How to Build a Strategic Portfolio Model

By Portfolio123 Member
Kurtis D. Hemmerling
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Introduction
There are sites on the Internet that allow you to follow a model portfolio, but how many give you the tools to create your own investment strategy based on the current academic research? Some of you reading this might wonder why would I even want to bother to create your own fund at all when there are so many funds and money managers waiting with abated breath for my capital? The two word answer is simple: risk - reward.

Did you realize that many of the people who want to manage your money do not even believe that it is possible to be better than average over the long-term? Many advisors feel that any market-beating return comes with higher risk and over time you simply generate average returns. They call the market efficient where all stocks have the exact same hidden risk to reward ratio and it is virtually impossible to do any better or any worse than the broad market. How depressing to give them your hard earned money when they have already given up trying. But to be fair, they don’t have many options available since the fund managers subscribe to the same theory and have also thrown in the towel. They create an endless amount of funds that are extraordinarily similar to a major index so that you have little opportunity to outperform. Or they assemble a gargantuan fund with hundreds of stocks with only the most passive of management.

But not everyone believes that the market is efficient as some inexplicable force prices stocks perfectly for the risk. There are academics and professionals that have hypothesized, theorized, simulated, tested and shown evidence that you can increase performance and lower your downside risk using a wide range of techniques...and these can be programmed into Portfolio123! This is like reading about some cutting edge science technique but also having your own team of scientists and billion dollar laboratory to repeat the discovery in your own home – and even improve upon it. What I love about Portfolio123 is that you are able to bridge the gap between the most forward-thinking academics and real world investing. You have the ability to take their ideas, expand on them, build a portfolio that can be rigorously tested in a real-world simulation over the past 15 years which also runs virtually on auto-pilot as it e-mails you buy and sell orders.

The time has never been better for ‘do-it-yourself’ investors as you have open access to the most brilliant minds in financial and investment theory as well as having the most powerful programmable quantitative engine at your fingertips. Yet, this sort of power is only available to those willing to put forth the effort. There isn’t some big red button to push that will dream up strategies and build them for you. The tools are all here but you need to be the craftsman.

This purpose of this article is to be the ‘quick guide’ to unleash the potential of Portfolio123 as I walk you through the process of building an investment system using only the resources found on the Internet. To begin though, you need a good idea...
Getting the Investable Idea

Some people think that once you have historical data and a program to test trading rules, you can mindlessly run random filters across and stumble across a trading system that makes millions while sailing around in your new yacht drinking 50 year old whisky as you watch your bank account grow with every passing second. Should you attempt the shotgun approach and attempt to create a system through thought-less rule-spamming to ‘data-mine’ a profitable strategy - it will prove to be a costly mistake. Why?

Imagine you review a series of televised chess tournaments in order to determine what it takes to be a grandmaster. If you mindlessly looked for similarities between the winning players you might have a list that includes hair color, shoe size and height. Does this mean that if you dye your hair, wear a certain size shoe and stand-up straight you will suddenly be the next Bobby Fischer? Hardly. So it goes when building an investment system – mindlessly running filters over stocks until you ‘find something that works’ will not result in a repeatable strategy for success. More than likely, you will be left with some fairly random commonalities between companies that have no bearing on profits and revenue.

To build a sound investment system that generates reliable returns, you first need a thesis or a concept of why and how you will be able to do achieve bigger returns than the broad market. These investment ideas do not need to be new creations from your head - there is already decade’s worth of academic research that you can draw inspiration from. But you do need to dig through these papers and abstracts to discover what has already been researched and tested. As you carefully read through the research, try to think about why these rules may translate into market out-performance or a reduction in risk. Often, the academic will come right out and tell you the rationale in the article summary, but you need to meditate on the line of reasoning to determine whether you comprehend and agree.

Finding the Idea

The most comprehensive resource that I know of is called Social Science Research Network (SSRN.com). Here you will find hundreds of thousands of papers – many of which relate to market-timing, momentum, capital structure, technical analysis, dividend yields, payout ratios, valuation techniques and much more. It can be a bit overwhelming at first. Start by picking a topic that fits with your investing style and that you already have a little knowledge and experience with. If you are a long-term investor, you may want to start with value premiums and dividends. Or you might simply type in ‘long-term investing’ in the search bar and sort through the results. This process will take some time.

