The A – Z Guide Of How to Use Portfolio123

By Marc H. Gerstein
edited by Paul DeMartino
Table of Contents

Chapter 1: Introduction ................................................................................................................. 2
   Using the Rules Wizard to Build Your First Screen ................................................................. 3
   Your First Backtest ..................................................................................................................... 6
   Fine-Tuning the Strategy .......................................................................................................... 7
   What We Have Accomplished ................................................................................................... 8

Chapter 2: Power “Free Form” Screening .................................................................................... 9
   Introducing the Free-Form Interface .......................................................................................... 10
      Inputting Rules ...................................................................................................................... 10
      Navigating the Interface ....................................................................................................... 11
   Making Sense of the Acronyms ................................................................................................. 14
   Portfolio123 Functions ............................................................................................................. 17
      What Is A Function And How Does It Work ........................................................................ 17
      Getting Comfortable with Functions – Practice Makes Perfect ........................................ 20

Chapter 3 Sample Screening Strategies: Technical Analysis .................................................. 31
   Establishing Liquidity Thresholds ............................................................................................ 31
   Technical Analysis Screening Strategies – Three flavors ....................................................... 32
   Pure Technical-Based Stock Selection ..................................................................................... 34
   Moving Average - Basic .......................................................................................................... 34
   Moving Average With Offset .................................................................................................. 34
   Relative Moving Average ....................................................................................................... 34
   MACD - Moving Average Convergence-Divergence .............................................................. 35
   The MACD Indicator – MACDD ............................................................................................... 35
   Gap Up ................................................................................................................................... 35
   Gap Down ............................................................................................................................... 36
   Highest .................................................................................................................................. 36
   CrossOver ............................................................................................................................... 37
   Ultimate Oscillator .................................................................................................................. 38
   Combined Technical-Fundamental Analysis Screens .............................................................. 39
   Technical-Analysis Used To Identify The “Best” ..................................................................... 40
   Summary ................................................................................................................................ 41

Chapter 4 Sample Screening Strategies: Fundamental Analysis ........................................... 42
The Type Of Trade ................................................................. 147
Experiment, Experiment, Experiment! ................................. 148

Chapter 13 Evaluating Your Simulations .................................. 149
SUMMARY .............................................................................. 149
HOLDINGS ............................................................................. 150
Return and Fundamental .......................................................... 150
Historical.................................................................................. 150
Performance ........................................................................... 151
TRANSACTIONS........................................................................ 152
Realized ................................................................................... 153
By Symbol................................................................................ 153
STATISTICS ............................................................................. 153
Trading .................................................................................... 153
Risk .......................................................................................... 154
IN CONCLUSION ...................................................................... 154

Chapter 14 Portfolios ............................................................ 154
LAUNCHING THE NEW PORTFOLIO ...................................... 155
MAKING YOUR INITIAL PURCHASES .................................... 157
REBALANCING ....................................................................... 160
IN CONCLUSION ...................................................................... 161

Chapter 15 Excel Add-In: Stefano’s P123 Manager .................. 162
Introducing Excel Add-In.......................................................... 163
Installation ............................................................................... 164
Our First Look At Stefano’s P123 Manager .................... 164
Experimenting With Different Rules ........................................ 171
Experimenting With Different Dates ........................................ 177
Experimenting With Different Rule And Date Variations ........ 181
Chapter 1
Introduction

Welcome to Portfolio123!

This is a powerful platform that helps you to easily perform a variety of vital tasks.

- You can create your own multi-factor ranking systems for stocks and for ETFs.
- You can screen for stocks or ETFs.
- You have an incredible amount of flexibility to design the kinds of rank factors and screening rules you want to design.
- You can fine tune the number of passing stocks or ETFs to whatever you wish by combining your screens with the quick-sort feature or a ranking system (one you create or one of ours).
- You can backtest either kind of model.
- You can create simulations that allow for fine-tuning of assumptions regarding capital and trading costs, and which allow you much greater flexibility when it comes to articulating sell rules.
- You can create automated portfolios that apply your model to real-world investing by telling you what to buy and sell, when to buy and sell, and how many shares to buy and sell.
- You can create books -- portfolios of portfolios -- to let you analyze whole investment strategies and allocations.
- With stocks, you can use fundamental analysis, technical analysis, or any combination that appeals to you.
- With ETFs, you can supplement the usual price-performance criteria you see elsewhere with a full range of sophisticated technical-analysis indicators, and you have unprecedented flexibility in defining the universe of ETFs you'd like to consider.

There's a lot here and it's far more affordable than any other comparable application. That's the good news. The bad news, so to speak, is that as platforms gain power, complexity rises. But don't worry. We're not going to just shrug our shoulders and lecture you on the need to roll up your sleeves. Although it will take some time and effort on your part to harness the full power of Portfolio123, we have done much to get you off the ground as quickly and easily as possible.

We'll demonstrate that with a quick-start lesson.

Using the Rules Wizard to Build Your First Screen

After you log in, examine the menus that run horizontally along the upper portion of the page. Click on Screen in the top row and then click New on the grey bar beneath. You'll be given a choice to create a Stock Screen or an ETF Screen. Choose Stock screen. After doing so, you'll see the screening interface.
You should see two buttons toward the bottom of the screen: “Add Wizard Rule” or “Add Free Form.”

The heavy-duty power is accessed through free form. But that’s where the most learning effort is needed; it will be introduced in the next chapter. Many users would prefer to hold off for a while on free form and start more slowly. But even those who want free form now should continue to the end of this tutorial to get a general perspective on the Portfolio123 approach to screening, and its emphasis on testing, sorting and ranking, functionality that may be new even to advanced users of other applications.

Continuing on with this quick-start screen, click on “Add Wizard Rule.” This will take you to an easy-to-use menu-driven interface with clear descriptions that will let you create powerful screens in a matter of minutes. You won’t be able to do everything you can with free form, but if you’ve used free or low-cost web screeners before, you are likely to be quite surprised at how much powerful this wizard can be.

We’ll assume you chose the wizard and that you see this interface:

The categories are self-evident. Let’s start by clicking on Value. You’ll see two subcategories:

- Value
- Valuation
- Dividend Income

Let’s click on the plus signs to open both of them,
Let's use the PEG ratio. Click on it.

Notice the lower right hand portion of the interface. Any time you click on an item, you'll get a plain-English explanation of what it's about.

To create the rule, we'll work in the upper right portion of the interface.

You see, in the upper right section, that a rule is already set up for you, in this case, a rule limiting consideration only to shares with PEG ratios below 1. This will be the case every time you choose something in the Wizard; Portfolio123 starts you off with a very basic rule and if you like it, you can simply click “Add Wizard Rule” and move on.

But you don’t have to accept the basic rule. You can click into the right-hand box and change the threshold from 1 to any other number you prefer. That’s probably obvious to most users and very much in line with what you can do on pretty much any elementary screen you’ve seen on the web.

Now let’s step it up a bit.

Notice the left-hand box, the one that says “Less Than.” More importantly, notice the arrow at the right edge of the box: This is a drop-down menu. Clicking it will reveal five choices:

- Less Than (this is the choice we started with)
• Less Than Industry Median
• Best In Industry
• Best In Sector
• Best In Market

How do you know 1 is the best possible PEG threshold? Many investors over the years have made plenty of money on stocks with PEGs of 1.5 or even 2. We can raise the threshold if we want, but for this quick-start, we’ll do something different. We’ll screen for stocks with PEG ratios that rank in the bottom half relative to industry peers. Use the dropdown menu and choose “Best in the Industry.”

The starting point here is a rule that looks for PEG ratios that are in the lowest (best) 20%. We want the bottom half. Click in the right-hand box and change 20 to 50.

Click on “Add Wizard Rule.” Doing so takes you back to the screener interface, but now you see your rule.

It’s just that simple.

Let’s go on. Notice that you get to choose wizard or free form each time you create a rule; you can mix and match at will. We’re going to stay with wizard for this screen, but the ability to mix and match can help you ease into free form gradually, as you feel ready.

We don’t want value traps. So we’re going to add a rule seeking companies with 5-year EPS growth rates that are in the top 35% relative to industry peers.
That’s good, but it’s the past. We want the good times to be ongoing. So here are a few more rules we’re going to establish.
We’d also like to see only companies whose EPS trends have been reasonably stable.
Here’s what the screen looks like as of now:

This looks great: growth stocks that have been beating estimates and which are modestly valued. Who could ask for anything more?

Before finishing up, let’s just take care of one more important item of business. Click on the Main Settings tab.

Notice the universe: It includes all stocks.

We can’t assume all stocks are worthy of even being in a screen in the first place. Let’s get rid of all the tiny OTC stocks, the ones that often have huge market spreads and which may be difficult, if not impossible, to trade effectively. So we’re going to use the universe drop-down menu to select NO OTC Exchange.
Now we’re done.

We’re going to click on the “Run” button on the left side of the interface.

And here is an illustration of the list of companies that pass the screen.

(NOTE: Look just above the company list. Notice on the right the link that says “download.” You’ll see these often on Portfolio123. They allow you to download the tables in Excel formats!)

That was easy and it was powerful.

**Your First Backtest**

This seems like a great screen: it considers deep value, a strong track record of growth, earnings stability, and consistent victory in the Wall Street earnings game. Before we congratulate ourselves on a screening job well done, let’s backtest and see if the screen really is as great as we think it is.

Now, click on the Backtest tab.
Notice that we re-set the Start Date – End Date from the default selection to the maximum period. Otherwise, we stayed with the default settings. Now click “Run Backtest.”

![Statistics Table]

The market turned $100 into $144.10. But the screen turned $100 into $330.70. Not bad!

We can be confident, too, because we backtested the strategy. However it’s important to understand that just because a model sounds good doesn’t mean it really is good. Many investors started screening enthusiastically in the past, only to fall away as time marched on and as can’t-miss strategies failed to deliver dollars-and-cents performance.

**Fine-Tuning the Strategy**

Why stop there? We can refine the strategy to see if we can do better.

First, we eliminate three rules; the ones involving earnings surprise and estimate revision. The financial media praises things like these. But on reflection, are such factors telling us more about how the company manages its investor relations strategy rather than the strength of its business? We also got rid of the rule relating to earnings stability. Perhaps that was being too greedy. If we want low value, growth stocks, perhaps we need to tolerate some choppiness (if a company has no baggage, it’s not likely it will have a low valuation). I also added a few EPS growth rules to enhance our five-year view with a more here-and-now flavor.
Here's the new screen.

And here's the new backtest result.

That's even better.

But we still have a problem. Look at the fifth column of the table, the one that tells us how many stock have passed our screen. It's normally several hundred.

That's too many. We can't buy all those stocks, nor can we research all of them with the idea of picking and choosing. At first glance, it may seem as if we had a hot model. In truth, we had nothing more than a great conversation piece. This may be another reason why many investors may have tried screening only to give up as time passed.

No worries. This, too, is easy to fix.

Let's make some changes in the Settings.

First, we decided we don't want to see more than 15 stocks. With a list like that, we would be able to buy everything or research everything. That would be useful.

This choice leads us to the next decision: how we should narrow the full list down to 15. There are many ways to do this. I can set Ranking to Quick Rank, and input a formula, either by typing manually or by pointing and clicking (activate menus by clicking on the notepad image next to the word formula). This particular formula is fully diluted shares outstanding over the trailing 12 months.
divided by the number outstanding in the prior 12 month period. I chose “Lower is Better” thereby causing companies that have been buying back shares to bubble up to the top of the sort.

Here’s the result of the backtest based on 15-stock lists created in this manner.

Bingo! That works. We have a model that beat the daylights out of the market and which never asks us to look at more than 15 stocks.

Wait a minute. Creating the quick-sort formula might be a bit intimidating to new users. The factor-selection menu is the same one used in free form, which we haven’t yet encountered.

No problem. Portfolio123 offers you a collection of pre-set ranking systems. Feel free to use one of those. For this example, we’ll select one of our Basic systems, the one called Quality. Select it by changing ranking to Ranking System in the dropdown menu and selecting it in the window that appears below.

Notice the little windows icon to the right of the ranking system’s title in the right-side descriptive box. If you click it, you’ll see the ranking system opened in a separate browser window.
Click to open up the folders and look around. You may not yet understand everything at a glance. But descriptions are available and by the time you finish Chapter 2, you'll be much better able to cope with the abbreviations.

Here, now, is a backtest of the screen limited to the 15 passing stocks that have the highest scores under the Basic: Quality ranking system.

That’s fine. The performance-test is OK, although not quite as strong as what we had when we sorted based on share buyback. Continue to experiment with other pre-defined ranking systems. This part of the process will become especially interesting to you after you are able to use ranking systems you create!

**What We Have Accomplished**

We’ve only scratched the surface of Portfolio123. We haven’t yet touched ETFs, nor have we discussed reports, universes, custom formulas, or lists. We just had a cursory glance at ranking systems and are yet to look at all at simulations and books. Most importantly, we had only a brief point of contact with free form (in the stock-buyback quick-sort formula). For users interested in
technical analysis, there are some rules in the wizard, but many still need to learn how to do it in free form.

However, we have come quite a distance.

• We saw how the wizard can help users create interesting screens right from day one; screens that are considerably more flexible than what is available elsewhere. (Use those dropdown menus!)

• We saw how important, critical in many cases, it can be to backtest. Much has been written over the years by many commentators about what makes for a good screen. But unless you backtest (or risk real money), you have no way of knowing whether any of those countless sounds-good-on-paper ideas would actually succeed in the real world.

• We saw how easy it is to backtest. The settings are by and large intuitive (but we’ll still go over them again later). And the tests run quickly!

• We saw how easy it is to revise and re-test and to do so again and again as necessary.

• Finally, we were introduced to sorting and ranking, steps that are important if your models are to create reasonable-sized lists that can be useful to you in the real world.

So are you ready for free form?

Many are not. If you’re in this situation, don’t worry about it. The rules wizard, combined with backtesting and ranking, gives you a much more powerful screening tool than most others on the market.

But many others are anxious to dive into the power of the free form interface. We’ll introduce that in the next chapter.
Chapter 2
Power “Free Form” Screening

Everybody cherishes usability, clarity, simplicity, and so forth. We all need to start somewhere, and most of us will be able to ramp up with a new tool much more quickly if the interface is easy to use. But there’s a tradeoff. Simplicity can diminish the benefit of using the application.

At Portfolio123, we work very hard to give you both of the above by, in essence, combining two applications into one. The easy application is the Rules Wizard, the subject of Chapter 1. The more powerful application involves use of the Free From interface, which is the subject of this Chapter.

We need to keep things in perspective. We think Rules Wizard is quite powerful compared to other easy-use screeners. But Free Form opens the way to far greater possibilities.

Using Free Form will require more initial effort. But its bark is much worse than its bite. Once you dive in, you’ll see it’s much more usable than what first impression might suggest. Moreover, Free From is especially important for those who want to use technical and statistical factors in their screens. And it’s vital for ETF investors since the Wizard applies to stocks only.

This Free-Form tutorial will be organized in three parts:

- **Interface** – You need to know how to find what you’re looking for and incorporate the concepts you choose into your screens. That’s where we’ll start

- **Acronyms** – EPS seems simple. EPSExclXorTTM seems a lot less simple. But it captures important characteristics omitted by the first version. And believe it or not, this acronym and the others are built in such a way as to make it much easier for your eye to quickly find exactly what you need. You’ll see. Stay with us!

- **Functions** – These are situations where an acronym alone won’t suffice and they are critical for technical and statistical rules, and for ETFs.

Consider a simple technical notion: Price>SMA, which means the stock price must be above the simple moving average. That’s certainly simple. But it’s also unusable. Which moving average? The 50-day moving average, the 200-day moving average? We could give you two moving average choices, say SMA50 and SMA200. That would be easy. But what about the investor who wants a 10-day moving average? We could add that, but no matter how many we add, we’re always going to encounter users who want a period we didn’t offer. And this doesn’t even begin to account for those who would like moving average periods to be calculated based on some interval in the past, such as the moving average for a 5-day period that ended 20 days ago. Offering SMA as a function, rather than a variable, allows us to satisfy everybody. Hang on. You’ll see how, and you’ll discover that it’s not nearly as hard as it looks.
Introducing the Free-Form Interface

Click on New Screen and then, after you enter the screening interface, on “Free From.” You’ll see the following.

There you have it, a blank line on which you can enter your rule.

Don’t worry . . . we’re kidding.

You certainly can type in a rule if you want to, or paste a rule you may have copied into your clipboard from someplace else (a posting in the Portfolio123 community, an e-mail from another user, something you may see later on in this tutorial series, etc.). But no, this is not the meat of the Free Form interface.

There is, actually, an important point to this little prank. You will see in a moment that there are lots of menus and many opportunities to populate your rule by pointing and clicking. But you don’t have to point and click. You can also type or paste. Best still, you can mix and match at will.

Inputting Rules

Most Free From users will use point-and-click for the big acronyms and probably choose to type the easy material. Consider this rule:

\[ \text{CurRatioQ} > \text{CurRatioQInd} \]

Translating to English, we’re looking for shares of companies whose current ratios are above their respective industry averages. Point-and-click is the easiest way to enter \( \text{CurRatioQ} \) and \( \text{CurRatioQInd} \). You would then type the greater-than symbol, >.

Now consider something more complex, like a formula that replicates the Altman Z-Score and a rule limiting consideration to companies whose scores are at least 2.

\[
(1.2*\left(\text{AstCur}(0,qtr) - \text{LiabCur}(0,qtr)\right)/\text{AstTot}(0,qtr))) + (1.4*\left(\text{IncAftTax}(0,ttm) - (\text{PayRatioTTM}/100)\right)/\text{AstTot}(0,qtr))) + (3.3*(\text{EBIT}(0,ttm)/\text{AstTot}(0,qtr))) + (0.6*(\text{MktCap}/\text{LiabTot}(0,qtr))) + (0.999*(\text{Sales}(0,ttm)/\text{AstTot}(0,qtr))) \geq 2
\]

Don’t panic . . . if you do want to use Altman Z score, there is a much easier way to handle it, which you’ll learn in a later section on Custom Formulas.

But for now, just think about how you’d input something like this. It’s obvious you’d want to use point-and-click for the data items and that you’d type the other things. But with all the computations, it would be very easy to make a mess of this, especially as you try to correctly balance the left and right parentheses. This is a situation where you may want to use the interface to build small parts of this rule, copy everything into Word or some other text editor, and polish it up there before pasting the finished product back into Portfolio123.
Navigating the Interface

Let's go back to our Free-From starting point.

There are two ways to open the interface. The most direct would be to click on the note pad icon to the left of the row. If you do so, you'll see this.

You can also click on the reference box you see in the upper center. But that is intended to be just what it says it is, a reference. It's not the same as an active interface. You'll notice the difference because as a reference, the background, and the rule area will be grey. You would need to click into the rule area, the blank row running along the bottom, in order to turn it into an active interface. You'll know you succeeded because the color will change and it will wind up looking as it does in the above image.

Let's start our instructional tour by going to the box labeled Type. Click on FUNCTIONS. Notice what suddenly appears in the Category box.

We'll come back to these later on. For now, click on STOCK FACTOR and then, look at the Category box.
These labels should be meaningful to those interested in fundamental criteria. Click next on GROWTH RATES and notice what appears in the next box, the one labeled Factor/Function.

There's the good stuff, the factors, the raw material for our rules.

Click on EPS%ChgTTM and look to the right of the Factor/Function box.

We see short description. We now know that EPS%Chg means EPS Percent Change. But what about TTM Over TTM (%). After your first use of StockSceen123, you will know exactly what this means; it's a concept you'll use often and won't need to look up again because it'll come into your mind so automatically. But first timers may need a prod. So click on the link to the right that says Full Desc. You'll get a pop-up window (make sure your browser will allow Portfolio123.com to do this) that looks like this,

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Category</td>
</tr>
<tr>
<td>Short Description</td>
</tr>
<tr>
<td>Ranking Default</td>
</tr>
<tr>
<td>Full Description</td>
</tr>
</tbody>
</table>
We now know that TTM means Trailing 12 Months. If the last reported quarter was for a period ending 9/30/07, we’d focus on EPS for the four quarters that ended 9/30/07 and wind up with the percent growth relative to the EPS achieved in the four quarters that ended 9/30/06.

Suppose you want to use a TTM EPS growth rate as part of your screen. Start by double clicking on EPS%ChgTTM. Now look to the bottom of the interface at the rule area.

