalized continuous online portfolio management with minimal human intervention. This is more or less the definition that you would get by searching Google. However, it leaves out something very important that most prominent players in the space share. All robos are based on mean-variance optimization sometimes known as Markowitz optimization. The key to this optimization is a portfolio variance formula that works like this in a two asset example:

Portfolio Variance =

[WEIGHT SQUARED OF ASSET 1] * [VARIANCE OF ASSET 1] +

[WEIGHT SQUARED OF ASSET 2]*[VARIANCE OF ASSET TWO] +

$2 * [\text{CORRELATION BETWEEN ASSET 1\&2}] * [\text{STANDARD DEVIATION ASSET1}] * [\text{STANDARD DEVIATION ASSET 2}]$

Standard deviation is simply the square root of variance, so all we have are weights, variances and correlations. Note that there are three components of the formula as we wrote it. The first and second are the product of the squared weight and asset's variance and the third line is the product of correlation between the assets and square roots of their variance. Mean-variance optimization is simply an algorithm that chooses a set of weights for assets 1 and 2 such that the overall Portfolio Variance is as low as possible for a given return requirement. This technique has been widely used since the 1980's by large fund managers including hedge funds. We will see later that the use of variance as the risk measure introduces serious problems.

Why Now, Robo? Moore's Law

The reason we are talking about robos now and did not talk about them 10 years ago is the tremendous increase in computing power. It is now possible to calculate multiple optimizations simultaneously right from a webpage, and that is what robo-advisors are essentially doing. Intel Founder Gordon Moore predicted that computing power would double every two years without an increase in cost and here we have websites that can calculate mean-variance optimizations almost instantly for a large number of simultaneous users.

2. Weaknesses of the Current Top Robo Advisors

Your clients and prospects need to understand that despite its power, a mean-variance-optimization technique let loose on individual investors is a disaster waiting to happen. Here's why:

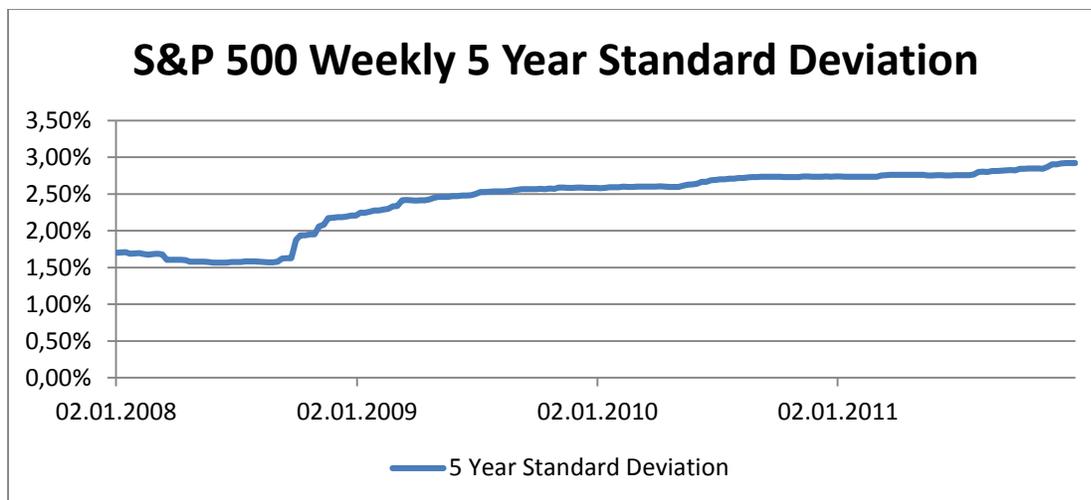
- **Optimizers = Error Maximizers.** In the 2000's, when I worked with hedge funds and other large asset managers who employed mean-variance optimization, these sophisticated traders always took great care to constrain the optimizer. The reason for this was that without the severe straight jacket of constraints, the optimizer would produce really crazy portfolios. This is why optimizers are sometimes called error maximizers. To understand why optimizers can maximize errors consider the fact that the optimizer works with parameters that are not certain. We do not know 'true' variance of any security, we do not know its 'true' correlation with other securities and we certainly do not know the future return on those securities. So, we work with estimates of those parameters. The problem is that an optimizer, despite all its computational power, is essentially a dumb machine, because it thinks that return of 7 is preferable to a return of 6.5, for example. In reality, we don't know true returns, we are just forecasting them and there is significant uncertainty in our forecast. The difference between a return of 7 and 6.5 may be almost non-existent because we are essentially guessing about the future, whereas the optimizer assumes that 7 is better and loads up on that security¹. It's the same with correlations. We estimate correlation between assets A and B to be .4