Below are a few papers you may find interesting are as follows:

- [Adaptive Market Timing with ETFs](#), 2010, Glenn
- [Best Ideas](#), 2010, Cohen, Polk and Silli
- [Enhancing the Investment Performance of Yield-Based Strategies](#), 2012, Gray and Vogel
- [Filter Rules: Follow the Trend, or Take the Contrarian Approach?](#), 2010, Kozyra and Lento
- [How Active is Your Fund Manager? A New Measure That Predicts Performance](#), 2009, Cremers and Petajisto
How to Identify and Predict Bull and Bear Markets, 2010, Kole and Van Dijk
Insider Trading and Share Repurchase: Do Insiders and Firms Trade in the Same Direction?, 2011, Bonaime and Ryngaet
Is Portfolio Theory Harming Your Portfolio?, 2011, Scott Vincent
Long-Term Volatility Forecasting, 2012, Reitter
Market Timing & Trading Strategies Using Asset Rotation, 2010, Schizas and Thomakos
Market Timing with Moving Averages, 2012, University of Adelaide Business School
Portfolio Diversification Dynamics as a Measure of Market Sentiment, 2012, Roger
Rebalancing and the Value Effect, 2012, Chaves and Arnott
Relative Strength Strategies for Investing, 2010, Faber
Revisiting the Fisher and Statman Study on Market Timing, 2011, Pfau
Size, Value, and Momentum in International Stock Returns, 2011, Fama and French
Timing and Volatility Quantitative Model, 2009, Baryshevsky
Where the Black Swans Hide & the 10 Best Days Myth, 2011, Faber

There are thousands more of such gems to be found at SSRN.com and these are just a select few to get you started. The important point here is that you need to have a solid concept of what you want to achieve and a rough idea of how to do so before you start hammering out trading rules in the Portfolio123 engine. Some questions you may want to ask yourself are these:

- Are you looking to lower downside risk in bad markets? Have you considered market-timing? If bear markets produce high price correlation, how can you use this to your advantage?
- Are you looking to lower day to day portfolio price volatility?
- Do you want to ‘beat-the-market’ in that you want stock picks that have larger returns on average?
- Are you looking to compound dividend returns? What role does payout ratio, yield and capital structure play?
- Do you prefer to follow trends or buck them? With the crowd or contrarian?
- How active of an investor are you willing to be?
- What is your preference for market capitalization?
- Are you aware of such effects (more pronounced on smallcaps) such as Post-Earnings-Announcement-Drift, upward EPS revisions, analyst upgrades, momentum, value and short interest?
Once you have your investment idea that harmonizes well with your objectives, goals and level of risk - you can proceed to the next step where we expand a concept into a strategy.

**From Concept to Crude Strategy**

Over the course of this article, I will be building an investment strategy based on the *Tweedy Browne* paper of high yield and low payout ratio...which is in turn based on a *Credit Suisse* report. As well, I will include some complimentary ideas from the *Gray and Vogel* paper, *Enhancing the Investment Performance of Yield-Based Strategies*. The underlying concept in these papers is that stocks with higher yields and lower payout ratios, by their very nature, have deep value which investors may not be pricing efficiently. Consider...

A stock offers a 6% dividend yield. But does this stock have good value or not? One cannot tell simply by the dividend yield. On one hand, the company might not even be generating profit and the dividend comes from cash reserves. This would not be of good value to the shareholder. On the other hand, a company might have so much profit that they pay only 10% of their earnings back to shareholders as a dividend. If the 10% profit represents a 6% dividend yield – this stock has screaming hot value. Of course, this is an extreme example not likely to be found in the market.

Our initial concept will be to trade stocks with higher yields with limits on the payout ratios as it suggests value – which in turn can lead to a rapid share price increase should sentiment improve. After reading the various academic papers, it is good to make a list of concepts that you feel comfortable with. Your system is liable to evolve and change during this process but you need a starting point.

Here is list of my crude investing concepts:

1. High yield
2. Lower payout ratio
3. Low debt and/or paying down on debt
4. Relative strength holdings

For the next step, you should be logged-in to Portfolio123.

- Click the HELP tab and the FACTOR AND FUNCTION REFERENCE link in the sidebar.