There’s the factor you’ve chosen. Now you can click into the box and type the rest of the rule.

You don’t need spaces around >20, but if you prefer, you can add them.

That’s a simple rule that seeks companies whose TTM EPS growth rates were above 20%.

If you like, you can check any time to see how your screen is doing in terms of narrowing the universe. Click the Totals button above the right side of the rule row.

Notice that you exited the rule-creation activity so the color changed. (You can go back to the creation-edit state by clicking anywhere inside the rule row or on the note pad icon to the left of it.) You also see on the right that the database started with 8,260 stocks and that your first rule narrowed it to 3,150 choices.

Let’s go on.

To add another rule, click on Free From and then click on the note pad icon to the right of the new row that appears. Once again, go to Type and click on STOCK FACTOR and then to Category and click on GROWTH RATES. Double click again on EPS%ChgTTM. After doing all this, you should see the following.
To finish the rule, we'll do something different.

Type a > after EPS%ChgTTM.

Next go back to Type but this time, click on INDUSTRY FACTOR. Go back to Factor/Function and double click on EPS%ChgTTMInd, which refers to the TTM EPS growth rate for the industry in which the company operates.

After you've done this, you should see the following.

This second rule introduces two new concepts.

1. We mixed and matched rules from two different Types in the same screen, actually, the same rule. In this case, we combined STOCK FACTOR and INDUSTRY FACTOR.

2. We see that we are not restricted to comparing factors to numbers. We can also compare factors to other factors. In this case, we compared EPS%ChgTTM to EPS%ChgTTMInd

Here are some more sample rules that show how you can develop this growth theme.

Rule three is an example of how you can compare trends on one part of the income statement to another, in this case, we're comparing TTM EPS growth to TTM sales growth.

Rule four is an example of how you can compare trends among the same item over different time periods, in this case, we want the latest year-over-year quarterly EPS growth rate (I’ll discuss the abbreviation in the next section) to be above the TTM EPS growth rate.

The fifth rule demonstrates use of the “and” statement. Novice users should skip the next section (and avoid rules like this). Advanced users should continue to see how to construct a rule requiring acceleration.

Advanced content:

This rule looks for companies for which the latest quarterly growth rate was more than 20% better than the TTM growth rate.

So why didn’t I just stop at EPS%ChgPYQ> EPS%ChgTTM*1.2?
Imagine if the TTM growth rate would have been minus 10% and the PYQ growth rate even worse, minus 11%. That is not acceleration. It’s deterioration; we don’t want to see a company like that.

But it would pass the EPS%ChgPYQ > EPS%ChgTTM * 1.2 test. Minus 10% times 1.2 equals minus 12%. The company we’re talking about here was at minus 11% which is above minus 12%, so it passes.

As it turns out, the negative numbers messed up our formula. But by adding the second half of the rule, I close the loophole: minus 11% is not better than minus 8% (which is the TTM growth rate multiplied by .8) so the company is eliminated.

Most important, this should help give you a sense of the kinds of things you can do with Free From.

Less advanced Free Form users can rejoin us as we move into the next section and look more closely at those acronyms so we can understand the raw materials with which we can work.

**Making Sense of the Acronyms**

Let’s start with an important basic, time period identification. Assume, for purposes of illustration, that the most recently reported quarter ended 9/30/07.

- **TTM**
  This means trailing 12 months. In this example, it would include the four quarters ending 9/30/07. This is important. The latest annual period, the one to which many investors and commentators often refer, ended 12/31/06 and is, by now, pretty stale. When using factors from the income statement of statement of cash flows, try to get in the habit of using TTM rather than annual numbers.

- **PTM**
  This means prior 12 months. In this example, it would include the four quarters ending 9/30/06.

- **Q**
  This means latest quarter. In this example, it would refer to the quarter that ended 9/30/07. As with TTM, this will often be fresher than the latest annual period, which ended 12/31/06. Keep this in mind as you screen for balance sheet items.

- **A**
  This means annual, the latest annual period; in this example, the year that ended 12/31/06.

- **PYQ**
  This means prior-year-quarter comparison. In this example, we’d be comparing the quarter ended 9/30/07 with the one that ended 9/30/06. It’s often referred to in conversation as the latest quarterly year-to-year comparison.

- **PQ**
  This means prior-quarter comparison. In this example, we’d be comparing the quarter ended 9/30/07 with the one that ended 6/30/07. It’s often referred to in conversation as the latest consecutive quarter comparison.
• 3Y, 5Y and 10Y mean three-year, five-year and 10-year respectively.

By the time you’ve done a couple of screens, these abbreviations will be second nature to you.

Moving on to the rest, you may well wonder why our data vendor bothers with acronyms and why we preserve them. Why not translate everything to plain English?

Consider the following illustration, a screen shot from the Factor/Formula reference listing contained in the Help section. It focuses on the various return-on-capital items we offer. But before turning the page to look, resolve to locate as quickly as you possibly can, the five-year average return on equity.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA%5YAvg</td>
<td>Return on Average Assets, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROA%5YAvgInd</td>
<td>Return on Average Assets Industry, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROA%PTM</td>
<td>Return on Assets, Prior TTM (%)</td>
</tr>
<tr>
<td>ROA%Q</td>
<td>Return on Assets, Quarterly (%)</td>
</tr>
<tr>
<td>ROA%TTM</td>
<td>Return on Assets, TTM (%)</td>
</tr>
<tr>
<td>ROA%TTMInd</td>
<td>Return on Assets Industry, TTM (%)</td>
</tr>
<tr>
<td>ROE%5YAvg</td>
<td>Return on Average Common Equity, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROE%5YAvgInd</td>
<td>Return on Average Common Equity Industry, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROE%PTM</td>
<td>Return on Average Common Equity, Prior TTM (%)</td>
</tr>
<tr>
<td>ROE%Q</td>
<td>Return on Average Common Equity, Quarterly (%)</td>
</tr>
<tr>
<td>ROE%TTM</td>
<td>Return on Average Common Equity, TTM (%)</td>
</tr>
<tr>
<td>ROE%TTMInd</td>
<td>Return on Average Common Equity Industry, TTM (%)</td>
</tr>
<tr>
<td>ROI%5YAvg</td>
<td>Return on Investment, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROI%5YAvgInd</td>
<td>Return on Investment Industry, 5 Year Average (%)</td>
</tr>
<tr>
<td>ROI%Q</td>
<td>Return on Investment, Quarterly (%)</td>
</tr>
<tr>
<td>ROI%TTM</td>
<td>Return on Investment, TTM (%)</td>
</tr>
<tr>
<td>ROI%TTMInd</td>
<td>Return on Investment Industry, TTM (%)</td>
</tr>
</tbody>
</table>

• How hard was it for you to guess that return on equity was ROE?

• Assuming you did, helped by the fact that you knew at the outset that we’d be looking at returns on capital, wasn’t it much easier for your eye to spot ROE%5YAvg as opposed to Return on Average Common Equity, 5 Year Average (%).

• Wouldn’t ROE%5YAvg also have been easier to spot than Return on Equity, 5 Year Average.

• And in addition to ROE, wasn’t it easy to recognize that 5Y meant 5 year and that Avg meant Average.

This may not seem earth-shattering in the context of this quick test. But as you hunt among a large list of factors for the one you want, and do so over and over again for rule after rule, this can be huge.

The hard part of dealing with acronyms would be writing them, remembering the code for five-year average return on equity (Is it ROE%5YAvg or ROE5YAvg% or ROEAvg5Y%?) and reproducing it without typos. But this dilemma is not going to materialize. You will always be able to point to the correct item (which, by the way, is ROE%5YAvg) or copy it from someplace into your clipboard for later pasting.

You will not have to state the item; all you’ll ever need to do is recognize it when you see it. In evaluating this task, consider the context. Had the above exercise been administered at a non-investor focus group convened by ESPN.com to assess the site’s presentation of major
league baseball statistics, getting anyone to decipher ROE%5YAvg would probably have been hopeless.

But that's not relevant here. Many Portfolio123 users may be NBA fans and may also visit ESPN.com, but that's not why we use this platform. We're in Free From here because we are interested in stocks, and because the Wizard doesn't give us all we need. Those among this highly targeted sub-population who click on STOCK FACTORS expect, going in, to be looking at things relating to fundamental analysis of securities, and those who click further on a category heading called PROFITABILITY RATIOS anticipate seeing various types of profit margins and returns on capital, not valuation metrics, growth rates, analyst ratings and so forth.

The point here is that most of what you need to help you decipher the acronyms lies not in the simple descriptions, not in the full descriptions, not in any other kind of glossary or Help material, but in what you already know and the expectations you already have, when you click the mouse.

As an investor, if you click into a category called GROWTH RATES, you can easily figure out what Sales3YCGr% means.

If you click into VALUATION RATIOS, you know what PEG means.

We're not 100% of the way home. Value-oriented users may not recognize, on first glance, what PEGLT or PEExclXorTTM mean. You expect that we're dealing, respectively, with some sort of PEG ratio and some sort of PE involving trailing 12 month something or other (probably a TTM EPS figure). Being this well primed, the descriptions register quickly and easily.

- PEGLT means “Projected Price/Earnings to Long Term Growth Rate”
- PEExclXorTTM means “Price To Earnings Ratio, Excluding Extraordinary Items, Prior TTM”

If there’s any doubt remaining, as there will be from time to time, we still have the Full Descriptions waiting in the wings. PEGLT and PEExclXorTTM are described as follows.

- This version, the PEGLT, is the more traditional version of PEG that is calculated by dividing the current year's projected PE (ProjPECurrFY) by the Long Term Growth Rate Estimate (LTGrthRtMean).
- This ratio is calculated by dividing the current Price by the sum of the Diluted Earnings Per Share from continuing operations BEFORE Extraordinary Items and Accounting Changes over the last four quarters.

Once you see this, you're likely to retain the definitions since, as noted, they derive closely from concepts that are already top of mind for you.

The best way to get comfortable with the available factors, and the acronyms used to identify them, is to just browse. Most you will recognize. Sometimes you will need the short descriptions. And on occasion, you’ll want to examine the full descriptions.

Hopefully, you'll be pleasantly surprised at how easy all this really is, especially when you approach the task with awareness of your background as an investor and your sense of what the Category names mean to you.

Those who are interested in using fundamental criteria to screen for equities (including such ancillary data types as insider ownership, institutional activity, analyst estimates and recommendations and short interest) and basic price-volume trends are now ready for some
serious screening. (Advanced fundamental investors should also look at the Appendix and its discussion of Line Item variables.)

Others, those interested in ETFs and technical-statistical analysis of equities, should continue to the next section, where we’ll cover functions.

**Portfolio123 Functions**

This is going to be more intricate than what we’ve seen thus far. But it, too, should be quite manageable once you get used to the idea of specifying parameters for a function – whatever that means (don’t worry, you’ll find out very soon).

Before we start, it’s important to take note of the descriptions that are embedded in the interface. When we dealt with fundamentals, it was suggested that these would most likely be consulted on an occasional basis. Functions are different. The Full Descriptions serve as important references.

Look at them, and do so often. They’re direct and to the point, so this won’t be time-consuming. And no prizes are awarded to those who can memorize and retain all the information on what parameter goes where for the various functions. The information will likely sink in for functions you use often. But otherwise, it’s not worth the trouble to memorize.

We’ll start with a general discussion of what a function is and how it works. This is where you’ll learn all about parameters.

Then, we’ll demonstrate some different kinds of functions. That will show you what function-based rules look like in a screen and teach you how to use the descriptions as a guide. All of these will be equally applicable to stocks and ETFs.

Then, we’ll devote special attention to an important and powerful set of ETF-specific functions that can be used to customize an ETF universe.

**What Is A Function And How Does It Work**

Essentially, a function is a mini program. It consists of two parts; the logic and the parameters.

- The logic, which is used over and over again, consists of directions telling Portfolio123 how to calculate the output you need. This is hidden from your view. All you see is a label, the name of the function.

- Logic is important, but it alone can’t help you screen. You need to apply the logic to a set of specific inputs. These are the parameters.

Let’s consider something very simple. Suppose we want to compute the average of three numbers. We don’t know ahead of time what the numbers will be, so for programming purposes, we’ll use placeholder labels: x, y and z.

The logic can be expressed as follows:

\[(x + y + z) / 3\]

Or, you might have a function that looks like this:
\text{Avg}(x,y,z)

You, the user, tell the function what numbers should be swapped in for \(x\), \(y\) and \(z\). So you might specify this:

\text{Avg}(4,-12,24)

The function would execute by doing this:

\[
(4 - 12 + 24) / 3 = 5.33
\]

Or, you might do this:

\text{Avg}(825,38,514)

The result would be this:

\[
(825 + 38 + 514) / 3 = 459
\]

Look at what's happening. You can compute average after average without ever having to specify the logic. The function already knows what to do. Your role is to replace the placeholders with your input, the numbers that need to be averaged.

That's a very easy function. Now let's look at a more useful variation, an \text{Avg} that can work with 2 to 20 numbers without knowing in advance exactly how many numbers there would be.

A Portfolio123 formal description for such a function would look like this:

\text{Avg}(x_1,x_2[,..,x_{20}]): \text{Returns the average value in list. Up to 20 parameters are allowed}

The description is telling you to activate the \text{Avg} function by typing (or pointing to) \text{Avg} and specifying at least two and up to 20 parameters, and that the parameters you supply should be enclosed in parentheses and separated by commas. \(x_1\) and \(x_2\) are placeholders for the first two parameters; these are mandatory.

Everything in the brackets […..,x_{20}], more parameters up to 20, is optional. Don't worry if you don't recognize the […..,x_{20}] notation. The accompanying text will tell you what's needed, as was the case with a very similar \text{Avg} function included among those offered by Portfolio123.

The logic of the function presented here would, more or less, be as follows:

- Count up the number of items supplied by the user in the parentheses
- Let \(n\) = the number of items
  - If \(n < 2\), stop and report an error message
  - If \(n > 20\), stop and report an error message
  - If \(n \geq 2\) and \(n \leq 20\), continue working
- Compute the sum of all the items the user supplied
- Divide the sum by \(n\)
- Report the result

Suppose you supplied this:

\text{Avg}(28,4)
The function would do this:

\[(28 + 4) / 2 = 16\]
Suppose you supplied this:

Avg(35,16,212,8,93,4)

The function would do this:

\[
(35 + 16 + 212 + 8 + 93 + 4) / 6 = 61.33
\]

As you can see, when you work with functions, you don't need to worry about the details of the logic. That's already been programmed and its part and parcel of the platform. Once you've identified the function you need, all you have to do is supply the parameters, making sure to place each number in the correct position.

In the above example, sequence was irrelevant: Avg(5,10) produces the same result as Avg(10,5). But if you're using a function for simple moving average, it can make a difference: SMA(5,10) is not the same as SMA(10,5). And speaking of SMA, let's make that the first in the series of examples we'll be presenting.

### Getting Comfortable with Functions - Practice Makes Perfect

In the above example, sequence was irrelevant: Avg(5,10) produces the same result as Avg(10,5). But if you're using a function for simple moving average, it can make a difference: SMA(5,10) is not the same as SMA(10,5).

Knowing how to correctly specify parameters – whether we want (5,10) or (10,5) or, perhaps just one parameter or more than two – is crucial to using functions. All the information you need to help you get it right is contained in the Descriptions that accompany each function. You don’t have to try to memorize this information. It’s easy to look up as you go along and advanced users do that all the time.

To help you get started, we'll look closely at various kinds of functions. These examples will help you recognize what to look for as you look up the parameters applicable to the functions you want to use.

### Financial Statement Functions

Portfolio123 offers many ratios you can use to create fundamental screening and/or ranking rules (such as growth rates). Other times, however, you will want to use specific numbers (such as trailing 12 month revenues) whether on their own or to build ratios that are not pre-calculated by Portfolio123 (no matter how many ratios are offered, sooner or later you’re going to find yourself needing something that’s not available, such as year-to-year EPS growth rates for each of the past four quarters). You can create these and many other non-standard items right now using Portfolio123's Financial Statement functions.

### Numbers versus Ratios

Fundamental data used by Portfolio123 can be categorized in two ways.

First are raw data items we get from Compustat, such as Revenues, EPS, Long-term Debt, etc.

Second is a set of ratios we calculate based on the raw items. Examples include EPS5YCGr%
(the annualized five-year EPS growth rate), CurRatioQ (the current ratio in the latest quarter), or ROE%TTM (trailing 12 month return on equity).

If you review your screens and ranking systems, chances are you will have made heavy use of ratios. Perhaps you even use all ratios all the time. This would not be surprising. More often than not, individual numbers are of little interest.

For example, do we care deeply about whether EPS is greater than or less than, say, $2.00? But we are likely to care very much if the $2.00 EPS figure is higher than a year-ago $1.50 figure, or less than a $2.50 year-earlier tally. We can address this without using ratios. We can simply require one EPS figure to be greater than another one. But that's not necessarily a great solution. There's a difference between a $2.00 EPS figure that is up from $1.50 a year earlier, versus a $2.00 tally that is above an earlier $1.97 base. We may want the former but not the latter. The way to distinguish is through a growth rate, which is a ratio.

An Example

Portfolio123 offers a strong collection of line items based on the financial-statements. All are available on annual, quarterly and trailing-12-month bases.

Let's take a basic example. Suppose you want a screening rule requiring each of the year-to-year EPS comparisons in the past year to be stronger than the one for the preceding quarter. Assuming we label the last-reported quarter as Quarter Zero (we don't count back any quarters; use the latest), here's how such a rule would look in plain English:

Year-to-year EPS growth rate in quarter zero (the last quarter) was above the rate achieved in quarter one (count back one quarter)
and
Year-to-year EPS growth rate in quarter one was above the rate achieved in quarter two
and
Year-to-year EPS growth rate in quarter two was above the rate achieved in quarter three
and
Year-to-year EPS growth rate in quarter three was above the rate achieved in quarter four

It's a nice rule, something that could easily appeal to an aggressive growth-oriented investor.

It cannot be implemented using the standard Portfolio123 ratio package. But the rule can still be built using Portfolio123's Line Item functions.

How to Financial Statement functions

The basic format is:

Item(offset, period, NA-handling).

Note that the last parameter, NA handling, is optional.
Let's learn in a hands-on way.

First, we need to know where to find the line items. They are available through the free-form
interface and, as we might expect, can be found in the Type identified as FUNCTIONS and consist of the first three Categories: INCOME STMT, BALANCE SHEET, and CASHFLOW STMT.

Let’s assume we want to work with EPS, which is in the INCOME STMT.

Once we recognize the item we want, we need to consider the three parameters.

**Parameter 1 – offset**

This tells Portfolio123 how far back in time you want to go. The most recent period is always identified as 0 (zero), meaning you count back zero period from the present.

**Parameter 2 – period**

This tells Portfolio123 what kind of time period do we want the number to cover? Do we want Quarterly, Annual, or Trailing 12 Months? Time period identification should be easy to remember:

- Qtr = Quarter
- Ann = Annual
- TTM = Trailing 12 Month

(NOTE: The interface is not case sensitive. You could just as easily type ANN, ttm, etc.)

**Combining the offset and period parameters**

It’s important to make sure you count back correctly, which is easy once you get comfortable with the way the numbering system works. As noted, the starting point is always the most recent period. You take the last period available and do not count back to any historical periods. Or to put it in computer-ese, you start with the latest available number and count back ZERO periods.

Let’s make sure we really understand the offset. Suppose the most recent quarter is the one that ended 6/30/12. Here are the some offsets:

- QTR 0 ended 6/30/12
• QTR 1 ended 3/31/12
• QTR 2 ended 12/31/11
• QTR 3 ended 9/30/11
• Etc. up to QTR 20

Suppose the latest fiscal year, the annual period, ended 12/31/11. Here are some offsets:
• ANN 0 ended 12/31/11
• ANN 1 ended 12/31/10
• ANN 2 ended 12/31/09
• ANN 3 ended 12/31/08
• ANN 4 ended 12/31/07
• Etc. up to ANN 10

Now let’s consider trailing 12 months (TTM):
• TTM 0 ended 6/30/12
• TTM 1 ended 3/31/12
• TTM 2 ended 12/31/11
• TTM 3 ended 9/30/11
• TTM 4 ended 6/30/11
• Etc. up to TTM 20

Notice what’s happening with trailing 12 months. Some users erroneously believe that if they want to compare a TTM period ending 6/30/12 with a TTM period ending 6/30/11, they think in terms of the annual structure and compare TTM 0 to TTM 1. That is not correct. We get a new TTM calculation after every quarter. Therefore, this comparison would be TTM 0 versus TTM 4.