¹ Many robos use a technique called Black-Litterman to infer expected returns for assets. With this technique, instead of guessing returns ourselves, we will use the current state of the market to infer future returns. Here we are basically assuming that the market is 'smart' and efficient and it knows the future return based on the way it prices the assets relative to one another today. Of course, trusting in market equilibrium this way does not

and correlation between A and C to be .45. If you already hold A in a portfolio and all else is equal, the optimizer will tend to add B and not C, because it sees a lower correlation. But correlations are notoriously unstable. A crisis hits and your .4, .45, even .5 and .6 correlations all go closer to 1 and the difference between .4 and .45 was just contrived. So the optimizer was really maximizing the error in your initial estimate. Optimizers can be precisely wrong as opposed to broadly right. Optimizers that are used by large institutions today correct for many of these error maximization problems with sophisticated techniques such as resampling, robust optimization and, cone algorithms. Needless to say, the first generation of robo advisors is not using these sophisticated technologies, but rather the techniques that were used before the 2008 crisis. And even with all those safeguards, the sophisticated institutional optimizers still run only under close supervision of experienced analysts. Letting machines that are essentially error maximizers automatically build investment portfolios is not a great idea. Just because it **can** be done, doesn't mean it should be.

- **Driving while looking at a rear-view mirror.** Robo-advisor methodologies are based on mean-variance optimization, which focuses on trailing variance as a measure of risk, as we saw in the formula above. Trailing variance is calculated from relatively recent history of the financial markets, usually a few years. Variance in financial models is simply an average squared difference between the average return and return on every date observed over some historic period of time. Thus it should be clear that when the market is trending up as we have seen over the past few years, the average return is positive and deviations from that average are relatively small. That is why in periods of prolonged market tranquility trailing risk measures have dramatically understated market risk. Having worked in risk management prior to the 2008 crisis, I can still remember how all variance based measures such as standard deviation, tracking error, Value-at-Risk showed “historically low levels of risk” leading up to the 2008 crash. It turned out that only the realized volatility was historically low, but the level of risk was quite high. This historically low level of risk predictions coming from variance based measures right before the Lehman collapse prompted much dismay including the insightful and famous “Risk Mismanagement” piece by Joe Nocera, which appeared in the New York Times Magazine on January 2, 2009. Consider the following chart that shows a 5-year trailing standard deviation of the S&P 500, a measure highly related to the type of variance used in mean variance optimization.

improve precision; we still do not know the future and neither does Mr. Market. It regularly ‘decides’ to move from one equilibrium to another, thus changing all our implied estimates of the future.



Note that risk, according to this measure, is very low just prior to the 2008 crash; increases dramatically toward the end of 2008; and peaks toward the end of 2011. The reason for this is that years that precede market crises have been unusually tranquil. This makes portfolios that are managed with variance based risk measures susceptible to a dramatic reversal. Furthermore, there is a rise in correlation, which exacerbates the situation by reducing whatever diversification is built into the portfolio. These are reasons why the Federal Reserve all but stopped mentioning Value-at-Risk (a variance related measure) in their risk assessments and now talks about risk in terms of stress tests. The renowned economist Hyman Minsky explained in his excellent Financial Instability Hypothesis paper that risk arises as a result of overleveraging in good times. Since realized variance is low during good times, this finding assures that variance based measures of risk will tend to suggest to 'buy high sell low' around crisis events. If our estimates of variance are too low, then our portfolio variance from the formula above will be too low. So, optimizer will produce a portfolio that in reality has a much higher risk level than the one assumed by a robo platform that uses such optimization.

As an example, let's look at Wealthfront's risk profile questionnaire:

1. What is your current age?
2. What is your annual after tax income?
3. What are your savings?
4. When deciding to invest, do you care more about maximizing gains or minimizing losses?
5. If your portfolio lost 10% of your market value, what would you do?
 - a. Sell All
 - b. Sell Some
 - c. Keep Some
 - d. Buy More

Following this, Wealthfront will recommend a portfolio based on the investor’s answers. According to every risk profile test I have ever taken, my personal risk tolerance is around the median. When I responded to the Wealthfront questionnaire, my risk tolerance was 6.5 out of 10. My recommended portfolio looked like this:

- 20% - Vanguard VTI (US Stocks)
- 17% - Vanguard VEA (Foreign Stocks)
- 13% - Vanguard VWO (Emerging Markets)
- 15% - Vanguard VIG (Dividend Stocks)
- 12% - Vanguard VNQ (Real Estate)
- 15% - iShares LQO (Corporate Bonds)
- 8%- iShares EMB (Emerging Market Bonds)

Now this portfolios contains some very risky assets, i.e. 38% of combination of foreign plus emerging stocks and bonds. Real estate stocks at 12% are almost as volatile as the emerging markets stocks. Let’s run this portfolio through a series of stress tests and compare it to the S&P 500.