This should be your new best friend – take some time to get acquainted with it. This is the list of factors and rules that you can program into Portfolio123. You can use these factors and functions to build complex formulas. Some might question this time-consuming step thinking that you will merely rely on the Rule Wizard to assist you in creating the strategy... but even if you use assisted rule-building you should be fully aware of the breadth of rules and formulas available. I won’t lie... you will be spending a lot of time reading and reviewing this section (or you can print it out if you like) but these are the tools of your trade. Be a master craftsman.
Initial Testing

To carry out our initial test we will enter a few rules into the SCREENER. This is the first step I would take to test the validity of our investing concepts to determine how well they work together. I view the SCREENER as the virgin testing grounds for new (at least to me) concepts. The SCREENER is not as elegant as SIMULATION testing when mimicking actual portfolio performance, but the SCREENER excels at broad strategy testing. The SCREENER can run the same strategies that the SIMULATION and PORTFOLIO can, but its strong point is to test ideas against thousands of stocks. For example, the SCREENER can test all value stocks against all growth stocks in seconds with two massive portfolios containing thousands of stocks each. SIMULATION can then be used as the second step where I take the tested strategy and create a portfolio that holds dozens of stocks with real world constraints that mimic my actual brokerage account.

The SCREENER layout looks like the picture below. The RULES tab is where you enter buying criteria that must be met in order for a stock to be purchased.

Using the FRank Function

This is where reading the FACTORS and FUNCTIONS really pays off. In our investment strategy we want high-yield stocks. How will we determine what is high yield and what is not since every market is different? Picking an arbitrary number (e.g. four percent) is weak since what is low during one period of time might be high in another. Thankfully, Portfolio123 has developed a flexible set of instructions that allows us to screen for the highest relative dividend yield.

- Under FUNCTIONS – RANKING & SORTING we find a valuable tool called FRANK (as in Function: Rank). FRANK allows us to sort stocks based on whatever factor we choose and return stocks in a certain percentile range.
We want the top 30% yielding stocks in the S&P 500. While the YIELD rule will return stocks that are above a specified yield, the FRANK function will return the highest yielding stocks regardless of the actual dividend number. The rule we are using looks like this:

- Frank (“Yield”) > 70

**Creating a Benchmark**

Before we test our first rule, we need an appropriate benchmark. Our system is based on the S&P 500 index, therefore, we should use that as our benchmark. Yet, the S&P 500 is a market-cap weighted index and we are using an equal-weighting methodology (where every stock is held at the same weight regardless of how big or small it is). Hence, we will use an equal-weighting of the S&P 500 as our benchmark.

Click the BACKTEST tab. Next, select the UNIVERSE of stocks to be the S&P 500. Our slippage will be 0% as we are merely testing the validity of our strategy at this point – later we will factor in trading costs and real-world constraints. We will rebalance every four weeks and start the test in January 1999.
The redline is our equal-weight strategy of the S&P 500 with an annualized return of 8.39% (you can also select the “S&P 500 equal-weight index” as the benchmark but it does not include dividends). The blue line underneath is the market-cap weighted S&P 500 index that is the most widely publicized.

The next step is to run our high-yield ranking rule across the index and keep the best 30% of the yielding stocks. Remember that our screener includes all dividend payments – which is vital for a test such as this.

While our total return improves slightly, our drawdown increases somewhat. We might question our initial test results since not all S&P 500 stocks offer dividends. Although I know this is not true, what if the S&P 500 only had 150 dividend stocks? Our rule that keeps the highest-yielding 30% of the index would, in that case, return the entire set of dividend yielding stocks. Our strategy is to find the highest-yielding stocks of ones that pay dividends. This is a different screen altogether and it requires that we modify our universe of stocks.

Thankfully, with Portfolio123 this is easy. But before we create an entire universe of S&P 500 dividend stocks when we can simply add a rule that states the yield on our screened stocks must be greater than 0? Wouldn’t that fix the situation? No because one is an ‘after-market’ rule modifying our universe and the other is a changed universe at the source. Consider how it is different...

- In one scenario you have a universe of S&P 500 stocks that pay dividends only. You have modified the universe at the source so only dividend-paying companies are present. Next, you add a ranking rule in the screener to choose the lowest 10% dividend payers. You will get stocks with small yields such as 0.1%, 0.2% and 0.3%.
In the next scenario you have all S&P 500 stocks in your universe. Your first rule is to have a yield greater than 0. Your second rule is to rank the entire universe of stocks and keep the bottom 10% yields. What will happen? The first rule eliminates the 100 stocks that don’t pay dividends but the second rule ranks the entire S&P 500 universe and finds that the lowest yielding stocks do not pay dividends at all. Thus, the two rules conflict and absolutely nothing turns up on your screen.