Putting all this together, if you want the most recent quarterly EPS number, it would be EPSExclXor(0,qtr), assuming you want to exclude extraordinary items, as is usually the case. (You don’t have to remember or type EPSExclXor; you can look for it in the reference menu and then point-and-click.)

Notice the how we identify which EPS figure you want (the function parameters). Start with the Item, which, as noted, you can get by clicking your mouse and then add parenthesis inside of which you’ll place two parameters: the first is the offset and the second is the time-period-type designation: qtr, ann or ttm.

Suppose you want to use trailing-12 months EPS and count back two periods. (If the most recent report is for a quarter that ended June 30th, counting back two periods would bring you to a quarter that ended December 31st). It would be EPSExclXor(2,ttm).

All line item data goes back five years. That means . . .

The count-back number for a QTR item can be anything from 0 to 20

The count-back number for an ANN item can be anything from 0 to 10

The count-back number for a TTM item can be anything from 0 to 20

We’re almost done. Remember mention of a third parameter, for NA handling. It’s optional. Most users will be satisfied with the default and, hence, never use it. But for those who may want to vary, here goes . . .
Parameter 3 – NA-Handling

When companies report results after the end of a period, they don’t always report all of their numbers at the same time. Often, they’ll issue an earnings release that has a lot (much more now than in years past), but is not complete. The remaining numbers will be included in the formal SEC filings (such as 10-Q or 10-K), which is usually filed shortly after the earnings release.

As a practical matter, the time lags between the earnings release, the formal filing and input by the financial databases is shrinking. But it’s not zero. That means there will be occasions when we are stuck with incomplete data.

Solution 1 – Input and use as much data as we can as quickly as we can and cope with the gaps as best we can

Solution 2 – Hold off until all data is available thereby using perfectly complete datasets at all times.

Solution 2, wait until everything is complete, holds considerable “Ivory Tower” appeal and we allow users to select this option via the NA-Handling parameter. But most who are active in today’s markets want as much data as they can get as quickly as they can get it. The default NA-Handling choice effectuates this most effectively.

The starting point here is to recognize that data that missing items appear in the database as NA, which stands for Not Available. Here are the ways the NA-Handling parameter addresses this.

FALLBACK – This is the default choice. You don’t have to spell it out; if you want to stay with it, you can leave the third parameter blank. FALLBACK means we compensate for missing items by falling back to the most recently available financial statement. So if, for example, an earnings release contains an income statement and balance sheet, payout ratio, which requires an items from the omitted cash-flow statement, will reflect a number that carries over from the last statement. The disadvantage is that the number is old. The benefit is that it will prevent the stock from automatically being excluded from a screen, as it would if a rule encountered an NA item. The good news, as noted, is that formal filings are being speeded up so this state of affairs tends to be very brief nowadays.

KEEPNA – This is the “Ivory Tower” solution. If up-to-date data is not available, then Portfolio123 reads the item as NA. The good aspect of this is that it is perfectly accurate. The negative is that many stocks may get kicked out of your models if, say, you rebalance a day or so before the complete data becomes available.

ZERONA – This is a variation on NA. You’re staying accurate but by substituting a digit (zero) for NA, you’re giving the stock a fighting chance of staying in a model.

A simple illustration

Suppose you’re interested in the ratio of R&D (research and development) to sales. Here’s what it would look like:

\[ \frac{\text{RandD}(0, \text{ttm})}{\text{Sales}(0, \text{ttm})} \]

If you want the ratio to be better than it was in the previous trailing 12 month period, your rule would look like this:

\[ \frac{\text{RandD}(0, \text{ttm})}{\text{Sales}(0, \text{ttm})} > \frac{\text{RandD}(4, \text{ttm})}{\text{Sales}(4, \text{ttm})} \]

A Comprehensive Illustration

Now that we understand how fundamental line-item functions work, let’s go back and build that sequentially-improving EPS growth rule we presented above but were unable to implement using the pre-calculated ratios.

We’re going to compute percentage growth rates like this: \((X-Y)/\text{abs}(Y)\) where \(X\) is the more recent item and \(Y\) is the earlier one. It will enable us to comfortably handle situations where
negative numbers may appear. Suppose, for example, EPS in the year-ago quarter was -.45 but is now .6. That's a nice improvement. We went from a noteworthy loss to a modest profit. But a conventional growth rate calculation, \((X/Y)-1\) would show it as a big decrease.

\((X/Y)-1 = (.06/-.45)-1 = -113\%\)

\((X-Y)/\text{abs}(Y) = (.06 - -.45)/\text{abs}(-.45) = 113\%\)

The second computation is the one that produces the more sensible answer, the one that shows nice improvement. This formula should be used any time you compute a percent change involving one or more numbers that might be negative. (If both numbers turn out positive, we'll get the same answer from both approaches.)

Using line item variables and the \((X-Y)/\text{abs}(Y)\) growth-rate formula, here, now, is our sequentially-improving EPS growth-rate rule.

\((\text{EPSExclXor}(\text{qtr},0)- \text{EPSExclXor}(\text{qtr},4))/\text{abs}(\text{EPSExclXor}(\text{qtr},4)) > (\text{EPSExclXor}(\text{qtr},1)-\text{EPSExclXor}(\text{qtr},5))/\text{abs}(\text{EPSExclXor}(\text{qtr},5))\)

\((\text{EPSExclXor}(\text{qtr},1)- \text{EPSExclXor}(\text{qtr},5))/\text{abs}(\text{EPSExclXor}(\text{qtr},5)) > (\text{EPSExclXor}(\text{qtr},2)-\text{EPSExclXor}(\text{qtr},6))/\text{abs}(\text{EPSExclXor}(\text{qtr},6))\)

\((\text{EPSExclXor}(\text{qtr},2)- \text{EPSExclXor}(\text{qtr},6))/\text{abs}(\text{EPSExclXor}(\text{qtr},6)) > (\text{EPSExclXor}(\text{qtr},3)-\text{EPSExclXor}(\text{qtr},7))/\text{abs}(\text{EPSExclXor}(\text{qtr},7))\)

\((\text{EPSExclXor}(\text{qtr},3)- \text{EPSExclXor}(\text{qtr},7))/\text{abs}(\text{EPSExclXor}(\text{qtr},7)) > (\text{EPSExclXor}(\text{qtr},4)-\text{EPSExclXor}(\text{qtr},8))/\text{abs}(\text{EPSExclXor}(\text{qtr},8))\)

Try it out. Copy each rule into your clipboard and paste into a blank free-form line in the screener.

By the way, speaking of copy-and-paste with clipboards, this can be a very effective way to create many Line Item rules. These can get complex, not so much from the Line Items per se, but from the need to make sure all your parentheses are correct. The most efficient way to handle this is to build your expression in Word or a text editor and then paste it into the screening interface.

**Ready to go!**

The sample rule looks complex. Actually, though, if you try to create something like this, chances are you'll spend very little, if any, time debugging the Line Items. Those are easy once you get used to the syntax and looking for what you need in the reference interface.

Your de-bugging efforts will most likely relate to the parentheses. Since every function has a set of parentheses to deal with, and since you'll often want to surround some variables with parentheses, as we do here in the numerators, the opportunity for error is high unless you work very carefully.

Bottom line: The learning curve on the Financial Statement functions will usually be quick. The extent to which you will be able to effectively use them to create your own rules will probably depend on your ability to master the use of parentheses.

And by the way, if you use certain things over and over, you'll be able to make life much easier by creating and saving Custom Formulas (Chapter 6).
The Simple Moving Average Function

Here’s a sample technical-analysis rule: Consider stocks only if the 50-day simple moving average is above the 200-day simple moving average.

Here’s how we get to the Simple Moving Average function, SMA.

The description tells us the syntax is SMA(bars [,offset,series]).

Based on what we already learned, we know that “bars” is a placeholder for a number. More specifically . . .

- Bars is number of trading days over which the moving average should be computed. It has to be a number between 2 and 500.

The brackets tell us the next two parameters are optional.

- Offset is a days-ago number. An offset of 10 means we’d calculate what the 50-day moving average was as of 10-days ago. Offset can be between zero and 100.

  If we leave this blank, the function will assume it should be zero. In other words, there would be no offset and we’d compute the current moving average.

- Series answers the question: Compute a moving average of what?

  If we leave the Series parameter blank, the function will assume we want to calculate the moving average of closing prices. This information is contained in the Full Description, where we also see a list of alternative series we could use. If we’re interested in market timing, we might use #Bench, which refers to the market benchmark that has been selected in the screener settings (the default is the S&P 500).

Using this information, here are some possible ways we could use SMA (or sma . . . it’s not case sensitive).

- SMA(50) > SMA(200)
  The 50-day moving average is above the 200-day moving average.

- SMA(50) > SMA(50,20)
  The latest 50-day moving average is above the level at which the 50-day moving average stood 20 days ago.

- SMA(50,0,#Bench)>SMA(200,0,#Bench)
The 50-day moving average of the market is above its 200-day moving average. If this condition is violated, no stocks will pass the screen, meaning we’d in essence, be going all cash; hence the market timing element.

Notice, in the last example, how use of the third parameter, the series, forced us to also use the second parameter even though it was originally optional.

For a second parameter, the SMA logic expects to see nothing at all, or a number. So if we use SMA(50,#Bench), we’d get an error message because the logic would not be able to cope with seeing #Bench where it expects a number. So even if we don’t want an offset, we must plug in a zero in order to push #Bench to the place where it belongs, the third position.

IMPORTANT: It is critical that each parameter be placed in the correct position, even if it means using zero for some optional parameters that we’d like to skip.

Pause here and review SMA. Let it sink in. Although it’s not the most elaborate technical-analysis concept, the function is pretty intricate given its use of optional parameters one of which involves specification of a series. One you feel fully comfortable with SMA, you should find most other functions quite easy.

When you feel ready to go on, we’ll tackle GapUp, which is interesting in that unlike SMA, we’re not asking the logic to give us numeric output. Instead, we’re looking for a yes or no; either the pattern we specify happened or it didn’t happen.

**The Gap Up Function**

This is where investors look for stocks that experienced a significant upward gap between the closing price on day one and the open price on day two. On Portfolio123, those seeking to implement this strategy can use the GapUp function. (There is also a GapDown function for those who are interested in the opposite approach.)

As with other functions, you do not need to program the details of an upward gap. All the necessary logic is stored inside the function and will execute when Portfolio123 finds it in a rule. You only need to supply the parameters, the important numbers that vary from investor to investor based on individual preference and even with the same investor at different points in time.

Let’s assume you want to look for a stock that experienced a gap up within the last five trading days.

- By thinking in terms of five trading days, we have already established one parameter
- Another parameter is the size of the gap. Will a 1% jump interest us? Most who use a strategy like this won’t care about a move that small. Let’s say we are interested in up gaps of at least 10%. That is another parameter.

This alone is enough to implement the strategy. Here’s the function description:

```
GapUp(GapPct,VolPct,bars,offset)
```

Notice that the function requires four parameters. We have already identified the numbers we’ll use for two of them: we decided bars will be set at 5, and that GapPct will be 10. We’re not using the other parameters. We don’t care about volume and we want the function to execute as of now, so we aren’t using an offset.
So it might seem that we should articulate the function as follows:

\[ \text{GapUp}(10,5) \]

That will not work!

Look again at the function description. None of the parameters are identified as being optional, as would be the case if the description looked like this: \( \text{GapUp}(\text{GapPct}, \text{bars}[\text{VolPct}, \text{offset}]) \). But that’s not what we see. Nothing is enclosed in brackets. That means everything is mandatory. If we don’t want to assign values, we have to plug in zeros. So let’s fix it.

\[ \text{GapUp}(10,5,0,0) \]

Again, this is not correct.

It’s not enough to have the correct number of parameters. Each one must be in the proper position.

The function we wrote starts reasonably; Portfolio123 will look for stocks that experienced gaps of at least 10%. It will refine the search by limiting consideration to those whose volume on the day of the gap was at least 5% above the average experienced over the number of days we set with the bars parameter. So, far so good . . . sort of. It is possible that we want 10 and 5 in the GapPct and VolPct positions, so this won’t precipitate an error. But it’s not what we chose (5 is meant to bars, not VolPct) so the result will be wrong. Next, the function will encounter a zero when it evaluates bars. That’s illogical. We need a number for bars.

All this is meant to drive home the importance of function descriptions, how these are vital references that should be used regularly. Again, no prizes are awarded for memorization or successful guessing.

Let’s now write the function correctly, with all required parameters in place, in their proper positions, and with zero if necessary to populate a parameter we’d rather not use.

\[ \text{GapUp}(10,0,5,0) \]

That is correct. It will show us the stocks we want to see.

Many will not want zero in the second position, the VolPct parameter. They’d rather restrict consideration to gaps that were accompanied by noteworthy volume spikes. Let’s assume we decide to do that; we’ll insist that gap-up volume be at least 500% above the average of the last 5 trading days, 5 being the bars parameter (note that the bars parameter does double-duty; it tells us the number of days against which the volume spike should be compared and how many days back we can search for a gap). If we choose to do this, our function would look like this:

\[ \text{GapUp}(10,500,5,0) \]

So now that we have this function, what should we do with it. How can we get Portfolio123 to use it.

As noted, this is not like SMA, which calculates a number. This function looks for a yes or no answer. Either a stock experienced a gap up under the conditions we articulated, or it didn’t; yes or no. In computer-talk, that translates to true or false. Accordingly, we can create a rule that looks like this:

\[ \text{GapUp}(10,500,5,0) = \text{true} \]
It would also be ok to leave the function in the rule by itself. All factors or functions that are sitting alone will be evaluated by Portfolio123 as if the "= true" were also there. So the following alternative rules would produce identical results:

\[
\text{GapUp}(10,500,5,0) \\
\text{GapUp}(10,500,5,0) = \text{true}
\]

(NOTE: By the way, the implied "=true" feature exists for every Portfolio123 factor or function. Start a new screen and for the first rule, just type the word price. Click on Totals to see how many stocks pass the screen. You'll notice that every stock in the database qualifies. By typing price alone you implied price=true, which meant you searched for every stock that has a stock price. Since all stocks in the database have prices, all pass.)

Those interested in using technical indicators should be good to go right now. There are many more such functions that have not been demonstrated here. But now that you understand what functions are and how they work, and most importantly, how to specify parameters, you should be able to work with the descriptions (if a Full Description is available, use that) to incorporate any of the other technical indicators into your models. But don't stop reading here. The next two sections covering other kinds of functions may also be of interest to you.

**Statistical Functions**

The functions included among those in the TECHNICAL ANALYSIS category include several that could just as easily be thought of as being Statistical. They can definitely be of use to equity investors, but are especially worth noting for use with ETFs. These functions, which should be familiar to those who are acquainted with MPT (Modern Portfolio Theory) are:

- **PctAvg** (the average of the percentage moves of the closing prices)
- **PctDev** (the standard deviation of the percentage moves of the closing prices)
- **Sharpe** (a Sharpe-like ratio, return divided by standard deviation ; unlike the normal Sharpe ratio, it is not adjusted for the risk-free return)
- **Sortino** ((a Sortino-like ratio, return divided by downside deviation; unlike the normal Sortino ratio, it is not adjusted for the risk-free return)

All have through descriptions to guide you through the parameters. We'll demonstrate Sharpe here.

The Sharpe function balances return against risk: it's average price percent change divided by the standard deviation of the percent changes. (Unlike the textbook version of Sharpe, we don't subtract the risk-free rate from return.) Details of our calculation can be seen in an Excel spreadsheet you can access by clicking on a link in the Full Description.

This function (as well as Sortino, a variation that defines risk in terms of downside deviation) comes in two easy flavors, 1Y and 2Y versions (one-year and two years respectively based on weekly returns; no parameters need be input). The Sharpe we'll demonstrate is the flexible one, the one that allows you to specify parameters. Here's the formal description:

\[
\text{Sharpe}(\text{range[..bars,offset]})
\]
- **Range**, the only mandatory parameter, refers to the number of bars in the overall period to be studied. If you want to use one year, the parameter should be set at 250, the approximate number of trading days used in a year. This number can go up to 502.

- **Bars**, the first optional parameter, refers to the number of bars that should be used to calculate return. If you omit the parameter, the function will assume you want 5, which usually amounts to a trading week. This number can go up to 60.

  This requires some thought. We’re allowing you input two different numbers as bars. The best way to visualize the difference is to consider some examples.

  - Sharpe(250,5) will examine weekly returns logged over the course of a one-year study period. Since 5 is the default value for the second parameter, you’d have achieved the same result had you used Sharpe(250).
  
  - Sharpe(250,1) will examine daily returns logged over the course of a one-year study period
  
  - Sharpe(60,1) will examine daily returns logged over the course of a sixty-day study period
  
  - Sharpe(500,20) will examine twenty-day returns logged over the course of an approximately two-year period

  This should suffice to show you how it works.

- **Offset** tells you how many days (bars) back you should count before starting the calculation

  - Sharpe(60,1,20) will examine daily returns logged over the course of a sixty-day study period the most recent day occurring about one trading month (20 days) ago
  
  - Sharpe(250,5,125) will examine weekly (5-day) returns over the course of an approximate trading year that ended 125 days ago. In contrast to what we saw with Sharpe(250,5), the second parameter is not optional here. Once we decide to make use of the optional third parameter, the second parameter becomes mandatory, even if we just want to repeat the default value – this is necessary to make sure 125 winds up in the third position.
  
  - Use of offset can support some interesting ideas. For example, the rule Sharpe(125,5,0)>Sharpe(125,5,60) will identify situations where the Sharp ratio has been improving over the course of the last three months. That this could have been written as Sharpe(125,5)>Sharpe(125,5,60). I didn’t really need to specify the third parameter in the first expression, since it is zero. I chose to do so for my own convenience.

Once you get comfortable using Sharpe, you should easily be able to work with descriptions to use the other statistical functions.

Now, let’s move on to another collection of functions that seem deceptively simple, but actually, pack quite a punch.
Price & Volume Functions

Start a new screen. In Type, click on FUNCTIONS. In Category, click on PRICE & VOLUME. Now peruse the selections available in Factor/function.

The STOCK FACTOR Type also included a Category called PRICE & VOLUME so it’s tempting to assume this collection is redundant. It’s not. It’s much more powerful.

Let’s examine the function called Close. The idea is simple enough; it refers to closing price, and it has one mandatory parameter, BarsAgo, which tells us how many bars we should count back. The most recent closing price would be Close(0). The closing price two days ago is Close(2).

This is already more useful than the collection included in the STOCK FACTOR category. There, you could only access price changes over fixed intervals; 4 weeks, 13 weeks, 26 weeks, 52 weeks or year to date. Here, you can customize your intervals. If you want a one week percent price change it would be:

- close(0)/close(5) . . . if you’re willing to have your answer expressed as .993, 1.025, etc.
- (close(0)/close(5))-1 . . . if you want a the decimal equivalent to a percent, such as -.007, .025, etc.
- ((close(0)/ close(5))-1)*100 . . . if you want a percent value, such as -.7, 2.5, etc.

The real fun can occur when you ask: Closing price of what?

The default answer is the stock price. But you can add a second optional parameter, series, to get the closing value of something else, such as the benchmark of your choice (the default being the S&P 500), the 10-year treasury yield, the consensus current-year EPS estimate for the S&P 500, and so forth. The Full Description lists the possibilities for the series parameter. Here are some sample rules.

- Close(0,#TNX) <= Close(10,#TNX) + .25
  The ten year treasury yield did not rise more than 25 basis points over the past 10 trading days

- Close(0,#SPEPSCY)>=Close(20,#SPEPSCY)
  Consensus current-year estimates for S&P 500 did not, on the whole decline in the past 20 trading days
Both of the above samples would be market timing rules. If the conditions fail, no stocks would pass your screen, meaning you’d be entirely in cash.

Suppose you don’t want an all-or-nothing approach to market timing. Perhaps you want to just restrict yourselves to large-cap or low-beta stocks when you’re nervous about the market.

You would then use the Eval function, which brings if-then logic to Portfolio123. This is an advanced function which will be explored more thoroughly later on. But if you feel comfortable at this point going solo using the descriptions, you’ll find Eval included in the MATH category of functions.