Below are the results in a bar chart. My Wealthfront recommended portfolio is on the left and the S&P 500 SPDR is on the right. Note, that despite my having roughly median (or slightly above median) risk tolerance, the portfolio that I end up with is virtually identical to S&P 500 in its risk profile. The biggest loss for both portfolios is in the Federal Reserve Dodd Frank 2015 Severe Scenario (marked as “A” on the chart), with the Wealthfront-recommended portfolio losing 46.4% and SPY losing 48.8% (virtually identical estimates of an uncertain future event). A 2008-like Stock & Credit Collapse (marked as “B” on the chart) is also similar, with the Wealthfront suggested portfolio actually losing more at 38.3% vs. 36.7% for the SPY. In a Euro Meltdown (marked as “C” on the chart) again the portfolios are virtually identical.



Since the beginning of May, 2015, when I completed the questionnaire, this portfolio has been down 4.2% and this happened in the absence of any major global crisis. I’m not sure that a risk averse investor would have expected that. And what if a major crisis erupts? This portfolio has no

Treasuries; it has nothing to cushion the blow because it relies on trailing variance as a measure of risk.

- **Buy High/Sell Low?** In addition to the problem of understatement of risk prior to a crisis, variance based measures overstate risk following it. You can see that risk in our chart keeps climbing all through 2009 and, in fact, keeps climbing through 2011. As a result, investors that go to robos after the crisis will get portfolios that are now excessively light on stocks. Mean variance algorithms can be thought of as ‘buy high sell low’ strategies around crisis events, which is the opposite of what investors want. Imagine if an advisor had suggested that clients load up on risky assets prior to the Lehman collapse, but then after the collapse in 2009 started putting everyone in bonds. That would be precisely what should not happen, but that is what existing robo technologies are set to do. It is no surprise that the Fed no longer uses Value-at-Risk (essentially same as trailing variance) when talking about systemic risk, but focuses exclusively on stress testing.

Where Do We Go From Here

Does this mean that robos will fail and you need not worry? Absolutely not. The tide of technological change cannot be stopped and digital ‘advice’ will negatively impact many advisory practices. If you ignore the trend and do not prepare to improve your practice, it is quite likely you will lose it. Robos will not extinguish human advice, but they will ensure that business will go to those who add most value in a most efficient manner. Advisors will need to create intermediate service for those clients who can use advisor’s robo offering for account and portfolio management. The discussion of the problems cited above can help you, because they will give you some openings to fight these behemoth startups, but they will not stop the technological revolution that is taking place in investing.

What All This Means For You

In the next section, we will help you decide if automated account opening and portfolio management tool is right for your practice. We will then examine some key points that you should keep in mind as (if) you embark on your robo journey.

Part 2 – How To Know if Robo is Right For Your Practice & How To Choose One

I. Is Robo Right For Your Practice?

I believe there are three important questions that you need to ask yourself before deciding if you are ready to join the battle for younger generation of investors.

1. Are you in it for the long term?

Adding a robo-advisory offering to your practice is the same as prospecting via any other sales channel. For a while, you will not get much AUM, but assets will build up if you are persistent. Eventually you will find that you've built an additional line of business – one that allows you to earn fees and add significant value while spending less time that you would with non-robo clients. You can spend the free time on your premium clients and will have a new revenue stream that you can invest in growing your practice. There are many benefits to creating an efficient segment of your practice where most of the routine work is done for you, by computers. But it will not be easy nor will it be fast. You need to commit for the long term, otherwise you will give up long before the payday.

2. Are you prepared to learn about new robo technologies?

It can be comfortable going through the same old routine, but if you are going to win business with millennials, you need to understand the strengths and weaknesses of the current robo offerings. You need to be an expert on these newer digital portfolio management technologies. The fact that you are reading this paper is proof that you are moving in that direction, but it is an ongoing process.