It is best to change your universe of stocks at the source since that is what ranking rules evaluate. There is a work-around but it is better to change it at the source so you do not need to worry about it later.
Creating a Custom Universe
To create a new universe, click TOOLS – UNIVERSES and select NEW UNIVERSE. Under the RULES tab you need only select the S&P 500 (as my base universe to start with) and then add a single rule that states the following:

- Yield>0

I click RUN just to see how many stocks are currently returned and the answer is 405. From here I click SAVE AS and choose a name. I select “S&P 500 Yielding Stocks” as the descriptive name for my universe. What we have accomplished is the creation of a new equity index where the constituents must be a member of the S&P 500 index plus paying a dividend.

Now I return to the SCREENER and re-run my test with this new stock universe that only holds dividend yielding stock in the S&P 500 index. I backtest the ‘top 30% dividend yield’ rule to see what effect this has on my risk and return.
The return improves slightly along with a few other risk/performance statistics although the maximum drawdown during 2008/2009 increases yet again.

**Adding In the Other Rules**

The next step is to build the rest of my investing rules which includes payout ratio, relative strength and debt ratios.

After some deliberation, I decide to use an absolute rule for payout ratio. My reasoning? I do not want a company that pays out more than 100% of its profit in the form of a dividend as this is not sustainable. But I neither want to overly restrict my universe of stocks (feel free to modify at will). So my basic payout ratio rule will stipulate that dividends must be less than profit earned.

- **PayRatioTTM<100**

The next rule either requires there to be low debt or a reduction of net debt. How can you create a rule that allows either one condition or the other?

**Creating a Forked Rule**

You need to program Portfolio123 to accept either condition A or condition B – yet you do not have a preference for which one. First, we need to define each rule clearly.
Our first condition is for a low debt-to-equity ratio. We create a simple rule just like our other FRank rules that will limit the debt-to-equity ratio to the bottom 50% of our universe (based on the most recent quarter):

- FRank("DbtLT2EqQ")<50

Our second condition is trickier since we have to dig into the BALANCE SHEETS as we will be comparing quarterly data to determine a change in ratios. Still, this is an easy feat for Portfolio123. P123 can test any quarterly line item for the trailing 20 quarters (5 years) or for the trailing 10 annual statements provided we are familiar with the FACTORS and FUNCTIONS.

To create this formula, I will use the long-term debt to equity ratio from one year ago (quarterly) and divide this by the long-term debt to equity ratio of the most recent quarter. In this instance, the bigger the number translates into more debt reduction. So my rule will look like this:

- FRank("(DbtLT(4,QTR)/EqTot(4,QTR))/(DbtLT(0,QTR)/EqTot(0,QTR))")>50

I know it looks scary but if you break it down it is simple. This is a ranking rule so we begin with FRank. Next, we take the LT Debt from the same quarter last year (It is number 4 if you count backwards from the most recent quarter being 0) and divide this by the total equity in the same quarter. You divide this by the same formula – only this time you use the most recent quarter (0). Put brackets around the whole string and make it return the highest 50% (which actually means the largest debt reduction).

All I need now is to place an OR operator between the two screening rules and Portfolio123 will either take the best 50% as regards low debt-to-equity or the best 50% as to reduction of debt-to-equity.

**Relative Strength Testing**

Our relative strength rule is simple and can be found under STOCK FACTOR – PRICE & VOLUME – PRS2Rel%Chg. This rule requires the 52 week performance of our stock to exceed the S&P 500. Better performing stocks have a tendency to do over the following year. This is called momentum much literature has already been written on the subject.
My 4 Rule Investment System
The 4 rules to my investment strategy looks like this:

Next, we need to historically backtest the strategy. As I do so, I notice that this system is overly restrictive during 1999 and 2000. This could be from my look-back rules or from some other cause. For the sake of this tutorial (and not to make it overly complicated), I will start my backtest in 2001. To do so, I need to re-test the benchmark (equal-weighted S&P 500). I run this manually because I want both an equal-weighted index but also dividends for a comparable total return.

The updated benchmark test since 2001 is below.