If you can decipher this based on your own study of the description you’re good to go.

\[
\text{Eval(Close(0,#SPEPSCY)>=Close(20,#SPEPSCY),close(0)>=0,beta<=.9 or MktCap>=5000)}
\]

All readers, whether or not you are inclined to jump now into the Eval function, should be well equipped to handle all TECHNICAL ANALYSIS and PRICE & VOLUME functions.

Now, let’s move to a special category of functions that are designed specifically for ETF screening.
Chapter 3 Sample Screening Strategies: Technical Analysis

The first two parts of this How-To series showed you how to construct screens. Part 1 covered the Wizard. Part 2 covered Free Form. We’ll now help you put this knowledge to work by demonstrating some of the many kinds of screens you can build. This Part will focus on technical analysis and the next one will emphasize fundamental strategies.

Some technical analysis screens can be built using the Wizard, but most who emphasize this approach will choose to use Free Form, which allows for much greater flexibility and which covers ETFs in addition to stocks. The part of Free From you’ll use will be the category called FUCTIONS. Make sure you understand generally how to work with these, especially how to specify parameters. If you need to review, see Part 2, pages 12-23.

When building any screen, it’s a good idea to start with one or more liquidity filters. There’s no point in creating a model that looks great when backtested if it turns out that you can’t trade the stocks under real-world conditions.

Establishing Liquidity Thresholds

Here are some sample liquidity filters which you can copy to your clipboard and paste into the free form rule area.

**Liquidity Based On Exchange Trading**

```
Universe(NOOTC)
```

- This eliminates pink-sheet stocks, those that don’t trade in the NASDQ or on an exchange.
- In the alternative, you could simply choose No OTC Exchange in the Universe-selection dropdown menu

**Liquidity Based On Price-Volume**

```
Close(0)>=5 and AvgVol(60)>=50000
```

- The first part of the rule looks for shares whose most recent closing prices were 5 or higher.
- The second part of the rule seeks stocks for which daily volume over the past 60 trading days averaged at least 50,000 shares
- It’s tempting to omit the price filter and use a much larger volume rule, but be careful about this. For stocks priced, say at $0.02, even 1 million shares worth of volume may not provide nearly as much liquidity as you expect: $0.02 per share times 1 million shares amounts to only $20,000 worth of stock. If you want to think along these lines, consider the next strategy.

**Liquidity Based On Average Daily Total**

```
AvgDailyTot(60)>=150000
```

46
• This rule requires the average daily total traded (price per share times number of shares) to have averaged at least $150,000 over the last 60 days

**Liquidity Based On Market Capitalization**

\[ \text{MktCap} \geq 500 \]

• Market capitalization must be at least $500 million
• For many, something like this will suffice on its own, the idea being that any issue with a market capitalization above a certain level is likely to have satisfactory liquidity. But if you’re worried about issues with less liquidity than meets the eye based on a large number of shares being owned by insiders and, for all practical purposes, not available for day to day trading, you could try something along the lines of our final sample strategy . . .

**Liquidity Based On Float Capitalization**

\[ \text{Float} \times \text{close}(0) \geq 400 \]

• This requires the float adjusted market capitalization to be at least $400 million
• Float refers the number of shares in the hands of the public and can be found under STOCK FACTOR >> SHARE RELATED ITEMS. Multiplying it by price, expressed here as the last available closing quote. This gives us a figure that is analogous to market cap, but based more specifically on the number of shares that are available for day-to-day trading.

Going on, each of the technical screens illustrated below will presume that the first rule was used to establish a liquidity threshold based on one of the above sample, or something you created along similar lines.

**Technical Analysis Screening Strategies – Three flavors**

When starting to screen using technical analysis, the first thing you need to do is decide what role the technicals should play. Generally speaking, there are three approaches:

1. **Pure Technical-Based Stock Selection**

   This is probably what most technical-oriented investors have in mind when they first consider the topic. They assume they’ll specify technical criteria and consider whatever stocks pass muster.

   Most of the samples we present here will demonstrate this approach.

2. **Combined Technical-Fundamental Analysis Screens**

   It may not always seem apparent but technical and fundamental analysis are inextricably linked. If a stock gapped up on strong volume, this might have been a random or irrational occurrence, but don’t count on it. There was probably something particular – usually fundamental – that caused it to happen, such as a reassessment of growth prospects following a surprisingly strong earnings announcement. If a stock’s 50-day moving average is above the 200-day average and continuing to trend higher, there is
likely to be a fundamental reason, perhaps margin improvement, or investor reassessment of what had been a very low P/E.

Technical analysis can and often is used by itself, with traders-investors content to recognize that relevant fundamental factors exist in the background but not particularly keen to openly think about them. Others like to have the fundamentals share center stage and will build fundamental screens to identify opportunities that seem promising along these lines, and then use technical analysis to identify which of those issues are most buyable right now.

3. **Technical-Analysis Used To Identify The “Best”**

Suppose you want low-P/E stocks. You could easily build a screen using one or two rules to establish basic trading liquidity, and then use the Quick-Sort feature to rank the remaining stocks from low-to-high based on P/E. You may then select the top ten. Alternatively, you might choose one of our pre-defined ranking systems, perhaps the Basic - Value ranking system.

This sounds good on paper but may often falter in the real world, as you’ll see when you backtest. However good rank or sort protocol may be at identifying a collection of stocks that, in the aggregate, are likely to be the best 10% of the universe, or even the best 5%, things may break down when you try to drill deeper, to the top ten stocks, for example. We’re dealing with statistical probabilities, not a precise company-by-company hierarchy.

Technical analysis picks up on collective investment-community sentiment. It doesn’t ask why the investment community feels as it does. Maybe the bullishness comes from growth trends, perhaps it has to do with balance sheet improvement, or maybe margin expansion, or more likely, different things for different companies.

By adding one or more technical rules to what is primarily a sort-based strategy, you can enhance your chances of success by, for example, finding very low-PE stocks that have attracted buying attention right now.
Pure Technical-Based Stock Selection

In all cases, it will be assume that your first rule was used to address liquidity and that we are now working with rule two, and however many more rules, if any, will be needed. The way the functions are established in Portfolio123, it won’t take much to establish a strong technical model. One or perhaps two such functions (in addition to the liquidity rule) will often suffice.

Here, now, are some sample technical strategies. We’ll start with some that involve moving average. These have long been popular. They are effective in detecting trends as well as trend acceleration or deceleration. Also, they are very easy to implement.

Moving Average - Basic

\[ \text{sma}(50) > \text{sma}(200) \]

- The stock’s 50-day simple moving average is above its 200-day moving average
- This is a very basic trending strategy
- More aggressive traders will probably want to use shorter moving-average time periods, such as \( \text{sma}(5) > \text{sma}(10) \)

Moving Average With Offset

\[ \text{sma}(20) > \text{sma}(20,20) \]
\[ \text{sma}(20,20) > \text{sma}(20,40) \]

- The first rule requires the 20-day simple moving average to be above the 20-day moving average as it was computed 20 trading days ago (i.e. using a 20-day offset)
- The second rule requires the 20-day simple moving as it was computed 20 trading days ago to be above the average as it was computed 40 trading days ago
- We’re looking, here, for acceleration in the moving average

Relative Moving Average

\[ \frac{\text{sma}(50)}{\text{sma}(200)} > \frac{\text{sma}(50,0,#Bench)}{\text{sma}(200,0,#Bench)} \]

- Here, we’re not so much interested in the 50-day average being above the 200-day average, but instead, in the relationship between the two. The greater the gap between 50 and the 200 day averages (measured in percent terms, so we won’t get caught assuming $55 versus $50 (a 10% gap) is superior to $12 versus $10 (a gap that’s smaller in dollar terms but amounts to a larger percentage difference).
- The rule seeks situations where the relationship between the 50- and 200-day averages is superior for the stock than to the comparable averages computed for a benchmark index (the default selection being the S&P 500).
- In a bear market, stocks could pass if the 50-day moving average was below the 200-day average, so long as the shortfall is less, in percentage terms, than is the case for the market
Now, let's step it up just a bit. MACD is a fancier technical indicator that sounds a lot more intimidating than it is. In fact, it's just a shorthand way of addressing more detailed moving-average strategies.

**MACD - Moving Average Convergence-Divergence**

\[ \text{MACD}(0) > 0 \]

- MACD is based on the relationship between the 12 and 26 day exponentially weighted moving averages. Unlike the simple moving average, which counts all prices in the averaging period equally, the exponentially weighted moving average gives more emphasis to recent prices.
- This rule requires the 12-day exponentially weighted moving average to be above the 26-week moving average. It could just as easily have been written as \( \text{ema}(12) > \text{ema}(26) \).
- To look for stocks whose MACD is accelerating, build a rule around the offset parameter, such as \( \text{MACD}(0) > \text{MACD}(5) \), which means the current MACD is greater than the MACD as of five days ago.
- The more interesting application of MACD may be in the indicator built around it, which we'll examine next.

**The MACD Indicator - MACDD**

\[ \text{MACDD}(12,26,9) > 0 \]

- The first two parameters tell us we're looking at the basic MACD, the 12-week exponentially weighted moving average and the 26-week exponentially weighted moving average. Note, though, that in this version of the function, you can make changes. Perhaps you want to compare 5- and 15-week average. In that case, the first two parameters would be 5 and 15, instead of 12 and 26.
- Getting the third parameter starts with the differences between the 12- and 26-day moving averages. Assume the daily differences were plotted on a separate trend line. The 9-day moving average of that trend line, the difference line, is the third parameter. (You could, of course, change the 9 if you'd like to evaluate the difference over a longer or shorter period).
- When the MACDD is positive, it means the stock is in an uptrend and would be considered bullish by those who use such strategies.

Indicators like moving average and MACD are great because they can be expressed numerically, meaning they lend themselves well to applications like Portfolio123. Interestingly, though, it can be argued that indicators like these are contrary to tradition.

At its heart, technical analysis is a visual discipline, where one looks at a chart and evaluates patterns; resistance, support, cup-and-handle, head-and-shoulders, pennant, and so forth. The problem is that such things can't be expressed numerically, since often the presence or absence of a particular pattern tends to be in the eye of the beholder.

But there are some chart patterns that can be translated to numbers.
Gap Up

GapUp(10,500,20,0) = true

- This rule looks for stocks that experience a gap up (a daily low that was higher than the previous day’s high price) of at least 10%. This even must have happened some time within the past twenty trading days and must have been accompanied by a volume spike of at least 500% above the average volume that prevailed during the 20-day period.

Gap Down

GapDown(10,500,20,0) = true

- This is the mirror image of the GapUp. Here, we’re looking for cases when the day’s high was at least 10% lower than the prior day’s low.
- Don’t fall into the temptation to assume that such a rule is only for short sellers. Here’s an example of a screen that looks for stocks whose trends were OK, at least up till 60 days ago, but experienced a gap down between 20 and 40 days ago, but has recently started to show signs of resuming its old uptrend.

\[
\text{sma}(50,60) > \text{sma}(200,60) \\
\text{GapDown}(10,500,20,20) = \text{true} \\
\text{sma}(5) > \text{sma}(20)
\]

- The first two rules make use of the functions’ offset parameters. If you are at all unclear about this, review the discussion of Functions in Part 2.
- Copy this screen and backtest it. You’ll see that this is not the sort of model you can use if you just want to buy all the stocks that pass. But if you look closely at the individual holding periods, you’ll see that there are usually few enough passing stocks that you do have time to review them all case by case, and that plenty of good opportunities can be uncovered this way.

Highest

Highest(#Close,20,0) > Highest(#Close,20,20)

- This rule evaluates closing prices (you could also use open, intra-day high, intra-day close, or volume) and looks for situations where the highest close within the past 20 trading days was above the highest close achieved during the prior 20-day period.
- You can really push this function, and use it alongside the mirror-image Lowest function, to screen for a pattern of higher highs and higher lows.

\[
\text{Highest}(\#\text{Close},20,0) > \text{Highest}(\#\text{Close},20,20) \times 1.05 \\
\text{Highest}(\#\text{Close},20,20) > \text{Highest}(\#\text{Close},20,40) \times 1.05 \\
\text{Lowest}(\#\text{Close},20,0) > \text{Lowest}(\#\text{Close},20,20) \times 1.10 \\
\text{Lowest}(\#\text{Close},20,20) > \text{Lowest}(\#\text{Close},20,40) \times 1.10
\]

- If you like visual chart analysis, look at this and see if it rings a bell.

\[
\text{Highest}(\#\text{Close},20,0) < \text{Highest}(\#\text{Close},20,20)
\]
I wouldn’t go so far as to say the latter is the pennant formation, but it has key elements in common: descending highs and ascending lows heading toward a point at which, presumably, something noteworthy is bound to happen. But be careful about using this for a buy-all-the-names screen. The “something” at the end of a pennant might be negative. Use this screen to hunt for ideas you’ll evaluate case by case, or combine it with other factors that give you reason to think the next move is more likely to be positive.

NOTE: Copy the pseudo-pennant screen. Backtest it using one-week holding periods. Backtest again using four-week holding periods. Assume zero slippage. Notice the superiority of the four-week test. This is an example of how ideas often need time to materialize, even when selected on the basis of technical analysis. Now try testing with a one-day holding period. Here, a zero-slippage assumption would be way too tenuous. Assume 0.25%. This test is terrible. Now, just for laughs, assume zero slippage. This time, the result looks a lot better. Moral of the story: day trading can be great on paper, but unless you’re a superstar at navigating your way around bid and ask spreads, you may be better off giving your ideas time to develop, and to overcome the initial spreads you faced when you bought.

When we think of visual chart analysis, it’s usually assumed that that we’re looking at stock prices. But that doesn’t always have to be the case. The Portfolio123 CrossOver function, for example, looks to moving average plots for an important visual cue, and one that can be expressed numerically.

**CrossOver**

CrossOver(#sma,10,50,200)

- Technicians often talk about the desirability of the 50-day moving average being above the 200-day moving average. If we’re going to assume that trends persist, as we would if we use trend-oriented strategies such as moving average, it seems reasonable to also assume it would be better to get in during the early stages of a trend. CrossOver helps us do that.
- The above rule looks for stocks whose 50-day simple moving average (the first parameter, #sma) crossed above the 200-day average at some point within the last ten trading days.
- For contrarians, or those who believe in mean reversion (oscillation), there is a mirror-image CrossUnder function.

On several occasions, it was noted that mirror image functions exist to identify what, at first glance, would seem to be bearish technicals: GapDown, Lowest, CrossUnder. The extent to which these are necessarily bearish, however, is a matter for debate.

Just as fundamental investing has different stylistic camps (e.g., growth versus value), so, too, does technical analysis: trending versus oscillating. Except for the side notes on mirror-image functions, we’ve focused thus far on trends. We looked for stocks whose trends seemed favorable and attempted to write rules that would help us identify them in the screener.
Oscillation reflects a different perspective, sometimes referred to as mean reversion. It assumes there is some sort of central tendency and that stocks often bounce around on either side of their theoretically proper levels. When they get high, it is assumed they will correct back down toward the proper level. When they get too low, it is assumed they will bounce back. This doesn't mean the true and correct trend is always sideways and that every instance to the contrary is an aberration that needs to be corrected. Actually, history gives considerable ammunition to those who argue that the central trend tilts upward, with much of the debate on being on how steep or gradual the slope is. But even in the context of a long- or intermediate-term uptrend, stocks do bounce around above and below the central tendency necessitating frequent reversions to the mean.

Technical analysis offers some indicators, known as oscillators, that help investors judge whether and the extent to which a stock may be overbought or oversold and, presumably, poised for decline or rally. These indicators differ from others in that lower numbers usually signify bullishness (low number are associated with oversold conditions).

Oscillators can involve complex calculations (actually, for mathematicians, they are extremely simple, but for investors, they are considerably more involved than P/E, growth rates, or even MACDD). Here's how the Ultimate Oscillator, one of those offered in Portfolio123, is calculated. This is presented just for the information of those who'd like to know. If you like, you certainly can skip the computations.

Buying Pressure: \( bp = \text{close} - (\text{lesser of intraday low or prior day close}) \)
True Range: \( tr = (\text{greater of intraday high or prior day close}) - (\text{lesser of intraday low or prior day close}) \)

7-day Average = \( \frac{bp-1/tr-1 + bp-2/tr-2 + \ldots + bp-7/tr-7}{7} \)
14-day Average = \( \frac{bp-1/tr-1 + bp-2/tr-2 + \ldots + bp-14/tr-14}{14} \)
28-day Average = \( \frac{bp-1/tr-1 + bp-2/tr-2 + \ldots + bp-28/tr-28}{28} \)

Ultimate Oscillator = \( \frac{(((4 * 7\text{-day Average}) + (2 * 14\text{-day Average}) + (28\text{-day Average})) / 7) * 100}{7} \)

Again, if you can’t follow it, or prefer not to bother, don’t worry. Suffice it to say that high levels of the oscillator, signifying greater buying pressure relative to the stock’s “true” range,” suggest it’s overbought and vice versa.

Interestingly, although this is complex to calculate, it’s easy to implement in Portfolio123.

**Ultimate Oscillator**

\[ \text{ULTISC}(0) \leq 30 \]

- This rule seeks stocks for which the current level of the ultimate oscillator is 30 or below.
- If you want to look for stocks for which the ultimate oscillator has been becoming increasingly oversold, try this:

  \[ \text{Ultosc}(0) \leq 30 \]
  \[ \text{Ultosc}(0) < \text{Ultosc}(20) \]

- Here’s another approach:

  \[ \text{Ultosc}(0) \leq 30 \]
 Ultosc(20)>=40

This is a representative sample of the kinds of things you can do with the technical indicators on Portfolio123. For those who are more advanced in this area, we offer a set of Wilder-based indicators. The calculations are too complex to be covered here, but for those who know what they are and want to use them, the functions as presented on Portfolio123 are just as easy to work with as the ones discussed above. Check the Descriptions that accompany the functions. If you’d like to learn more about the J. Welles Wilder indicators, you can check his book *New Concepts in Technical Trading Systems*.

**Combined Technical-Fundamental Analysis Screens**

Many who use technical analysis stick to just that and do quite well.

Many others use technical analysis hand-in-hand with fundamental analysis. The most typical approach is to identify a list of suitable investment candidates using fundamental criteria. These tell us which stocks deserve to move. But such factors don’t necessarily tell us when the stocks will actually receive the favorable treatment they ought to have. Remember the old adage:

Q: How long can the market continue to be wrong?
A: A heck of a lot longer than you can continue to stay solvent!

Based on this, many investors filter fundamentally sound stock lists through technical filters to help them determine, not if the stock is worth buying, but whether it would be reasonable to act on bullish sentiment right now.

Doing this is easy. Just create a fundamental screen and then, add one or two technical rules such as those discussed above to the screen.

The challenge lies in strategy. What sort of technical rules might enhance the performance of a fundamental screen?

Consider, for example, use of the pre-defined Quality – Basic screen as a starting point:

```
universe(nootc) and close(0)>=5 and mktcap>=250 and Industry!=fsmisc
OpMgn%TTM>12
OpMgn%5YAvg>12
ROI%TTM>12
ROI%5YAvg>12
IntCovTTM >=3
```

This simple set of rules will usually uncover about 150 stocks that most would regard as fundamentally sound, the sort of stocks the average investor should feel comfortable owning. Assume, too, we boost the comfort factor by honing in on the top 15 stocks as per the Portfolio123 QVG (Quality-Value-Growth) ranking system.

To many, it will seem eminently sensible that a technical rule, if added, should be geared toward identifying which of these sound stocks are actually trending favorably. Try it. Add the following rule: `sma(50)>sma(200)`. Now, backtest the top 15 as per the QVG ranking system.
As of this writing, that test produced very disappointing results. The model outperformed the market when no technical filter was used, but substantially underperformed when the sma rule was added.

Now change the technical rule to this: sma(5)>sma(20). This is a much shorter-term version of the same thing, Backtest again.

As of this writing, the model is now outpacing the market, but by a lesser amount than was the case before the rule was added. From the vantage point of trying to support a buy-now decision, the second rule, with its short term orientation, added new information to our model, which tended to focus on less immediate factors. That was a plus. But it’s still not doing for us all we need, since we’d still be better off with no technical filter at all.

Now, flip the technical rule around. Make it look like this: sma(5)<sma(20).