3. Are you prepared to go beyond the relationship business and produce some quality content?

Your robo offering is not a matter of 'if you build it, they will come.' There will be few random visitors to your website who are willing to open an account on your robo platform, even if it's right there on your site. It just won't happen and it is unlikely to ever happen as competition in the online space heats up. You must actively work on getting investors onto your robo platform by explaining your value proposition through the content you produce, such as educational articles, videos, webinars and whitepapers. Some financial advisors talk about their business as being predicated on relationships. It is true to some degree, but consider this. One of the key suggestions that robos have for young investors is to 'ditch your father's golfing buddy and use our 21st century technology to invest'. It is important to have good relationships, but if all you have is a great relationship – then younger investors will perceive that they are paying you to be their friend, which will not fly with millennials. How can you counter that? Establish your expertise by producing quality educational content and posting it in appropriate places online. It may seem like a lot of work, but without it you will gradually lose business because there will be no compelling argument for why millennial investors need to go with you instead of Wealthfront or Betterment at 25 bps. I highly recommend a book called Epic Content Marketing by Joe Pulizzi. It has many great ideas about how to stand out in the new economy.

II. Criteria For Choosing a Robo Solution For Your Practice

If you can answer “yes” to all three questions above, then the next step is to consider which robo provider is right for your practice. Here are key criteria:

1. Competition: Can your robo provider compete with you?

A number of advisor robo providers also have direct to retail offerings (e.g. Betterment, Schwab Intelligent Portfolios). This may create a great deal of conflict. If I am an investor and I know about both offerings, I would certainly have questions. Imagine a doctor telling you that he will take care of you, but most of the answers you get will come from WebMD, a site available to anyone. Don't you have a professional version of the site that is more sophisticated than the one available to just anyone? How do you justify the fees that you charge above and beyond using the service that is widely available? I am not saying these questions have no answers, but the necessity of answering them will be a distraction. At RiXtrema, we know that many advisors already recognize this, since this is one of the first questions they ask when we are talking about robo-services for their practice.

2. Risk Controls: Is the robo platform risk aware?

We have seen above that most of the first generation of robo advisors do not focus on risk and that will likely cause them problems as market volatility is rising. They will lose clients they worked so hard to get onto the online platform. Furthermore, those clients will be irate because they lost money and had no idea of the risk in their portfolios. You must be sure that the robo platform you choose has a solid risk model embedded within it and that investors can see clearly the types of risks they are assuming.

3. Design: How does it look in your website?

One of the key benefits of working on a robo strategy is that it elevates the technological stature of your whole practice. By having a visible automated portfolio management platform you are showing all visitors to your website that you are at the forefront of technology. A robo solution must allow any user to go through the process and kick the tires. Even if they don't become your client, they will be impressed with the capability of your website.

4. Tax Aware Rebalancing

Tax rebalancing is an important aspect of a customized portfolio strategy. Periodic rebalancing is necessary to bring the portfolio in line with the risk tolerance parameters chosen by the investor. However, the rebalancing must be tax-aware, as unnecessary taxes are wasteful. A word of caution here. Some robo-advisors are starting to advertise daily tax-loss harvesting. This is sheer lunacy or a shallow marketing gimmick. Most of the investors that are in the robo platform are in early stages of wealth accumulation. Their tax rates are likely to increase in the future as they get more experience and make more money. Squeezing every little bit of tax losses out of these portfolios is probably counterproductive, as investors will have to pay higher

taxes down the line. The main goal of tax aware rebalancing is to avoid short-term gains and to offset necessary gains with losses, as opposed to blindly maximizing every possible loss that is available.

5. Fees

Most advisors I have talked to are charging 40-50 bps for the level of service that they give to younger clients in their robo platform. You can go a bit higher depending on the service that you provide in this bracket, but there is not a great deal of room to go lower. Your services must include at least a quarterly phone call to talk through basic tax and planning issues. This means that you should not pay more than 15-20 bps for a robo solution, otherwise you will not be compensated adequately for your time.

6. Model Portfolios

Does the robo support your models? As we discussed above, optimization techniques can create individualized portfolios, but they can also create problems. Ideally, you want a robo solution that can place the client directly into one of your models that is appropriate for that client. This will make it easier to have future conversations with that client. It also makes it much easier to upsell the client to full service, because you already know the model portfolio that the client is invested in.

This paper provides a good overview of the robo advisory field, enabling you to discuss these trends with colleagues and clients in an informed way. If you are ready to introduce a robo platform into your practice, contact RiXtrema at mail@rixtrema.com to help you make the right choices.