<table>
<thead>
<tr>
<th></th>
<th>Total Return</th>
<th>Annualized Return</th>
<th>Max Drawdown</th>
<th>Sharpe Ratio</th>
<th>Sortino Ratio</th>
<th>Standard Deviation</th>
<th>Correlation with Benchmark</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal-Weight S&amp;P500</td>
<td>168.63%</td>
<td>8.50%</td>
<td>-59.10%</td>
<td>0.18</td>
<td>0.23</td>
<td>25.87%</td>
<td>0.79</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Heading back to our simple 4 rule system, we achieve the following results:
Our annual return is 2% higher than an equal-weighting S&P 500 strategy and our drawdown is less. Sometimes I will turn my rules on and off – one at a time – to see the individual performance of each rule and then the combined performance of synergy.

As I do so, I find that the relative strength is actually harming returns and being overly restrictive on our stock selection. Why might this be the case? Relative strength looks at price performance of our stock and compares it to the market. However, our high-yield dividend stocks contain a large amount of the returns in dividend payments which is not reflected by a strong price performance. Thus, relative strength might be more meaningful in non-dividend stocks than income stocks. Just think of a quick example...

Stock ABC pays dividends while stock XYZ does not. Stock ABC has a 10% dividend yield. Share prices have stayed flat all last year and the previous 3 years. Stock XYZ has risen 5% every year for the past 3 years. Stock XYZ appears to be the better stock. But wait – stock ABC has returned 10% annually while stock XYZ has only been able to accomplish half that much. In fact, the higher the dividend yield the less meaningful relative strength becomes.

The rule is removed and the strategy is re-run.
This seems to make more sense. What further improvements can we make on this S&P 500 dividend system?

Thankfully, we have a Portfolio123 community and we all help one another out. Marc Gerstein is a highly intelligent and accomplished investment guru that is always around to offer his support when needed. After looking over my strategy he discerned that this strategy could woefully pick up stocks where the equity was negative, thus throwing off my formulas. Hence, I am recommending the addition of this one extra rule to prevent any miscalculations. You can add it to your screen or directly to your universe.

- EqTot(4,QTR)>0 and EqTot(0,QTR)>0

It simply states that the equity in the same quarter last year and the most recent quarter must both be positive. Thanks Marc for picking that up. Its performance effects are negligible at this point but its safety net is priceless.
Creating a Ranking System

Portfolio123 has developed a powerful tool called ranking systems that let you grade stocks based on a theme. A ranking system is a group of rules built around a theme. A value ranking system might include price-to-book, price-to-assets, price-to-earnings, and price-to-dividends. All the stocks in our universe are graded by these factors and you can select the top scoring stocks to hold in your value portfolio. Ranking systems can be applied to any other strategy you have or it can be used by itself. I prefer to use it to enhance an existing strategy.

Our 3 buy rules recommend anywhere between 25 and 50 stocks. Would you like to hold the best 10 according to Warren Buffett principles? What about the best 10 according to fundamental growth or quality or price momentum or the 33 other ranking systems created by Portfolio123? You can even create your own ranking system. We will build our own ranking system later, but for now, let’s utilize the various Portfolio123 ranking systems to pick the ‘best 10’ stocks.

After testing out various ranking systems, including one that uses market-timing, I settle on one called BASIC: QUALITY. Holding the ‘best 10’ stocks according to this ranking system (in addition to our 4 investing rules), we get the following results:

From our preliminary testing we conclude that we have a good core strategy to build upon. The question is...where to from here? At this point we should do one of three things:

- Use the Advanced Backtest
- Build our own ranking system
- Create a real-world simulation
**Advanced Backtest**

I do not wish to spend a lot of time on the advanced backtest other than to say that it is a useful statistical tool to check for strategy robustness. Why is this useful? Perhaps you have an investment strategy that works well starting in March 2009. But is your gain due to superior strategy or lucky timing? In our strategy, we re-balance every 4 weeks. What if we started investing on week 2 instead of week 1? Or week 3? How different might the results be?

The advanced backtest gives us a few stats to mull over.

- Every 4 weeks this strategy earns 1.24% vs the market return of 0.26%.
- In up-markets it averages 3.87% which is similar to the market gain of 3.33%.
- But in down-markets, this strategy only loses 2.62% every 4 weeks on average while the market on average dumps over 4.26%.

Our strategy gains from a reduced downside in bad markets but it does not out-perform in bull markets.
Creating a Ranking System

Creating a ranking system can be an in-depth process. There are layers of complexity and depth in a relative ranking system. For the sake of this article we will build a simple ranking system based on our three rules and you can enhance this later if you choose.

- Click RANKING – NEW – STOCK RANKING SYSTEM.

Give your ranking system a name and click SAVE. On the right hand side of the screen is the interface for building a ranking system.