This definitely is new information, very new information. We’ll now get a list of consistently fundamentally solid companies whose stocks lost steam.

Interestingly, in this test, the model outperformed not just the market, but also the results achieved by using fundamentals alone.

The moral of the story: Learn to love, or at least respect, the notion of mean reversion (or oscillation) if you haven’t yet done so. The market never goes up or down in an infinite straight line. If you pile up too many bullish rules in your model, you may simply be increasing your exposure to the prospect of a downward correction.

This isn’t to say you should never add a bull-oriented trending technical rule to a fundamental screen. There are times when that will help. But such occasions should be identified via testing, not seat-of-the-pants hunches, and not even based on your experience with purely technical screens.

When you’re doing technical analysis alone, your bullish technical rules will often help steer you toward stocks that have been deemed fundamentally sound in the eyes of market participants whose collective trading decisions resulted in the bullish patterns you detect. When you add technical rules to a fundamental screen, you don’t need to think this way. Your fundamental rules will have done all the necessary legwork in pointing you toward good companies. The addition of a bullish technical rule may amount to overkill.

**Technical-Analysis Used To Identify The “Best”**

This is similar to the technical-fundamental combination screen except here, the screen contains technical rules only. All fundamental concepts are incorporated into one of the pre-defined Portfolio123 ranking systems, or a quick-sort that you create.

This approach is useful when you want to create a broad technical screen, one that is likely to show more passing situations than you are able to buy or analyze. Use the quick rank or ranking system to narrow the list to a manageable number.

Consider, for example, the Gap Up pattern. What’s not to love – a stock that jumps briskly on big volume. This doesn’t happen often, but it can be frequent enough to produce more stocks than anyone can buy or analyze.

Create the following simple two-rule screen:
Backtest results are good (assume weekly rebalancing), but often, the screen contains more than 50 stocks, sometimes, more than 100. There’s not much we can do in the real world with something like this.

Now, change the settings so that we consider only the top five stocks and that these be selected using the Basic: Sentiment ranking system, Backtest again.

The picture changes quite a bit. Performance is again strong. This time, though, you can do something about it; you can follow an automatic trade-everything-weekly strategy, or you can look at each chart individually and decide case by case.

Mix and match technical screens and ranking systems and test the combinations. Not everything will work. But you’ll see many that will be backtest quite nicely with 15, 10 or even 5 stocks.

Now, try a variation using Quick Rank.

Setting up a Quick Rank is similar to creating a free-form fundamental screening rule. Clicking on the note-pad icon next to the Quick-Rank box will open the free form rules interface; you can use this and type manually. The one difference is that the Quick Rank item needs to always be in true-false form. Don’t actually say =true; just input the factor. For example, if you want to sort based on the trailing 12 month rate of EPS growth, all you need do is input: EPS%ChgTTM.

Try combining the EPS%ChgTTM Quick Rank with the Gap Up screen and backtest. The result is OK. But here, too, you can mix and match. Try combining the Gap Up screen with analyst upgrade, improvement in the average analyst recommendation score. This is: AvgRec-AvgRec4WkAgo. Make sure you set the drop-down menu to say Lower is Better (these scores sun from 1.00, best, to 5.00, worst). Assuming you’re looking for the five best stocks and are rebalancing weekly, this should be considerably stronger.

The screen-quick rank paring can also go the other way. You can have a fundamental screen and narrow down with a technical Quick Rank. Here, though, you’d need to use a formulation that lends itself to a numeric answer, something that can be sorted. So it would not be helpful to specify GapUp(10,500,20,0) as a Quick Rank formula. Formulas you could use include sma(50)/sma(200) (higher is better), sma(5)/sma(20) (lower is better), MACDD(12,26,9) (higher is better and so forth.

**Summary**

When creating a technical screen, organize your efforts in terms of two important strategic decisions.

1. Decide what role technical analysis will play
   a. a screen based entirely on technical tests
   b. a screen that reflects a combination of fundamentals and technicals
   c. a combination screen wherein one approach is used for screening and the other for a pre-defined ranking or a Quick Rank formula
2. With regard to the technical-analysis portion of your model, decide which technical style you will pursue
   a. trending
   b. oscillating
With those decisions in hand, you will have come quite far. You’ll know what kinds of functions you’ll be looking for and you’ll know where to place them. And as you’ve seen from the Functions discussion in pages 12-23 of Part 2 and in the examples presented here, using functions to create rules is actually quite easy once you’ve gotten into the habit of checking the Descriptions to see which parameters are needed and the sequence in which they need to be specified.

The next Part of this series will cover Fundamental screening strategies.

Chapter 4 Sample Screening Strategies: Fundamental Analysis

After learning how to use the Wizard and Free Form interfaces to build screens in Portfolio123, Part 3 provided some sample Technical analysis strategies. This part will continue by touching on Fundamental Analysis.

A considerable number of fundamental samples already exist among the pre-defined screens. Using the "Save As" button, you can copy any of these screens into your own account. Once there, you can run them as is, or modify as you wish. As a result, it’s not really necessary to provide here a lot of sample screens. Instead, this Part will emphasize the thought-process behind building fundamental screens.

This, actually, is the biggest obstacle for many who find it difficult to screen. Admittedly, our Free form interface involves a "learning curve" but our Wizard can be picked up pretty quickly. That’s also the case with other screeners you may have seen on the web. But however intuitive an interface may be, however effective we or anyone else is in addressing the how-to-do-it questions, the ultimate make-or-break dilemma is what-to-do. That’s what will be covered here. Once you learn to approach screening in a strategic manner, information overload ceases to exist because you’ll easily know exactly what you want to look at.

Elements of A Fundamental Screening Strategy

Here’s an outline of the fundamental screening framework:

- **Liquidity**
  - Start your screen with some sort of liquidity framework. This could be as simple as a rule that says Universe(NOOTH), which omits all pink-sheet stocks, or a volume test like this: AvgVol(60)>=150000, which means the trading volume over the past 60 days must have averaged at least 150,000 shares. Other possibilities include close(0)>=5, which limits consideration to stocks whose latest price was $5 or higher, or MktCasp>=100, which means market cap must have been greater than or equal to $100 million.
  - Needless to say, you can combine several rules like these
  - You don’t actually have to use screening rules to manage liquidity, but we haven’t yet covered the other approach, Universes. So for now, handle it through screening rules.

- **Classification**
  - Decide how you would like to classify different parts of the equity universe – define different styles
• Large cap, mid cap, small cap
• Growth, value
• Etc.

• Threshold Preference
  o Decide how you would like to define the kinds of companies you want. Do you want companies that meet numeric thresholds, or rank well relative to industry peers, sector peers or the market as a whole

• Primary Focus
  o Decide which style(s) you’d like to focus on, or if you want to pursue a generalist approach, make a knowledgeable decision to that effect
  o Make this the focus of your screen

• Secondary Focus
  o Decide how you’d like to narrow down to your final selections
    • Usually, this will involve a style different from that of your primary focus
    • Often, it will be generalist in nature
  o This could be implemented by some additional screening rules
  o On Portfolio123, you may choose to implement this using the Quick Rank or a pre-defined ranking system

**Classification**

Some investors have a preference when it comes to company size and will want the stocks they see to be large cap, mid cap, small cap, or micro cap. It’s very easy to add such a preference to your screen. Just include a rule requiring market capitalization (MktCap) to be greater to or less than your preferred threshold.

If you want to bound both ends of the range, use an AND statement in your screening rule. For example, if you want small companies, but not too small, do something like this:

MktCap>=250 and MktCap<=1000

That limits consideration to stocks with market caps between $250 million and $1 billion. If you check the description of the MktCap factor, you’ll see that it is defined in terms of millions of dollars. So six zeros will always be added, behind the scenes, to any number you specify.

If you are inclined to think in terms of market cap categorization, here are some things to keep in mind:

• The more your focus gravitates toward larger companies, the harder you’ll have to work to create screens that succeed. Larger companies tend to be covered by more analysts and talked about more intensely in the media, resulting in much more share price action being sparked by noise and chatter rather than by objective fundamentals. This is not to say larger-company screens can’t work – they can – but be prepared to work a lot harder and backtest more vigorously.

• Be vary careful about stereotypes. Many believe big companies are inherently safer. Try creating screens on that basis and backtesting. You’ll see that often, it’s not so. Others assume that smaller firms will have stronger growth characteristics. That, too, may turn out to be just a stereotype. Often small-stock appeal is based on the potential for growth
that hasn’t yet fully materialized in the past (and hence won’t be visible in historic growth factors).

I suspect most who screen tend to be agnostic when it comes to size. They create the best screens they can and, as long as liquidity considerations are satisfied, accept whatever size companies appear. The classifications that occupy most attention tend to be stylistic: Growth, Value, etc.

As important as it was to steer clear of stereotypes when it came to size, it may be much more so when it comes to style since this is an area where stereotypes attract, perhaps, the most passion. Here is the big secret when it comes to style: They can all work if executed well, and they can all hurt you if executed badly.

Don’t take my word for it. You have a powerful backtester at your disposal. Put it to work. Notice, as you experiment, that value is not inherently most prudent. Notice that growth is not inherently speculative. Notice that companies with debt are not inherently riskier. Etc., etc., etc.

Look, too, at the world around you. How is it possible that Ben Graham and Warren Buffett on the one hand and William O’Neil and Jim Cramer on the other hand can all succeed over prolonged periods, even though they fall into stylistic camps that seem hopelessly opposed. In truth, when it comes to what’s important, they aren’t opposed at all: they are all united in being excellent when it comes to implementing the styles they chose to pursue.

If you wish to be agnostic when it comes to style, to create a screen that has a little of this and a little of that, you certainly can do that. But even though all styles are valid, it can still be a good idea to have a focus. That’s because different styles will attract stocks having different characteristics and it’s important to gravitate toward those that best match your own temperament and risk-reward preferences.

We’ll discuss the styles further when we get to Primary Focus. But before going there, we need to address one more preliminary topic.

Threshold Preference

Do you want good companies or good stocks?

This is not a trick question. They are not necessarily the same, and each has its own merits.

Look at the Style–Specific pre-defined screens. Notice that each style features four kinds of screens:

1. Basic – This is where numeric criteria are used to establish thresholds. An example would be a requirement that a five-year average annual growth rate be above 25%.

2. Compared to Industry Peers – An example might be a requirement that companies have growth rates that rank in the top 35% relative to industry peers. A company could pass the screen if its earnings were falling, so long as the decline was less steep than those of most others in the industry. A variation of this would use sector, rather than industry, comparison,

3. Compared to Market – This is similar to industry/sector comparison except that here, we’d be looking at how companies rank relative to all others regardless of industry/sector
4. Comprehensive – This is a demanding approach that requires companies to fare well in chosen factors when measured relative to both industry/sector and the market as a whole.

Basic is the easiest concept to grasp and the one most familiar to novice screeners. It can point the way toward good companies and/or good stocks depending on which factors you use.

- It’s strength is not so much in simplicity (just because something is easy doesn’t mean it’s good) but in the fact that the user is establishing a certain minimum threshold below which he will not go under any circumstances. To pursue this approach, you must be willing to accept a screen that would produce a very small number of results, perhaps even none, under certain conditions.

- The drawback lies in the difficulty in establishing reasonable thresholds. For one thing, standards are not absolute. Who is to say that a 25% growth rate is really more deserving of notice than, say, 15%-20% which, when viewed realistically, would be seen as being pretty darn good? There was once a time when it was reasonable to look for P/Es below 8 (as Ben Graham used to do); nowadays, a threshold like that will most likely confine you to sticking with all cash except for occasions when you get to consider companies whose earnings are about to fall off a cliff, and probably drag the stock prices down with them. This is not to say you should never use Basic thresholds. But if you use them, do not be blasé about your numeric tests. Consider how you would defend them if challenged.

Peer (Industry or Sector) Comparison is a classic good-company approach. When it comes to numbers, you’re willing to accept anything so long as the company is “better” (the standard being defined by you) than other companies similarly situated.

- The strength of this approach lies in its ability to uncover company excellence. Many investment gurus and authors say much about evaluating management. In the real world, you’re not going to be able to do it. (In the extremely unlikely event you can get access to key decision makers, federal law limits the extent they can communicate specially with you and unless the company is in the same field as the one in which you’re professionally active, you probably wouldn’t be able to properly evaluate whatever tidbits on information happen to fall your way.) The good news is that talented corporate management teams tend to leave “financial footprints of success.” These are visible where companies are able to consistently post better results than other firms that are similarly situated (i.e. the cyclical firm whose earnings fall five percent in a downturn while peers experience declines averaging 20 percent).

- The bad news is that in the day to day world of Wall Street, true talent is not always rewarded. Gurus and authors suggest that stock market success can be achieved by focusing on great companies. That’s not necessarily false. But however well good companies are reward in terms of stock market strength, never underestimate Wall Street’s willingness to also favor ordinary, mediocre, and sometimes downright rotten companies as well, often for prolonged periods. Going back to the cyclical-company example, the better firm’s stock might, during a recession, get slammed about as much as all the others in its industry. The case for investing would lie in the likelihood that it will really soar when its excellence becomes manifest during a recovery. The good-company investor reasons that it’s tenuous to try to time top-down circumstances, and that the best course of action is to simply load up on corporate excellence and, if necessary, wait a bit.

Market comparison, where you look for situations where a company ranks well compared to all others, looks like a good-company approach but actually has a much stronger good-stock element than many realize.
• The good-company flavor appears from the fact that it relies on comparison, rather than numeric thresholds. We want companies that are “better.” Realistically, though, you’ll often find your results weighted toward companies in businesses that are presently hot. The way-better-than-average cyclical company is probably not going to make it into your screen when business conditions are weak. It’ll probably get nudged out by ordinary or mediocre companies that happen to be in currently stronger less-cyclical businesses.

• Market scholars would like to think Wall Street should be able to see through this sort of thing. Don’t count on it. Investors can be remarkably short sighted and often wouldn’t blink at favoring a shares of a mediocre company in a hot industry over those of an excellent firm in an out-of-favor business. Pursuing the latter can still be a fine strategy. (Peter Lynch made a great living doing that!) But there’s no shame in making money riding current Wall Street waves.

Comprehensive comparisons are the superheroes of screening tests. These are for investors who want it all: corporate excellence and the forefront of Wall Street waves.

• On paper, these are, hands down, the best tests you can create. That should be obvious.

• In reality, don’t assume such screens will always deliver. There is a lot of imperfection in the world and Wall Street has tremendous tolerance for flaws. The more you demand, the more exciting opportunities will, due to imperfections, fall by the wayside.

• Think of comprehensive comparisons as being like hot peppers. A dash here and there can do wonders for what would other side be an ordinary meal. But you definitely don’t want to overdo it.

Portfolio123 offers two ways to implement comparative screening.

The easy way to use the collection of industry-average factors (in the free form interface, these can be found under INDUTRY FACTOR. The general approach would be to compare companies to industry average. Here’s an example involving a five-year EPS growth rate:

\[ \text{EPS5YCGr\%} > \text{EPS5YCGr\%Ind} \]

The pro, here, is simplicity. Such rules are easy to create. The con is restrictiveness. You can’t engage in market or comprehensive comparison, nor can you do much beyond seeking companies that are better than average.

Portfolio123 functions offer more power and flexibility for those willing to deal learn to use the functions. These can look very intimidating at first, but once you get used to them, they are quite manageable. If you haven’t yet looked at the Functions section of this tutorial series, please make a point of doing so before going on with this section.

The function most likely to be used for comparative screening is FRank. It has one mandatory parameter followed by three optional parameters.

The mandatory parameter is formula/factor, which must be enclose in quotes. This is obvious. Portfolio123 can’t rank anything until you tell it what it is that you want it to rank.

If you want to rank companies based on five-year EPS growth, your function would look like this:

\[ \text{Frank("EPS5YCGr\%")} \]
Upon seeing that you omitted the optional parameters, Portfolio123 would fill them in with default entries. It would assume you want EPS5YCGr% ranked relative to all stocks (that you are aiming at market comparison) and that you want the sort to be descending, meaning high numbers are good.

I very strongly suggest you get into the habit of always using the first two optional parameters. Express the function this way:

\[ \text{Frank(“EPS5YCGr%”,#all,#desc)} \]

The first optional parameter, #all in this case, is where you tell Portfolio123 what kind of comparison you want. Alternative entries could be #industry or #sector.

Suppose you aren’t looking to rank growth rates. Suppose you want a factor where low numbers are more bullish than high numbers, such as P/E. In that case, the default value for the first optional parameter definitely will not work. You would need to ask Portfolio123 to do an ascending sort by stating the parameter as #asc.

Suppose you want a market comparison and an ascending sort. Might you do this?

\[ \text{FRank(“PEExclXorTTM”,#asc)} \]

That specifies an ascending sort. You leave out #all because it’s a default value that will be presumed by Portfolio123.

That would produce an error message. Remember, from the Functions section of the tutorial series, that each parameter must occupy its assigned position. After the formula, Portfolio123 expects to see #all, #industry or #sector. You have to push #asc into its proper position by using one of the comparison specification. So a correct way to specify the function would be:

\[ \text{FRank(“PEExclXorTTM”,#all,#asc)} \]

So a screening rule involving PE comparison might look like this:

\[ \text{FRank(“PEExclXorTTM”,#all,#asc)} \geq 75 \]

The 75 value is a percentile score with 0 being worst and 100 being best.

For now, don’t worry about the last optional parameter. Once you get comfortable with Universes, a topic that will be covered later, it will become more meaningful.

**Primary Focus**

Articulate some sort of primary stylistic focus. You’ll have plenty of opportunity to flesh it out later. But it’s important to start somewhere. There are many screening factors available in Portfolio123. Once you articulate a stylistic focus, you’ll find it easy to zero in on the ones most relevant to you.

There are no hard and fast rules for categorizing styles. Here is an approach that’s worked pretty well for me.

- **Growth**
  
  This style emphasizes historic rates of growth.
Don’t fall for the intellectual snobbery that often arises in response to growth stocks, which tend to be dismissed as aggressive or even speculative. Actually, though, growth is an important element and one that is conspicuously included in every academic valuation formula. Without growth, there’s no reason to ever buy stocks since bonds yield more and feature less price risk.

EPS growth is the primary target, but don’t ignore sales growth. If sales aren’t growing, it will be difficult and ultimately impossible to keep earning moving ahead for a long period of time.

Theorists place great emphasis on long-term growth rates, which demonstrate sustainability. That’s fine. Use these. But don’t ignore short-term time periods. Wall Street isn’t at all shy about rewarding flash-in-the-pan situations, and if you rebalance frequently (every four weeks or so), this can work well.

- **Value**

Once again, don’t fall prey to snobbery regarding low low low PEs, etc.

The days when low PEs prevailed because investors didn’t know better are history, along with the pocket-size S&P sock Guides that were as valuable to a prior generation as Yahoo! Finance is today. Nowadays, assume everybody knows about the low metrics. The job of the modern value investor is to figure out why the Street is willing to leave the metrics at low levels, and to look for a reasonable basis to disagree. Value investors today should spend no more than minutes looking at price ratios (these are obvious and easy to ascertain) and hours evaluating the companies. So if you build a value screen, be especially attentive to our subsequent discussion of Secondary Focus.

- **Income**

Obviously, this style emphasizes dividend yield. Naturally high is good.

Once again, though, always assume the Street knows what’s going on. If you see an especially high yield, look for a reason for why investors might be reluctant to bid up the stock. Often you’ll find something involving dividend security, a meaningful risk that adverse developments may cause the dividend to be reduced or eliminated.

Conversely, look for reasons why some yields are lower than others. Often, this will have something to do with dividend growth. The higher the rate of dividend growth, the lower the current yield is likely to be. This is an important consideration. Few income stock purchases can be justified based on yield alone; you’d usually do better with bonds. Growth is where income stocks get their edge.

- **Quality**

This is where you get to apply all the principals you learned reading about Warren Buffett, Ben Graham, etc. You want good margins, good rates of turnover, strong returns on capital and healthy balance sheets. This is the penultimate good-company approach.

If you’re taking an investment class and want to discuss the stocks you found, Quality will point you to examples you can brag about. Remember, though, Wall street is quite happy rewarding mediocrity. So be sure to pay attention to the need for a Secondary theme.