- Click ADD NODE and STOCK FACTOR.

It should look something like this:

Here you can add various ranking rules in the clickable fields near the top. Below that you can state whether a higher or lower number is preferred. At the bottom you can grade these factors against all stocks or just those in the industry or sector. I add the following 3 rules:

- Yield – higher is better – compare vs. Universe
- PayRatioTTM – lower is better – compare vs. Universe
- Long-term debt to Equity – lower is better – compare vs. Universe
Once you have entered these, you will need to select ADD NODE – STOCK FORMULA. Give it a label and copy the formula you entered into the SCREENER and paste it in the box that says FORMULA.

- \( \frac{\text{DbtLT}(4,\text{QTR})/\text{EqTot}(4,\text{QTR})}{\text{DbtLT}(0,\text{QTR})/\text{EqTot}(0,\text{QTR})} \)

Make sure you frequently click the SAVE button or you are liable to lose your work!

- *I wanted to add that Marc Gerstein once again noticed that this ranking system may pick up stocks with a negative equity – thus throwing off the calculation. Although this article is primarily for illustrative purposes (and not for you to go out and throw money at this system), I need to mention this as negative equity could throw off this equation. There are a few fix this. The easiest and best would be to change the universe at the source. I add a simple rules in the universe that states this rule: EqTot(4, QTR) > 0 and EqTot(0, QTR) > 0*
Next, you need to decide the WEIGHT of each rule. Will yield be more important than the payout ratio? What percentage of the overall ranking weight should each rule be? You can adjust these by clicking the name of your ranking system...

...and then going to the right-hand sidebar and clicking on the WEIGHTS tab.

If you leave the numbers at 0, these rules will all have the same weight. Because I have 4 rules (I separated the two debt rules), each rule carries 25% weight. Seeing as we have two debt-to-equity ratios, I would prefer to place more emphasis on the Yield and Payout Ratio. Adjust the number to whatever you like. Just remember that anytime you UPDATE the ranking system – hit SAVE or suffer the consequences.

In the left sidebar, click on the word PERFORMANCE. We are going to back-test our ranking system in our S&P 500 dividend universe. The fields on this page should be familiar.
After testing my ranking system I am shown the following results:
What have I accomplished here? I now have a set of relative ranking rules that can be used on any system or strategy – past, present or future. As an example, I run a test using no other strategy other than ‘the best 10 stocks’ as determined by this ranking system. The chart below shows the back-tested performance using only my 4-rule ranking system on the entire S&P 500 index while rebalancing every 4 weeks.

Now this ranking system may not be suitable for any and all strategies as it is tailored toward dividend stocks. As well, this simple ranking system will no doubt need added layers of complexity and optimization. Remember to include either in the screener rules or in the universe rules a requirement for equity being above 0 in both the most recent quarter and the same quarter last year (EqTot(4,QTR)>0 and EqTot(0,QTR)>0).

But you can likely see the power of first proving our investment ideas through the SCREENER and then building it into a ranking system to have a powerful and flexible tool to be re-used in many different applications.

Now that we have proven our concept, developed sound investing rules and even have a new ranking system at our disposal - how do we create a portfolio that e-mails us recommendations of when to buy and sell the various holdings? For this step we need to learn how to create a SIMULATION and a PORTFOLIO. Don’t be alarmed – you have already performed 75% of the leg work by creating the strategy in the SCREENER.
Simulation Testing and Optimization

Creating a simulation allows us to simulate what trading this system would look like in a real portfolio with cash. This is as close to the real thing as it gets. And once we have the simulation settings just right – we simply click one button and it becomes an automatic and hands-free system that e-mails us rebalance notices.

How do we create a simulation?

- Click SIMULATION – NEW – STOCK SIMULATION.

I will walk you through each screen – one at a time. Your GENERAL screen will look like this:

You need to name the system and choose how much starting capital you want to invest with and an appropriate benchmark. Next, you can enter in the commission for each trade and how much price slippage you expect. The bigger the stock the less price slippage you will experience and these are some of the most widely followed companies – so I expect little slippage. Because I am using Foliofn as my brokerage, I do not pay a commission for each trade ($29 per month flat-fee if using ‘window trading’ which is available twice daily).

Our initial setting is for a re-balance every four weeks, but as I will show you later, you can increase your rebalance to weekly and still manage your annual turnover. Thus, you will have a more responsive system while keeping not over-trading.