- **Sentiment**
This is the penultimate good-stock approach. Sentiment-oriented investors could care less about the underlying merits of a company. If there are none, that’s OK, so long as the Street likes the firm for whatever reason, or even for no reason. If there are some reasons but the Street’s view of them is exaggerated, that’s OK too, so long as it’s willing to act on its erroneous belief.

Notwithstanding an army of know-it-alls who are only too happy to wag their fingers in response to Sentiment investing, the fact remains that you can prosper very handsomely through this sort of thing. Test it. Build some Sentiment screens and backtest.

But be careful. There are few things the Street hates more than realizing the error of its ways. You don’t want to be caught holding shares of a beloved growth company when the day finally comes that the Street figures out that the business isn’t really all that great. It may not happen for months or years. But sooner or later, it will probably happen. If Sentiment is your primary style, rebalance quickly, every four weeks or more often. Also consider and especially solid Secondary Focus.

By now, you may have noticed an important common theme: Ignore stereotypes! Wall Street is far more varied than many give it credit for being. Approach screening with an open mind.

**Secondary Focus**

After reading the prior section, it should by now be apparent why you should want your models to incorporate at least one additional style. All of them are interesting. All of them can make money for you. But all of them come with their own drawbacks.

Also, since no single style has a monopoly on merit, there really is no reason to lock in on just one. If you are a diehard Quality investor but things went awry and you wound up quickly doubling your money based on the emergence of some Sentiment factors, would you really be upset? Stylistic purity works best on a soapbox. When it comes to succeeding in the market, flexibility tends to be more useful.

There are two ways to incorporate a secondary focus.

1. Obviously, you can do this by adding additional screening rules to reflect one or more additional styles (don’t be afraid to go so far as to wind up with a generalist screen).

2. Alternatively, you can stick with a single-style screen and add variety through a Quick Rank and/or a Ranking System.

**Translating Ideas Into Screens**

For fundamental screening, you’ll look primarily to STOCK FACTOR, the second item in the “Type” window.
INDUSTRY FACTOR, another useful grouping, offers pre-calculated industry averages for many items in the STOCKFACTOR grouping. If you're going to make comparisons using FRank, you will place the appropriate stock factor(s) in the first parameter position.

Most of the STOCK FACTOR categories are easily recognizable. Here, however, are some thoughts on especially useful items.

- **PRICE & VOLUME**
  It's tempting to go to the PRICE & VOLUME section of the FUNCTIONS are for the increased flexibility it provides, including its ability to specify daily pricing. But don't underestimate the usefulness of taking a step back and seeing how things evolve given the passage of a little bit of time. I often use Pr4W%Chg, the share price percent change over the past four weeks, and compare this to the industry average (Pr4W%ChgInd) to get a sense of general market sentiment.

- **DIVIDEND INFORMATION**
  Yield and Yield5YAvg are important items. But be careful about being too demanding. High yields are associated with often-justified concerns about dividend cuts. Be willing to set maximum limits on the yields you'll consider.

- **SHARE RELATED ITEMS**
  MktCap is an obvious choice if you want to consider issue size. You can use ShsOutAvgTTM and ShsOutAvgPTM (PTM means Prior 12 months) to look for recent share buybacks. If liquidity is a concern, you can use Float.

- **EARNINGS ESTIMATES**
  Opinions vary widely about Wall street analysts and the way they work, but like them or loathe them, there's no getting around the fact that many institutional investors move large amounts of money based on their estimate changes and recommendation changes. You'll find plenty of opportunities going with the flow, and also on the contrarian side (selling on upgrades and vice versa). Either way, it's worthwhile to pay attention. I work with estimates (CurFYEPSMean for example), where those estimates stood at various points in the past (e.g., CurFYEst4WkAgo), AvgRec (Average Recommendation: Thomson Reuter's score reflecting an aggregation of all recommendations with 1.00 being most bullish and 5.00 being most bearish) and where AvgRec stood at various points in the past. Look, too, at LTGrthRtMean, the consensus Wall Street Long-Term EPS growth rate forecast and revisions thereto.

- **VALUATION RATIOS**
  P/E is, of course, the dean of this category. Just make sure you check the factor definition, since there are several different ways of reporting EPS. One of the key versions is PEExlXorTTM. You recognize PE and TTM. The middle part of the acronym,
ExclXor, means that the EPS number used in the calculation excludes extraordinary items. Be sure to check definitions of PEG (P/E to Growth rate) as well; besides different ways to compute EPS, there are different growth measures that can be used. Look, too, at Price/Sales (Pr2SalesTTM) and Price/Book (Pr2BookQ). I'm less enthusiastic than I once was about the cash flow ratios (those non-cash allocations criticized by many actually reflect an effort to match revenues incurred over the course of many quarters with expenditures incurred in a single quarter; the effort is admittedly imperfect, but ignoring it altogether can lead to very distorted pictures of overall company economic performance), but they're there if you want them.

- **GROWTH RATES**
  Sales and EPS are my favorites. But guard against being too demanding. In the real world, the higher the growth rate, the more likely it is that deceleration, perhaps a sharp drop-off, is just around the corner.

- **FINANCIAL STRENGTH RATIOS**
  DbtLT2EqQ (Long-term debt to equity in the latest quarter) and DbtTot2EqQ (total debt to equity) are standards. Sometimes I compare the latest quarterly figures with PYQ (prior-year quarter) tallies. Look too at the liquidity items, CurRatioQ (current ratio) and QuickRatioQ (quick ratio) and IntCovTTM (trailing 12 month interest coverage ratio). This is also where you can find various measures of payout ratio.

- **EFFICIENCY RATIOS**
  Turnover ratios are among the least glamorous but can be quite valuable: AstTurnTTM (trailing 12 month asset turnover), RecTurnTTM (receivables turnover), and InvTurnTTM (inventory turnover).

- **PROFITABILITY RATIOS**
  This group, too, doesn't get nearly as much attention as it deserves. But that's probably a good thing in that inadequate attention creates opportunities for those who are looking. Return on Equity (ROE%TTM and ROE%5YAvgInd) is the main textbook measure, but I prefer Return on Investment (ROI...), which factors out the impact of debt financing on business performance (you need a good COO to have a good ROI but a mediocre business can produce a great ROE as long as you have a smart CFO; and frankly, I prefer companies whose prowess is supported by something more than an aggressive or brilliant CFO).

- **INSTITUTIONAL OWNERSHIP**
  Number of institutional shareholders (#Institution) can help you get a handle on whether or not the company is flying below the radar of the big guys. So, too, can Inst%Own when evaluated in comparison with its industry average.

- **INSIDER TRADING**
  Sometimes I work with insider buying, preferring number of transactions (InsBuyTrans) to number of shares (Ins#ShrPurch); the former shows sentiment while the latter mixes sentiment with personal wealth, i.e. buying power, of the insiders involved. Insider selling factors are here too, although they don't always signal sentiment since insiders do sell to monetize stock-based compensation.

- **SHORT INTEREST**
  Depending on your temperament and philosophy, you can use these factors to go with the flow, or look for a potential short squeeze. I like measuring shorts by looking at SI %Float (short interest as a percent of float), SI%FloatPM (the same item for the prior month), SI%FloatPM2 (the items two months earlier) and SI%FloatPM3.
Using the factors to create a rule

When creating a screening rule, think in terms of three components:

1. The Factor

   This is the item you are using; EPS%ChgTTM, PEG, CurRatioQ, and so forth.

2. The Relationship

   A relationship is usually one of these
   > (greater than)
   >= (greater than or equal to)
   < (less than)
   <= (less than or equal to)
   = (equal to)
   != (not equal to; note that this is different from the <> symbol often used elsewhere)

   Portfolio123 is a powerful platform so this is not a complete list of possible relationships. But working with these can keep you busy for a long time, until you're prepared to tackle the advanced features.

3. The Base

   This is what the factor is being compared to. In the rule "PEG <= 1.00" The base is 1.00. In EPS%ChgTTM >= 20, the base is 20. We want the TTM EPS growth rate to be greater or equal to 20.

   Up till now, we've always thought of the base as being a number. But in Portfolio123, that need not be the case. In fact, when I screen, the base is usually another factor. For example:

   • EPS%ChgTTM >= Sales%ChgTTM
     The company's TTM EPS growth rate is greater than or equal to the company's TTM Sales growth rate

   • EPS%ChgTTM >= EPS%ChgTTMInd
     The company's TTM EPS growth rate is greater than the average TTM EPS Growth rate of the industry to which the company has been assigned

   • EPS%ChgTTM >= EPS5YCGr%
     The company's TTM EPS growth rate is greater than its own 5-year growth rate

   • CurFYEPSMean > CurFYEst4WkAgo
     The mean (consensus) Wall Street EPS estimate for the current fiscal year is greater than where it stood four weeks ago

Making it interesting

If you just stick with the kinds of rules demonstrated above, where the base is another factor, rather than a number, you'll already be building screens far more powerful than you can create on most other applications. But on Portfolio123, you can do more . . . much more. Here are some examples:

   • EPS%ChgTTM >= (Sales%ChgTTM * 1.25)
     The company's TTM EPS growth rate is at least 25 percent greater than the company's TTM Sales growth rate
• (EPS\%ChgTTM / EPS\%ChgTTMInd) > (EPS5YCGGr\% / EPS5YCGGr\%Ind)
  The extent of the company's EPS growth superiority relative to its industry peers is
greater in the TTM period than it was in the 5-year span. This introduces the notion that
you can have multiple items (formulas) in both the factor area and in the base. Suppose
the company is below the industry average. You could leave that rule as is and accept
companies that are becoming less bad. Or you can do this . . .

• EPS\%ChgTTM > EPS\%ChgTTMInd And EPS5YCGGr\% > EPS5YCGGr\%Ind And (EPS
\%ChgTTM / EPS\%ChgTTMInd) > (EPS5YCGGr\% / EPS5YCGGr\%Ind)
  Yes, we can use "And" in your rules. So now, we repeat the above rule but apply it only to
companies that are superior to their industry peers.

• EPS\%ChgTTM >= EPS\%ChgTTMInd Or Sales\%ChgTTM >= (Sales\%ChgTTMInd *
1.50)
  Knowing from the above that you can use "And," it should come as no surprise that you
can also use "Or." This rule is for one who likes to see above-average EPS growth, but
would accept above-average sales growth in its stead. This rule accomplishes that
subject to a requirement that the degree of superiority be great enough. Note, though,
that with a rule like this, I'd worry that the sales surge was coming from a potentially
dilutive acquisition. So I might do this instead . . .

• EPS\%ChgTTM >= EPS\%ChgTTMInd Or ((Sales\%ChgTTM >= (Sales\%ChgTTMInd *
1.50)) And EPS\%ChgTTM >= 0)
  This is the same as above, but we also require that TTM EPS not be down.

The negative number adjustment
Now, did you catch the bug in EPS\%ChgTTM >= (Sales\%ChgTTM * 1.25)?
Let's see . . . if sales growth is 4 percent, EPS growth would need to be at least 5 percent. That
works.
If sales growth was minus 6 percent, EPS growth would need to be at least minus 7.5 percent.
Ouch . . . that's not what we want. We might have an EPS growth rate that is worse than the
sales growth rate!
Any time we make a comparison like that, where the base could conceivably be a negative
growth number, we should consider adding a little safety valve into our rule.
EPS\%ChgTTM >= (Sales\%ChgTTM * 1.25) And EPS\%ChgTTM >= (Sales\%ChgTTM * .75)
Suppose the sales growth rate is 4 percent. We'd need the EPS growth rate to be at least 5
percent (4 * 1.25) and at least 3 percent (4 * .75). The latter is redundant. If growth is above 4 *
1.25, it's certainly going to also be above 4 * .75. And if it's below 4 * 1.25, the stock is omitted
even if the 4 * .75 part of the rule is satisfied. In this case, the redundancy doesn't hurt us; it's
simply irrelevant.
Suppose the sales growth rate is minus 6 percent. Minus 6 times 1.25 is minus 7.5, so we are
exposed here to the sort of comparison we don't want. But the company would also have to pass
the minus 6 times .75 requirement, which means its EPS growth rate could be no worse than
minus 4.5 percent. That's OK. If EPS growth is minus 4.5 percent or better, compared to an
industry average of minus 6 percent, we'll take it.

We did it
Now you know how to screen. And you now know why Portfolio123 doesn't restrict itself to the
Wizard interface. You may not yet be able to articulate your ideas. But that will come over time
with practice.
Chapter 5 ETF Screening

Much of what you already know and do in the Portfolio123 stock screener is applicable to ETF screening as well.

- The Free-Form rule-construction interface is the same.
- The Backtesting interface is the same.

Here are the key differences:

- Fundamental criteria analysis (valuation metrics, growth rates, balance sheets, etc.) are inapplicable so the numeric aspects of your models must be created using price- and volume-based factors (such as technical analysis)
- Unlike stock screens, which can use half dozen or more numeric rules, ETF screens will often wind up using just one or two such rules, and perhaps even none (you may wind up doing a taxonomy-based screen – see below – and using numeric rules only for a Ranking System or a Quick Rank)
- Taxonomy-based rules, often of minor significance in equity screening (industry, index membership, etc.), are likely to be dominant in ETF screening
- ETF result sets are likely to be much smaller than is the case for equities. With the latter, 10, 20 or more stocks may be considered desirable. For ETFs, five or fewer choices, perhaps even one, will usually be preferable.
- Establishment of backtest settings and interpretation of results must be approached with more of an artful spirit, since the ETF universe has expanded so much, both in number and variety of offerings, since 3/31/01, the earliest backtest date we use. Sometimes, clicking on the “Max” link will result in a prolonged period of meaningless results, as would be the case if you screened for leveraged ETFs, which didn’t exist until mid-2006. Other times, a “Max” backtest will be numerically meaningful but analytically challenging as might be the case if, for example, you screened using all equity ETFs (the nature of the universe of equity ETFs was considerably less varied, perhaps even blander, before 2005; when you interpret your results, you’ll have to keep in mind the larger palette from which you’ve been painting, so to speak, in latter years).

All of the differences are important and need to be kept in mind. Ultimately, however, there is one over-arching difference mastery of which will make it easy for you to create effective ETF screens: taxonomy-based rules. Once you get the hang of that, everything else will fall into place and you’ll have a very satisfying ETF screening experience.

Preliminary Review

Everything we do with ETFs involves the Free Form interface. Please make sure you are comfortable with it. If not, you may wish to review Part 2 of this tutorial, focusing on the discussions of interface and functions.

As to numeric rules, these are the same whether for stocks or ETFs and are covered in Part 3.

This Part of the Portfolio123 tutorial will be devoted to taxonomy-based ETF screening. Three topics will be covered: (i) a quick review of the Groupings functions that are used to articulate
ETF taxonomy rules, (ii) explanations of the taxonomy classifications used by Portfolio123 and illustrations of how they can be used to build screens, and (iii) consideration of how taxonomy-based screens can be enhanced by numeric rules or rankings.

**Keeping Informed**

If you are serious about ETFs, it would be a good idea to find and regularly consult information sources that are most likely to provide sound insights. Well established investment media outlets, including the most popular web portals, are not nearly as sound in ETF coverage as their stature and branding might suggest.

Start with the ETF section of SeekingAlpha.com. The good ETF sites, those that really understand where the ETF industry has come, where it is, and where it’s probably going, tend to syndicate their articles on Seeking Alpha. You’ll quickly learn who’s who in ETF coverage and which commentators/sites you’d like to follow.

**ETF Screening: The GROUPINGS Category of Functions**

How annoying is it to go to an ETF screener and find that you can screen on Equities or Fixed Income, but that you can’t distinguish between large- or small-cap equities.

How annoying is it to go to a different ETF screener and find that you can screen on ETFs specializing in small-cap growth stocks, small-cap value stocks, mid-cap growth stocks, etc. But that you can’t screen on value in general, small cap in general, small and mid cap but not large, all kinds of value ETFs, etc.

This should resonate with anyone who has tried to screen for ETFs. Some platforms force you to define your ETF world in very general terms. Others force you to get very, often overly, specific.

Portfolio123 is different. You can be as general as you want. You can be as specific as you want. You can be as generic as you want. You can be as idiosyncratic as you want. Summing up, you can define your ETF world however you want.

This is accomplished using the GROUPINGS collection of ETF functions.

Click on New ETF Screen in the menu running along the top of the page, and once you see the interface, click on Free Form, which, for ETFs, is presently the only choice you have. Then, under Type, click on FUNCTIONS. Under Category, click on GROUPINGS. Here’s what you’ll see.
You’ll notice that our ETF taxonomy includes quite a few classifications, some of which are visible above and others of which could be seen by scrolling down within in the Factor/Function window. Here are the ETF-specific classifications, or groupings:

- **Asset Class**

  Equities, Currencies, Commodities, Fixed Income, Mixed Assets (which have become more popular lately, as some new ETFs try to imitate hedge funds), and Alternative (which had one ETF that folded, but we’re still keeping the category to accommodate the increasing creativity of ETF sponsors)

  (Note: These and the items below are plain English references. Look at the Full Descriptions for the abbreviations you would type into Portfolio123)

- **Country**

  You can choose among individual countries or multi-country.

- **Family**

  iShares, PowerShares, ProShares, Direxion, Rydex, SPDR, Claymore, Vanguard, Wisdom Tree, etc., etc., etc.

- **Method**

  Standard Long (once upon a time, this was the only method in use by ETFs), Standard Short, Leveraged Long, Leveraged Short, Hedged, Quant Model (PowerShares Dynamic XTFs and those that followed), Special Weights (Wisdom Tree, and those that followed)

- **Region**

  ASIA, BRIC-Chindia (Brazil, Russia India and China, or just China and India), Developed, Emerging, Europe, Global (note that many of these ETFs have big stakes in the U.S.), Latin America, Mideast-Africa, North America, Pacific ex Japan
• Sector

We have the usual ones you’d expect for equities: Consumer, Energy, Financial, Healthcare, Housing, Industrials, Materials, Real Estate, Resources (General), Services, Technology, Telecom, Transportation and Utilities.

We also have some you might not expect: Agriculture, Alternative Energy, Infrastructure, Social (for socially conscious ETFs), Special Theme (this where we see a lot of creative ETFs, such some launched by claymore), Precious Metals, Timber and Water.

For fixed income, we have Municipal and Taxable.

We also have General Sector for when you want to eliminate sector-specialist ETFs.

• Size

We have Large-Mega Cap, Mid Cap, and Small-Micro Cap.

You can specify General if you want ETFs that don’t specialize.

• Style

For those who specifically want to exclude specialist ETFs, we have General.

For Equity ETFs, we have Equity Income, Growth, or Value

For fixed Income, we have General Fixed Income, High Yield, Short-term, Intermediate-term or Long-Term

You don’t always have to use these groupings. When you start a new ETF screen, your default universe consists of All ETFs. Use the groupings functions only to the extent you want to limit.

There are two ways to work with groupings, the basic functions or the set functions.

If you want include or exclude just one item from any particular collection, here are some examples:

ETFAssetClass = equity
ETFassetClass != equity
(Note that != means not equal to)
ETFMethod = stanlong

If you want to work with some items from a particular collection, but not necessarily all, use the set functions.

ETFMethodSet(stanshort, levshort)=true
ETFRegionSet(BRIC, Chindia, Pacific)=true
ETFMethodSet(levlong, levshort, stanshort)=false

72
You can mix and match very creatively by using screens containing several groupings functions. For example:

\[
\text{ETFAssetClassSet(} \text{equity, curr)} = \text{true} \\
\quad \text{ETFCountry}! = \text{usa} \\
\quad \text{ETFRegion}! = \text{global}
\]

This will give you a list of non-U.S. ETFs that specialize in equities or currencies.

\[
\text{ETFAssetClassSet(} \text{equity, commod)} = \text{true} \\
\quad \text{ETFSector} = \text{agric}
\]

This will identify agriculture ETFs, whether they focus on agribusiness equities or commodity futures.

\[
\text{ETFCountry} = \text{USA} \\
\quad \text{ETFAssetClass} = \text{equity} \\
\quad \text{ETFMethod} = \text{stanlong} \\
\quad \text{ETFSectorSet(financial, housing, realest)}
\]

Often, you'll you can build many ETF screens using only the GROUPINGS functions in the manner illustrated above. Then, choose only the top ETFs based on your quick-sort or a ranking system included in Portfolio123. According to a Portfolio123 backtest, the last set of functions, if used as a complete screen and the Risk-Reward Aggressive ETF ranking system, would have been a nice way to bottom fish among ETFs that got hammered by the financial crisis. Over a one-year period ending in mid-March of 2010, a portfolio consisting of the top 3 ETFs thusly selected would have risen 95.8%, versus 80.8% for the S&P 500, assuming four-week rebalancing.

Finally, assuming you have some extremely idiosyncratic ways you'd like to define the world of ETFs and that even these functions don't allow you to fine-tune as tightly as you wish. In that case, you could create custom list using tickers you hand select. There will be occasions when this can be useful and we will cover Lists in a later portion of this how-to series.

**Reviewing the GROUPINGS Category Of Functions**

We'll keep it simple for the purpose of reviewing the functions and focus on only one aspect of the taxonomy, Asset Class.

There are two relevant functions, ETFAssetClass, and ETFAssetClassSet. They are the top two choices that appear when you choose FUNCTIONS and GROUPINGS in the Free-From interface.
Note the "Full Desc" link all the way over on the right. As with all functions, it's important to use these. For our present example, Full Desc (which stands for Full Description) will tell us what asset class choices we have. Here is the window that opens when you click on the link.

As emphasized in Part 2 of the tutorial, there is no virtue to trying to memorize the acronyms. Get comfortable using these Full Description windows.

Suppose we want an equity only screen.

To choose one item from within a particular portion of the taxonomy, use the function that follows the ETFXxxx format, in this case, ETFAssetClass (by the way, this is not case sensitive; you could also say eflassetclass).

Here's how your rule would look.

That's it. Now you're ready to move onto other things if you like (region, country, style, etc.).

Suppose you want several items from the taxonomy. You could do something like this:
Notice the numbers on the right. Those appear when I clicked on Totals. Since ETF taxonomy screens do tend to rely more than equity screens on typing, I click on totals after every line. When I see a number – as opposed to an error message – I know there are no typos.

For something simple like this, the use of “or” statements is fine. But if I make too many choices, it can get cumbersome.

If you want to choose more than one item from a taxonomy category, you can switch to the function that follows the ETFXxxxSet format, in this case, ETFAssetClassSet (or if you don’t want to bother capitalizing carefully, etfassetclassset, ETFassetClassset, etc.).

Here’s how this approach would look:

If you don’t want to type true or false, you can use 1 for true or 0 for false.

Speaking of false, suppose you want all asset classes except for fixed income. This can be done in a variety of ways.

Note: Use != to indicate not equal to . . .

Here are other alternatives:

Notice from the last two examples that ETFXxxSet can be used for a single item. If you get confused about the differences between ETFXxx versus ETFXxxSet, you can always use the latter.
That’s the same as . . .

Practice creating a variety of asset class groupings. Once you’ve mastered these two types of GROUPINGS functions, you’re ready for “the good stuff,” the different aspects of the Portfolio123 ETF taxonomy.
The Portfolio123 ETF Taxonomy

Taxonomy screening exists for stocks, but it’s often not that big a deal. Many screens do not include rules governing Industry or sector membership, presence or absence in an index like the S&P 500, etc. The most common taxonomy might be the NOOTC universe, or something like it, as part of a preliminary trading-liquidity-oriented rule.

With ETFs, taxonomy can be vital.

Consider for example, the plight of one who wants to screen for ETFs that invest in U.S. equities and are not specialized in a single sector and are neither leveraged nor short. Some ETF screeners force you to simply accept all stock ETFs or all bond ETFs. That won’t do. Other ETF screeners may force you to say you want large-cap value stocks or with small-cap value stocks or with mid-cap growth stocks, etc., but won’t let you work with just plain stocks or combinations of sub-groupings. That won’t do either.

ETF investors may not talk about taxonomy as glowingly as equity investors talk about their favorite fundamental or technical concepts. But they should never underestimate the importance of a strong taxonomy. In many cases, the inability of a screener to break down a taxonomy the way one wants will render a platform unusable.

The Portfolio123 taxonomy categories are as follows:

- Family
- Asset Class
- Region
- Country
- Method
- Style
- Size
- Sector

We recommend that you use this as a roadmap for building your ETF screens. When you start a new screen, you start out with all ETFs. To narrow down, go through each taxonomy category one at a time and decide what, if anything, you want to do in that area.

"Nothing" is a perfectly acceptable answer. If you are open to all ETF families, then skip the category and move to Asset class, the next one on the list. Just make a habit of pausing, even if only for a few seconds, on each category. You’ll be amazed at how often ideas come to mind that you might otherwise have missed.

Let's now consider all the categories.

Taxonomy Category: Family

As noted, many users will have no inclination to add any filters that address this. But some will. Experienced ETF investors do think in terms of brand differences.

Some investment advisors, for example, may want to confine themselves to iShares and, perhaps, the SPDR family of ETFs, and maybe Vanguard as well. Others may find special appeal in the PowerShares offerings. Traders nowadays, particularly those who engage in market timing,
may be interested in restricting their efforts to ProShares (and, possibly, Rydex and Dimension). Special situations investors might want to zero in on the Claymore product line. Wisdom Tree is a class almost unto itself; some may want to focus entirely on it; others may want to filter it out.

Are any of these ETF brands unfamiliar? If so, that would underscore the importance of going to SeekingAlpha.com and developing a new set of preferences and habits regarding the way to keep up with the world of ETFs. (For now, though, we’ll cover several of them later as we get to aspects of the taxonomy where they make their respective marks).

As with all the other categories, you can ignore this one, you can choose one family, or you can mix and match as you wish.

**Taxonomy Category: Asset Class**

This sounds so easy: stocks or bonds.

That used to be so. Now, however, as the ETF industry has spread its wings, giving us more classes to consider. Here are the ones in the Portfolio123 ETF screener:

- **Alternative**

  This is a catch-all category for ETFs that are not amenable to traditional classifications. As of this writing, the only ETF in this category is one that invests in European carbon emissions credits. More alternative ETFs were on the drawing board before the financial crisis erupted. The extent to which this category will be further developed by ETF sponsors remains to be seen.

- **Commodities**

  These are ETFs that invest in commodity futures contracts. We gave careful consideration as to whether we should combine these with equity ETFs that invest in commodity-producing companies. We decided against it because futures investing really does have a different flavor, mainly in the way contango or backwardation can impact performance separate and apart from (and often in opposition to) commodity price trends. Another factor in our decision to restrict this category to futures-only ETFs is the ease with which users can create a screen that includes commodities and relevant stock sector ETFs if they so wish.

  By the way, do you know what contango and backwardation mean? Be careful about investing in commodity ETFs until you do. There’s plenty of information out there; just Google the phrases.

  For starters, contango refers to a tendency of futures contracts to be priced above “fair value.” At the point of expiration, the contract price and market price must be equal. So when contango is present, there will be gradual downward pressure on the prices of the futures as we get closer to expiration.

  Backwardation is the reverse; a situation where the futures are priced below fair value. Here, there is upward pressure on the futures prices as expiration nears.

  None of this is as simple as it seems. The downward bias of contango and the upward bias of backwardation need to be balanced against ongoing changes in the commodity’s spot price. (Arguably, contango might reflect accurate expectations of a rise in the spot price and backwardation might reflect
expectations of decline.) If this sounds complicated, it is. Those who create investing/indexation protocols for use by ETFs live every day with, and even have nightmares about, issues like these.

For you, however, it might actually be easier. Just view the price trend of a commodity ETF as a phenomenon in and of itself that reflects a blend of spot price, contango/backwardation and expectations all rolled up into one.

You can create rules around the share price trends. It is not necessary that you unravel the factors underneath the trends. Just know that they are there. So if, for example, oil ETFs are failing your technical tests even though oil is rising, don’t assume you’re doing anything wrong. It may be the impact of contango on the futures held by the ETFs. Just accept the ETF price trend for what it is; put aside any preconceptions you might have.

• Currencies

This is a fairly new group of ETFs that have emerged to mimic currency trends via use of direct investment and/or derivatives.

• Equity

This, of course, is the largest and most traditional category of ETFs.

• Fixed Income

Fixed income, huge in the world of open-end mutual funds, was not well represented in the early days of the development of ETFs. Now, ETF offerings here are growing and starting to become more segmented (term structure, municipal versus taxable, etc.).

• Mixed Assets

This is a fairly new asset-class category, but one which seems slated for growth in the years ahead, judging by indications from ETF sponsors. Simply put, these are ETFs that invest in more than one asset class, usually a combination of stocks and bonds. Sometimes, asset decisions are based on an allocation model. In other cases, they reflect the new “target-maturity” trend, which aims to see fixed income grow as the ETF approaches a planned liquidation date.

**Taxonomy Categories: Region and Country**

Generally, these categories are self explanatory.

As you peruse the available Regional choices, you’ll notice the obvious geography-based choices (North America, Europe, etc.). We also include some choices that are thematic: Emerging, Developed, Pacific Ex Japan and BRIC-Chindia. With regard to the latter, BRIC stands for Brazil, Russia, China and India. Chindia refers to just China and India.

When it comes to countries, we list all that are available in the database. Be aware, though, that in many cases, there are no country-specific ETFs. If you want to get a sense of what individual countries are available now, choose a region and then examine the list of ETFs that are included.
Taxonomy Category: Method

A few years ago, there would have been no need for us to address this. Everything would have been in the category we refer to here as Standard Long. Now, however, we have some stark choices and it’s critical that you address this, one way or another, in each ETF screen you create. If you backtest an ETF screen and determine that your results are a mess, check to see what you did in terms of ETFMethod or ETFMethodSet. You’d be amazed at how many problems can be fixed with more attention, TLC perhaps, to this area.

Here are the choices:

- **Hedged**

  These are ETFs that attempt to go long or short, and/or use derivatives, in order to give hedge-fund like performance (at least the ideal). At present, there are only four ETFs in this group. Our decision to articulate this as a separate category reflects the likelihood that such ETFs like these will be introduced in the future.

- **Leveraged Long**

  These are ETFs that use leverage and/or derivatives to try to double the daily moves of their benchmarks. In other words, a leveraged S&P 500 ETF will aim to rise 2% in a day when the S&P 500 rises 1%.

  It won’t always hit the mark precisely. But for the most part, they have come close enough to satisfy investors.

  These can be incredibly useful products, but they are also incredibly controversial and misunderstood. This is one reason why it’s vital that you look for sources of commentary that really understand ETFs, something that is not the case with much of the mainstream financial media.

  It’s especially important for anyone working with these ETFs to recognize that the doubling (or tripling in some cases now) is meant to be operative on a daily basis. If you are aiming at a one-week holding period, the ups and downs of individual days may vary such that the overall five-day performance of the benchmark won’t translate to an overall five-day doubling of that leveraged ETF. Mathematical compounding can produce unexpected results depending on the daily pattern of ups and downs, more so as holding periods stretch out.

  Aggressive users may be tempted to jump right into these leveraged ETFs. We suggest a gradual approach. If you are unfamiliar with these products (mainly Proshares ETFs, but also Rydex and Dimension), take some time to watch them and get accustomed to how the doubling plays out over the holding periods that interest you. And, of course, make sure your personal risk tolerance can cope with a deliberate quest for volatility.

  Another matter that surfaced in a big way late in 2008 was tax efficiency. Some leveraged ETFs, mainly from Rydex but ProShares as well, wound up making massive capital gain distributions, something that is not usually expected in the ETF world. You should familiarize yourself with these issues, which tend to be well covered in the IndexUniverse.com and in the ETF section of SeekingAlpha.com ETF section.

- **Leveraged Short**
These work like the Leveraged Long ETFs but the portfolios go short, directly and/or via use of derivatives.

These became huge headline-grabbers during the recession since they make it so easy for any investor to sell short. From the point of view of the trade, all you’re doing is making a long stock purchase. If, for example, you want to short the S&P 500, you make a long purchase of an ETF that is designed to deliver the inverse of the S&P 500’s performance, or in the case of a leveraged short, double the inverse (i.e. if the S&P 500 drops 1% in a day, these leveraged ETFs are expected to rise 2%, and vice versa).

The ETF buyer need not deal with the usual baggage of short selling (paying dividends, the uptick rule, potentially infinite losses) since these are handled within the ETF portfolio. However, if one is using leveraged short funds, refer to the comments above (regarding Leveraged Long) about daily leverage in general and compounding issues as well as tax efficiency.

- **Quant model**

  This is a fairly new development in the ETF world that was popularized by PowerShares and subsequently followed by others. It involves the use of quantitative models to try to identify stocks with strong prospects for relative performance.

  This approach has induced much in the way of rhetorical gymnastics for attorneys who work for ETF sponsors, since we don’t usually think about passive benchmark-tracking funds seeking to outperform anything. Here’s how they do this: First, a proprietary index is created to be passively tracked by the ETF. That way, the ETF fits smoothly into the usual structure as a passive investment. Second, the unique wrinkle, is how stocks are selected for this index. Instead of relying on decisions by a selection committee to pick what they hope will be a “representative” (whatever that means) sample of the overall U.S. business world, the decisions are made by quantitative models that are designed to outperform the standard indexes like the S&P 500. (These models can be conceptually similar to the ones built by Portfolio123 users for stocks.)

  That’s how outperformance enters the passive world of ETFs. These ETFs are as passive as any when it comes to tracking their nominal benchmarks. The outperformance enters as the index sponsor aims for a “my index is better than your index” situation.

  It’s too early to say how all this will work out. But it does seem to be a briskly growing area within the ETF world. Portfolio123 users can ignore the distinction simply by combining Quant model with Standard Long. But many may find it interesting to look at the quants alone and try to design screens that identify which ones have the hot hand. It can also be a lot of fun to use the backtester to compare the performance of quant ETFs to those of your own Portfolio123 stock models.

- **Special Weights**

  This is a close cousin of Quant Model and is another case where attorneys and marketers, have had to jump through some verbal hoops.
The usual situation, evidenced most notably in the S&P 500, is for an index to include stocks on a market-capitalization weighted basis. This does not necessarily reflect an assumption that bigger-is-better but is instead based on an ivory-tower effort to have the index represent the investment world as it is (or as a former colleague once quipped, “God’s investment portfolio”). If Company X is five percent of the world, than an index that depicts the state of the world should give Company X a five percent weighting.

Enter Wisdom Tree in the mid-2000s, which decided to weight its “index components” (i.e. stocks held in the ETF portfolios) based not on market capitalization but instead on the total dollar amount of dividends paid by the companies.

Clearly, this departs from the academic God’s-portfolio approach. That raises the question of what it is designed to do. One can find some marketing rhetoric suggesting that dividend-weighted indexes are supposed to be better. A particular point made by Wisdom Tree is how market-cap weighted indexes can exaggerate market trends and how dividend weighting can produce more stable results. While they don’t talk overtly of pursuing alpha, they still seem to be quietly nudging their way into the “my index is better than your index” camp.

Accordingly, one might argue that these ETFs ought to be included in the Quant Model category. We strongly considered doing just that. But as models go, these weighting rules seem much more . . . excuse the rhetorical blurring . . . passive. Just as some might suggest dividend weighting is better, others might suggest it’s just different.

Adding to the mix is another group of ETFs (FTSE RAFI, distributed through PowerShares) that seeks to weight indexes/portfolios not simply based on dividends but instead based on fundamentals (a proprietary combination of factors such as revenues, book value, etc.). Robert Arnott, the inventor and primary spokesman for this category, is a prolific writer and speaker. You can find many of his papers through IndexUniverse.com (one of the new breed ETF sites whose content you’ll find on Seeking Alpha).

As of this writing, the Special Weights Method also includes some Rydex equally-weighted ETFs, and some by RevenueShares, that weight on the basis of, as you might guess, revenues.

Because of the nebulous and often subjective relationship between these ETFs on the one hand and PowerShares model-based (“Dynamic”) ETFs on the other hand, and indications that more fundamentally-weighted ETFs may be forthcoming, we decided to establish Special Weights as a separate category. However, Portfolio123 users could, if they wish, build a universe that combines Special Weights with Quant Model.

- **Standard Long**
  
  This is the traditional approach to funds; buy the securities and hold them pending rebalancing.

- **Standard Short**

  This is similar to leveraged long, except that here, ETF daily performance is targeted at the inverse of the benchmark, rather than a doubling of the inverse.
**Taxonomy Categories: Style, Size and Sector**

These include traditional, familiar choices.

Style includes such old standbys as Growth and Value as well, here, as Equity Income. It also includes some choices relevant to fixed income (short term, intermediate term, long term, high yield).

Size includes General (for ETFs that are agnostic regarding the issue of company size), Large-mega cap, Mid cap and Small-micro cap.

Sector includes many familiar choices, but also a few new wrinkles. There’s also a General category. Use it to eliminate the sector specialists.

Those interested in fixed income can choose Taxable Fixed Income or Municipal Fixed Income as sectors.

For equity investors, there’s also a category called Special Theme. Examples of this currently-small but potentially growing group include ETFs designed to invest in companies with big share buyback programs and an ETF designed to hold companies whose shares are being bought by corporate insiders. Social, as a sector, refers to ETFs that invest in companies the sponsor believe are socially conscious.

**Putting The Taxonomy Together In A Screen**

By the time you have gone through all the categories addressing the ones that interest you and ignoring those that don’t, you’ll find that most of your screening work has been accomplished. You may want to add a rule addressed to trading liquidity. Beyond that, you may need one or two at the most to filter based on price trends. Add in a Ranking system or Quick Rank, select the top1-5 ETFs, and you’re done.

This may differ from other ETF screening experiences you’ve had. Elsewhere, ETF screeners tend to be modeled along the lines of stock screeners; light on taxonomy and long on numeric tests (which, in the case of ETFs, would typically be based on mainly on price trends).

You certainly can replicate such screens on Portfolio123 (actually, we probably give you considerably more flexibility regarding technical analysis, price trends, etc.). Try it that way. Often, though, you’ll not be satisfied with your lists because of the presence of the kinds of ETFs you didn’t really want to see.

You don’t have to sacrifice numeric rules. You can have all you want. Ultimately, though, we believe thoughtful decisions regarding taxonomy rules (their inclusion or omission) are what will make the results you get here most relevant to your needs.

Here are some sample taxonomy rule sets (in the next section, we’ll combine them with numbers to wind up with complete models).

**For Financial Planners**
Let's start with a plain vanilla taxonomy screen that might be used by a financial planner that seeks general equity (no sector specialists) and municipal bond ETFs. We’re limiting consideration to US-based funds from the biggest-name families.

The list is big, with 82 ETFs as of this writing. In the next section, we’ll see how to use numeric criteria to trim it. For now, just focus on using taxonomy to narrow the palette.

The above image is provided so you can see what a screen like this looks like in the interface. Below, the tests will be repeated without the interface so you can, if you wish, copy each line into your clipboard and paste into your screener.

```
ETFFamilySet(iShares,SPDR,Vanguard,Rydex)=1
ETFAssetClassSet(Equity,FixInc)=1
ETFCountry=USA
ETFMethod=Stanlong
ETFSectorSet(Munis,Gensect)=1
```

Notice, in the last rule, the importance of mentioning at least two sectors, one for equities and one for fixed income.

Try experimenting with the rule.

First, delete the reference to Munis. Now, no fixed income ETFs are visible because none of them are classified as GenSect, which is an equity item. If you delete GenSect and use Munis only, your screen will show only the fixed income ETFs. The equity ETFs fell away because none satisfy the Municipal Bond sector requirement.

Next, get rid of the last rule altogether. Now, you have sector funds added to the mix, as well as taxable bond funds.

Henceforth, other sample taxonomy screens will be presented as text only, to facilitate copy-and-paste.

**For Aggressive Market Timers**

```
ETFAssetClass=Equity
ETFCountry=USA
```
ETFMethodSet(LevLong, LevShort)

Try it.

Are you surprised at how big the list is? Actually, it's getting bigger all the time as the fund companies add more in this category. (Indeed, as it stands right now, the list would be bigger if we didn't limit it to domestic equities.)

Add these three rows to narrow things down:

ETFSector=GenSect
ETFStyle=GenStyle
ETFSize=LargCap

Now you're down to basic market funds and will focus most heavily on your timing rules. From this point, you'd add some sort of rule to identify up-trends; at any point in time, half the ETFs, the longs or the shorts, will fail the test.

In the alternative, you can use if-then logic (the Portfolio123 Eval function to switch between LevLong and LevShort depending on market conditions.

Here's how that screen might look.