The next tab, POSITION SIZING, looks like this:
Here is where we decide how big our optimal portfolio size will be. We can also decide how far to let stocks go before we rebalance. If our constraints are 30% from ideal size, we will not rebalance a stock that trades at $10 per share unless it moves above $13 per share. Personally, I am not a fan of micro-managing our positions so I will leave this number at 30%.

Our next tab is UNIVERSE & RANKING. We already have a custom made universe, so go ahead and select that one. I will use the BASIC: QUALITY ranking system.

For now I will ignore the STOP LOSS rules. Empirical evidence suggests that using a STOP LOSS does not improve performance or lower risk after fees. If you find that it works for you – go ahead. I don’t and
won’t. You may click on PERIOD & RESTRICTIONS and select MAX. If you have a professional level account, you have historical backtesting since 1999, but if you have any other account, you get the trailing 5 years of data.

We want to focus on our BUY and SELL rules. First we open the BUY tab. Here we have 2 buy rules pre-loaded.

- The first rule ensures that our portfolio will not become more than 30% weighted in any one industry.
- The second rule dictates that we can only buy up to 5% of the daily volume. This is good risk management.

Next, simply cut and paste the 3 rules from the SCREENER.

![Rule Table]

This covers our buying criteria but we need to consider when we want to sell. How will you do this? This is where many people run into problems. I have a couple of tips that you might be able to use.

- Create a buy/sell rule using the ranking system
- Use the inverse of a buy rule to become a sell rule

We will start by using the inverse buy rules in order to sell. Simply copy the buy rules and paste them in the sell fields. Just make sure you switch the operators around.

![Sell Rule Table]

From here, click Re-Run Simulation. As a side point, your simulation will only be saved by running it. So if you get this far and close it down without running it...your simulation may be lost. Here is how our initial set-up tested with all our brokerage fees and real-world constraints:
What we are noticing is the effects of real-world portfolio constraints. Our return is not as good as previous, but this is more realistic of what we will experience going forward. What small optimizations can we make?

**Optimizing a Simulation**

There are a few things we can do to optimize our simulation. The first is to change the re-balancing to weekly. We re-run the test to see the effects. Whoa! Our turnover is through the roof. This comes from
our selling rules being overly restrictive. What we want to do is turn our sell rules off and on – one at a time – to determine which one is causing the high turnover.

Our debt-to-equity rules seem to be the cause of our high turnover problem. I simply delete this selling rule. Now our turnover is down, but so is our performance.

What else can be done? If you have a professional level account you can use the OPTIMIZATION button to make numerous small changes and compare the differences all at once. As an example, you can select 10 different ranking systems and with a couple of clicks of the mouse, you can see charts and stats on the various iterations. This saves you running the simulation over and over and over….but I am not going to get into this advanced feature in this article. Just know that if you want to make numerous small changes and you want to compare the effects – the OPTIMIZATION is the way to go.

**Buy and Sell With Ranking Rules**

Another technique is to add a pair of ranking rules. For instance you could add a minimum rank of 75 to the buy rules (rank>75) but require the system to sell when it falls below 75 (rank<75). These rules will usually help you raise cash when the market is falling – which means your max drawdown will decrease. You will need to play around with different ranking numbers to see what works. Each ranking system behaves a bit differently. Perhaps 50 is a good minimum rank on one system while 80 is preferred on another.

Below is an example of when I add a minimum rank of 80 to the buy and sell rules.
While this decreases our downside risk, it also increases our portfolio turnover and lowers our annual gain. Perhaps this rule is a bit overly restrictive. I will back it off to 75.

**Add Diversification for Buying and Selling**

Here is a cool rule for those of you who love diversification — *maximum correlation*. This rule will compare price performance of the suggested stock pick to the price performance of the portfolio. If the new stock pick is trading too similar (highly correlated) to the rest of the portfolio, it will not be purchased. Thus, I will add in the following rule on the buy side:

- MaxCorrel(10,1)<.80

But the real power of this rule comes on the sell side. The majority of stocks become highly correlated in a bear market. So if we sell stocks when the individual holdings became highly correlated to one another, we should have a basic market-timing strategy where stocks are removed progressively in bear markets. After some testing, we use a sell rule as follows:

- MaxCorrel(10,1)>.92

Our portfolio looks like this:
Keep in mind that this is a fairly simple investment system. Still, it is starting to take on a level of sophistication with diversification rules, cash management and more. And we are really only scratching the surface of what can be done. Further options and customizations are numerous. But I will stop the portfolio optimization here as I want to talk about the role of hedging.
Hedging a Portfolio

Some investors add a hedge to their portfolio to lower volatility. You can do this by creating a long/short portfolio (which Portfolio123 can do in the SCREENER section) or by having some short exposure to the market through an ETF. I should tell you upfront that I am not a fan of employing a constant hedge just to lower volatility at the expense of upside performance. I prefer to have a market-timed hedge that adds downside protection when conditions warrant it.

It is a simple process to add a hedge to a SIMULATION at Portfolio123.

- First, click HEDGE MARKET TIMING. Select ENABLE.

You have a few customizations at your disposal:

- **Hedge**: pick an appropriate hedge for your trading strategy. A short S&P 500 ETF seems reasonable for our strategy.
- **% of Total Equity**: Since our strategy already manages downside risk through other techniques, I will employ a hedge worth 50% of my holdings. But I will not include cash in that calculation...I am only going to hedge my real equity position.
- **Transaction Type**: Long. The ETF is already short or inverse the market. I will use margin so as not to tie up any cash or to force stocks to be sold if enough cash is not available for my hedge.
- **Slippage**: 0.1%
- **Rebalance Frequency**: Already set to weekly
- **Entry and Exit Rules**: I use the Add Wizard Rule to enter in my hedging rules. Under SP500 Fundamentals, I select SP 500 Estimates Trend. The concept behind this rule is that the S&P 500 earnings trend often precedes a market topple (you can read more about this under the main tab TOOLS). I select Add Entry/Exit Pair and I am done.

From here I re-run the SIMULATION.
Because our hedging technique uses market timing signals, our upside performance is enhanced while further reducing our downside loss. The blue bands represent when our hedge was engaged. Our maximum loss was 19%. If I run this test over the trailing 10 years, the maximum drawdown is only 14.88% with the return staying the same.

Suppose you like this portfolio strategy and you feel it is ready to trade. How do you turn this SIMULATION into a PORTFOLIO that e-mails you the signals? You merely need to click the mouse a few times.
Creating a Portfolio

How do you create a portfolio? You have 2 methods depending on how you want to start investing.

If you want to jump in this portfolio exactly as it is according to the simulation, simply click the MAKE PORTFOLIO tab in the sub-menu. Now your SIMILATION is moved to the PORTFOLIO section of the website. By using this method, you are jumping into an existing portfolio. Some stocks may have been held for years and may no longer meet the buying criteria – although they have not yet triggered the selling criteria either. But what if you want to ‘leg in’ to the portfolio and only buy stocks currently making the buy list?

The second option is if you want to form a new portfolio based where you only buy the stocks that would currently pass all of the buying criteria. To do this, click SAVE AS – NEW PORTFOLIO. There should be no need to make further changes except to the REBALANCE METHOD. It defaults as SEMI-AUTOMATIC which means you will be sent any new buy/sell recommendations where you must log-in and confirm before it is executed. I prefer to run all my portfolios on AUTOMATIC where it runs on auto-pilot. If I need to change something for some reason or another, you can do so by editing transactions.

You should also know that as of the time of this being written, PORTFOLIOS cannot utilize the HEDGE MARKET-TIMING feature. I happen to know that it will be included very soon and likely it already is a running feature by the time you are reading this. But for now, you may need to run a simulation to determine when the hedge is added and removed. All your holdings will be exactly as shown on the PORTFOLIO.

When you are ready, click REVIEW and GET RECOMMENDATIONS – GO. You will be given a list of recommended stocks. If you have no issue with these holdings, click GENERATE PORTFOLIO.
Summary
Congratulations, you have successfully created your first portfolio based on academic research. This portfolio will run virtually hands free sending you re-balance notices when necessary on the weekend.

Recall the steps we needed to take...first we need an idea. This starts with reading papers and previous research. Pick concepts that you agree with and that fit your investing style. Next, build out those ideas into actual rules – whether they be absolute (market cap greater than $3 billion) or relative (market cap in top 50% of all stocks). You can use the screener to test your concepts in a universe of stocks. Once you have a strategy that works on this level, use the simulation to test the strategy using real-world portfolio constraints. When you have an acceptable model in simulation, create a portfolio to be sent rebalance notices through your e-mail.

If you have a great system that you want to share with others or monetize, submit it to Portfolio123 for review and you could have it included in the Ready-2-Go line-up.

Sincerely,

Kurtis Hemmerling