ETFAssetClass=Equity
ETFCountry=USA
ETFSector=GenSect
ETFStyle=GenStyle
ETFSize=LargCap

Eval(sma(50,0,#bench)>sma(200,0,#bench),ETFMethod=LevLong,ETFMethod=LevShort)

The last rule, translated to plain English, tells the screen that if the 50-day moving average of the market benchmark (which defaults to the S&P 500) is above the benchmark's 200-day moving average, then the ETFMethod is LevLong, otherwise, it's LevShort.

For Tech Fans

ETFAssetClass=Equity
ETFSectorSet(technol, telecomm, healthcar)
ETFMethod=stanlong

Does the second rule seem a bit odd? Did you expect something like ETFSector=tech?
First, the database abbreviation for the tech sector is technol, not tech. This is just a reminder: Check those Descriptions constantly!

Notice, too, that I added two other sectors: telecommunications and healthcare. Run the screen and check the results. Refine if you like. But at least start broad and take a look. A lot of stocks tech fans like just happen to be considered telecomm. Many such investors want science-driven emerging growth stories, not just Apple, Research in Motion, etc. Many such situations are to be found in healthcare. Not all of the latter will appeal. That’s why it’s so useful to experiment, look at the results, and refine, not just on the basis of backtesting but also on the kinds of ETFs you want to see. (And don’t be shy about going to the fund web sites and looking at the kinds of stocks they put into their portfolios).

Speaking of emerging situations, many tech fans may prefer those that aim smaller in terms of company size. As it turns out a rule like ETFSzie=SmallCap or even ETFSzieset(MidCap,SmallCap)=1 will have a list containing just one ETF.

But you can help your cause by adding this rule: ETFSize!=LargCap.

**Natural Resources**

Energy, commodities and natural resources, dormant for nearly a generation, have been top of mind for investors since the mid 2000s. Here’s a way to play that area via ETFs.

- ETFA Asset Class Set (Equity, Commod)=1
- ETF Method = stanlong
- ETF Sector Set (agric, altenergy, energy, materials, precious, resource, timber, water)

This is fairly inclusive (adding, as it does, water and materials). You may want to delete those.

Also, experiment with equity-only or commodities-only versions.

By the way, if you really want to have some fun and put your technical analysis skills to work on the rest of the screen, change the second rule to ETFMethod!=stanlong. You’d be amazed at how much choice you have in the leveraged and short areas.

**Deconstructing The Stock Market**

Often, as soon as the word “fund” is uttered, thoughts regarding style immediately rush to mind: growth, value, large-cap, etc. The traditional open-end mutual fund industry has long been sliced and diced this way and it’s only natural for the ETFs to follow suit.

You don’t absolutely have to think along these lines, as you’ve seen from the above examples. But you can do it if you want. Here’s an example:

- ETFA Asset Class = equity
- ETF Country = USA
- ETF Method = StanLong
ETFStyleSet(value, eqincome) = 1

If you’re interested in size-based categorization, you can do something like this:

ETFAssetClass = equity
ETFCountry = USA
ETFMethod = StanLong
ETFSizeSet(midcap, smallcap) = 1

Needless to say, you can combine style- and size-based preferences:

ETFAssetClass = equity
ETFCountry = USA
ETFMethod = StanLong
ETFStyle = growth
ETFSize = largcap

As usual, you need not stick with the StanLong method. More and more short as well as style- and size-based leveraged ETFs are becoming available.

**Deconstructing The Bond Market**

ETFs got off the ground in a big way with stocks. It would be an overstatement to say now that fixed-income ETFs have caught up, but the area is growing and it has already become significant, enough so to allow fixed income strategies and blended strategies (involving equities and fixed income) to be implemented entirely through ETFs. Part of that comes from the number of fixed income ETFs available. Also, on Portfolio123, you can slice and dice this area just as effectively as you can with equities.

Here’s an example:

ETFAssetClass = FixInc
ETFMethod = StanLong
ETFSector = TXFIXINC
ETFStyleSet(INTFIXINC, LTFIXINC)

These rules will produce a list of domestic taxable fixed income ETFs that emphasize intermediate- and long-term maturities. Under style, you could also have opted for short term or high yield (i.e. junk bond). We saw above that under sector, you could also have chosen municipal bonds.
Fixed-income investors should note that all ETF prices used in Portfolio123 are adjusted for dividends paid by the funds. So any percent changes you compute will, actually, reflect total return (price change for the ETF itself plus the impact of income received).

**Traveling Abroad**

This is a rapidly growing area of ETF issuance with many country-specific and regional funds now available and more continuing to be issued. To date, there aren’t yet many non-US fixed income ETFs, but foreign stock funds are plentiful.

You can categorize by country using the ETFCountry or ETFCountrySet functions. Here are some examples:

```
ETFCountry=Mexico
ETFCountrySet(Mexico,Brazil,Chile)=1
```

Some are interested in building models geared toward country rotation. (If that would be the case for the above examples, one would need to think carefully about the list. For example, is the omission of Argentina from the CountrySet rule intentional or inadvertent?)

But many investors who want non-US ETFs don’t have a single country in mind and are instead, thinking in terms of some sort of international theme. In that case, the country-oriented functions are not necessarily the way to go. The above examples, for instance, most likely reflect an interest in Latin America or emerging markets as a whole. So it would be much more efficient to implement the approach using one of these rules:

```
ETFRegionSet(Latin,Emerg,BRIC)
ETFRegion=Latin
ETFRegion=Emerg
ETFRegion=BRIC
```

One thing you need to be aware of is the nature of ETFs categorized as Global. These portfolios really and truly are global, meaning they include U.S. equities. Since the U.S. is the premier world stock market, U.S. stocks can be heavily weighted in the portfolios.

If you want a broad-based international flavor excluding U.S., you might want to try a screen like this:

```
ETFAssetClass=equity
ETFRegionSet(namerica,global)=0 and ETFcountry!=USA
ETFMethod=stanlong
```

By the way, leveraged and short ETFs have lately been issued in increasing number with focus outside the U.S. So don’t forget to make a decision, one way or the other, on how you want to handle Method.
Building A Complete ETF Model

Taxonomy-based screening rules as presented in the preceding section can take you quite far. Indeed, many who approach ETF screening with very specific goals will be able to stop right there and eyeball the lists they've created.

Others who are not tied to specific goals or who would like to try as best they can to refine their choices within the constraints imposed upon them by their goals can add numeric criteria to their taxonomy-based rule sets. There are two ways to do this. One is to simply add one or more additional screening rules. The other is to use rankings.

In all cases, however, the screen should include a liquidity rule. For most investors, it need not be a stringent one, just something that will be sufficient to indicate that you will be able to buy and sell when you need to on terms that are no worse than tolerable.

**Liquidity**

For most who aren’t active traders, something simple like AvgVol(60)>=25000 should suffice. (This means average daily volume over the past 60 days was at least 25,000 shares.)

Needless to say, if you don’t like the 25000 number, you can adjust it.

When you deal with liquidity, there is one important tradeoff you need to keep in mind. The more interested you are in exotic ETFs (hedged, alternate asset classes, and so forth), the more lenient you’ll need to be when it comes to liquidity filtering since many of these ETFs are not heavily traded.

**Numeric Screening Rules**

Additional screening rules can look like the basic performance-based tallies such as you see elsewhere. Here, for example, is what a complete model seeking international ETFs that performed better than most in the past six months might look like.

\[
\text{AvgVol}(60) \geq 25000 \\
\text{ETFAssetClass} = \text{equity} \\
\text{ETFRegionSet(america,global)} = 0 \text{ or ETFcountry!} = \text{usa} \\
\text{ETFMethod} = \text{stanlong} \\
\text{FRank}(\text{"close(0)/close(180)"}, #all, #desc, #previous) \geq 90
\]

The most interesting rule is the last one, which uses the Frank function to compare each ETF to the others. This function is discussed in Part 4 of this series, on page 7.

The last rule evaluates ETFs based on share price performance over approximately six months (180 days). Specifically close(0)/close(180) means the latest closing share price divided by the price 180 days ago. It limits results to ETFs whose percentile scores were at least 90; in other words, the ETFs have to rank in the top 10%.

The other parameters are as follows:
#all, the second parameter, tells the screener to consider the 180-day share price change for all ETFs. You could substitute any of the taxonomy categories if you wish. For example if you say #AssetClass, you’d be comparing equity ETFs only to other Equity ETFs. Check the Full Description of the Frank function for the list of choices.

#desc, the third parameter, tells the screener to do a descending sort; i.e. to assume that higher numbers are better.

#previous, the fourth third parameter, is something we didn’t discuss in Part 4. It can be very useful for ETFs where sorts based on the entire universe can be less meaningful since so many ETF sub-groups are so different from others. With this screen, for example, do you really want to compare the performance of these global ETFs to others that use short or leveraged strategies, to municipal bond funds, etc. By specifying #previous, the screener will work only with those ETFs that pass the screen up through and including the previous rule.

The disadvantage of using Frank is that you can’t be sure of the exact number of ETFs that will pass your screen. As of this writing, the above screen produced 10 ETFs. For stocks, that would be a very manageable number. For ETFs, the list may be too big.

The FOrder function can solve this problem. It is similar to Frank, but looks for a rank order position rather than a percentile score.

Here’s how the last rule of this sample screen might be re-written:

```
FOrder("close(0)/close(180)",#all,#desc,#previous)<=3
```

Now, instead of seeing however many ETFs make the top 10% based on 180-day share price change, we’ll just see the top three.

Actually, the list produced by the above screen could just as easily have been accomplished by adding a rank to a screen (and it would have been simpler to accomplish). It’s only worth it to bother using screening rules if you want more than one relative test, as in the example below.

```
AvgVol(60)>=25000
ETFAssetClass=equity
ETFRegionSet(namerica,global)=0 or ETFcountry!=usa
ETFMethod=stanlong
FRank("close(0)/close(180)",#all,#desc,#previous)>=80
FOrder("close(0)/close(20)",#all,#desc,#previous)<=3
```

Here, we’re looking for international ETFs whose 180-day share price performance ranked in top 20% (the 80th percentile or better). From among the 19 ETFs that pass, we select only the top three based on twenty-day performance.

This is all well and good, and as of this writing, all variations outperformed the S&P 500 in one-year backtests (assuming four-week rebalancing).
Actually, though, you can do a lot more. All the power contained in the Portfolio123 price/volume, technical, and mathematical functions are available for use in ETF screening. Consider, therefore, the following variation on the above example:

\[
\begin{align*}
\text{AvgVol}(60) & \geq 25000 \\
\text{ETFAssetClass} & = \text{equity} \\
\text{ETFRegionSet(namerica,global)} & = 0 \text{ or ETFcountry!}=\text{usa} \\
\text{ETFMethod} & = \text{stanlong} \\
\text{CrossOver}\left(\text{sma},10,5,20\right) \\
\text{FOrder}\left(\text{"close}(0)/\text{close}(90)\",\text{#all},\text{#desc},\#\text{previous}\right) & \leq 3
\end{align*}
\]

The next to last rule seeks ETFs for which the 5-day simple moving average crossed above the 20-day average at some point within the last 10 days.

**Ranking**

Notice that the last rule in each of the above samples is designed solely to get the final list down to a reasonable number of ETFs.

If you have only one sort criterion in mind, there’s an easier way to accomplish this result. You don’t use a Quick Rank.

You could, therefore, do something like this to produce a screen that, as of this writing, showed 19 passing ETFs.

\[
\begin{align*}
\text{AvgVol}(60) & \geq 25000 \\
\text{ETFAssetClass} & = \text{equity} \\
\text{ETFRegionSet(namerica,global)} & = 0 \text{ or ETFcountry!}=\text{usa} \\
\text{ETFMethod} & = \text{stanlong} \\
\text{FRank}\left(\text{"close}(0)/\text{close}(180)\",\text{#all},\text{#desc},\#\text{previous}\right) & \geq 80
\end{align*}
\]

Then, you could go into Settings and use 20-day share price change to narrow down to three ETFs.

If you’d like a more complex sort criterion, you could use a full-blown ranking system in lieu of a Quick Rank.
Below, the 19 passing stocks are sorted, and the top three selected, based upon the pre-defined ranking system known as “ETF Rotation – Basic.”

This ranking system is calculated on the basis of three factors:

- The five-day change in the share price (factor weighting: 70%)
- The 120-day change in the share price (factor weighting: 15%)
- The Share Ratio computed over the course of one year (factor weighting: 15%)

Since Ranking Systems and Quick Ranks allow you to precisely control the number of ETFs that will pass your model, many will find it effective to screen using only liquidity- and taxonomy-based rules and then go directly into ranking to finalize the lists.

**Summary**

ETF screening on Portfolio123 becomes easy and powerful if you approach it using a roadmap.

**Step 1:**
Create a liquidity rule

**Step 2:**
Create a set of taxonomy rules considering each of the following categories:

- Family
- Asset Class
- Region
- Country
- Method
- Style
- Size
- Sector

You don’t actually have to use them all, but it would help if you at least get into the habit of considering each and making a conscious screen-by-screen decision to use or ignore each category.

**Step 3 (Optional):**
Create one or more numeric (e.g. price performance, technical analysis, etc.) rules.

**Step 4 (Optional but highly recommended):**
Narrow down to what for you is a reasonable number of ETFs by using a Ranking System or a Quick Rank factor or formula

Step 5:

Backtest. It's very rare to find this capability among ETF screeners. Since you have it, why not use it!
Chapter 6 My 123

This portion of the tutorial series will cover key ancillary features of Portfolio123 that can be accessed by clicking on the My123 link in the menu running across the top of the page. In addition to managing various aspects of your account, this section offers the following functionality:

Lists
Here, you can identify a group of stocks or ETFs by ticker. These lists can be inclusionary (i.e. use a screening rule limiting consideration only to stocks on the list) or they can be exclusionary (i.e. a rule barring listed tickers from the screen).

Universes
When you start screening, your universe is All Stocks or All ETFs. We give you a variety of additional pre-defined universes (such as S&P 500 stocks). You can also go into the My123 and create other kinds of universe that may be more to your liking.

Reports
This determines what information you see for each stock after you run your screen. If you ignore this altogether, you will get the P123 Default Report, which, as you probably have already noticed, lists Market Cap, 4-week % price change, EPS % Change for the latest quarter and trailing 12 month period, three variations of P/E, and Dividend Yield. The “Run” section of the screening application itself gives you some additional pre-defined alternatives. Beyond that, the My123 section gives you considerable leeway to create your own report.

Ticker Links
The My123 Ticker Link feature allows you to dramatically enhance the range of information you can see, as well as the sources of information, when you look for more information on a particular ticker.

Custom Formulas
Are you interested in Enterprise Value? It’s not included among the many items we get from our data provider Thomson Reuters. However, Portfolio123 does include the items needed to create an Enterprise Value formula which, ultimately, looks like this: MktCap+ DbtTotQ-(CashPSQ*ShsOutMR); in plain English, that’s market cap + debt minus cash per share multiplied by the number of shares. You can certainly use that formula exactly as is. But as you do so, over and over and over again, you may find it inconvenient to re-type it every time. You don’t have to. You can store MktCap+ DbtTotQ-(CashPSQ*ShsOutMR) as a custom formula called, for example, $EV (all custom formulas begin with $) and simply use that. As you continue to use Portfolio123, you’ll see that this is a tremendous benefit, especially if you like to create interesting Reports.

The following sections will explore each of these features.
Lists

Usually, when we screen, we specify certain quantitative rules, accept whatever stocks pass muster, and reject those that don't. Assuming we designed our screen well – i.e. the rules accurately target the kinds of stocks we’re looking for – we should be agnostic about specific stocks. We accept those that pass, we ignore those that don’t, case closed.

Sometimes, though, we’re not willing to take such a stance. Regardless of the rules we use, there may be some stocks we do not want to consider, or others that we do want to work with. Situations like this can be handled with user-created lists.

A list is simply a group of tickers you specify, whether one or two, in the dozens or in the hundreds.

The benefit of using lists is that they are easy to create and are amenable to any sort of mix-and-match you can imagine.

The downside lies in the area of survivorship bias. In other words, the collection of tickers you specify is static. If, for example, you want to screen against a list based on the buy recommendations of XYZ Brokerage firm, bear in mind you'll be working with the current buy list only. If you wanted to test year-ago results, the purest way to do that would be to create a second list based on the year-ago buy list, assuming you can get it. If you stick only with the basic list, your year-ago screen will be run against today's list.

Survivorship bias isn't necessarily the end of the world, as long as you understand its presence and implications. Backtests will not really be time-machine type exercises. Instead, they will produce hypothetical pro forma insights. Whether this can work for you depends on whether the list is likely to be very fluid over time. A brokerage-firm buy list probably would be troublesome in the context of a backtest. It would be less troublesome if it's something that could conceivably be more, albeit imperfectly, stable, such as a brokerage firm coverage list.

An Example

I'll illustrate with a real-life list I created called "SmallCap_Specials."

If I just want to focus on small caps, I could use the pre-set Portfolio123 Small Cap universe, or I could establish a screening rule or custom universe using market capitalization requirement.

But that's not what I'm looking for here. I want a list of attractive small caps. I don't require that all of them be here-and-now buys; I'll use my Portfolio123 models to help me make those decisions. But I do want to start with a well established, pre-vetted collection of pretty good companies that have merit even if their shares aren't indisputable immediate Buys. To accomplish that, I decided to use the 434 stocks in the coverage universe of a former colleague who presently runs his own, very successful, small-cap research firm.

The coverage universe has not been perfectly stable over the years. Successful stocks outgrow the small-cap category and new ones come in. So I do have to take backtest results with a grain of salt. Nevertheless my respect for the firm's vetting methods makes me willing to do some work with its coverage universe even if I do have to rely less than usual on backtesting.

To create this list in Portfolio123, start on the home page and look for the "My P123" link. After you do this, you'll see "Lists" among the choices that appear in the body the page.

Click on "Lists." After you do that, you'll see an interface that allows you to create a new List. (After you've done this once, you'll also see your existing lists along with links that allow you delete or edit them.)

Figure 1
I type the name of my list, "SmallCap_Specials," into the "Name" area. And I put the tickers into the large box below the name area.

Figure 2

Don't panic... I did not type all those tickers!

If it's a small list, you could simply type the tickers in one at a time, with different tickers separated by commas, spaces or new lines. But I'm working with 434 tickers, too many to type manually.

That's no problem. If I can get the tickers into my Windows clipboard, something that can almost always be done (by copying from a spreadsheet, a text file, a word processing file, or sometimes even by running as mouse over tickers shown in a web site), I can simply put my cursor into the box and paste. That's what I did with my 434 SmallCap_Specials. After doing that, I click on "Save."

That's it. We're done.

Notice that the top of custom-list interface provided instructions for getting your list into a Portfolio123 screen. Figure 4 shows what the screening interface looks like after I follow that procedure.

Figure 4

Now, I can simply continue to build my screen.
I know that all 38 stocks (or less if I narrow further with a Ranking System or Quick Rank) will have passed muster under the vetting principles applied at my friend’s firm.

The Flip Side

Use of lists is actually a two-way street.

The list doesn’t have to identify stocks you like. You can also create one for stocks you hate.

Let’s suppose I’ve had it up to here with iPhone, Blackberry, Google and all the popular tech names. I’m tired of them. I hate them. I don’t want to see them and I don’t care how great they may look in terms of the data.

I can create a FedUpWithBigNames list as follows:

**Figure 5**

Now, watch how I make darn sure none of those names will get into my screen no matter how wonderful their numbers might be.

**Figure 6**

The InList("FedUpWithBigNames")=false rule did the trick. Notice, from the running totals along the right, how those 10 stocks were knocked out even before we got down to serious screening.
Universes

If you haven’t yet read through the preceding section on Lists, I recommend that you do so now. A universe is very similar to a list; some might even say it’s a better and more useful version of a List.

1. Unlike a list, a universe is created using rules (the same sort we use to create screens. Here, we aren’t focused on specific tickers but are instead looking to base inclusion/exclusion decisions on rules.

2. Unlike a ticker-specific list, a rules-based universe will change over time. That means you can feel comfortable backtesting. Survivorship bias is not an issue.

To access the Universe section of the site, click on "MyP123" in the upper menu and choose "Stock Universes" from among the items on the list that will then appear in the body of the page. After doing that, click on "New" which you’ll find on the menu that will appear on the left side of the page. That will bring you to the Stock Universe interface.

Figure 7

This should be very familiar; it looks a lot like the screening interface.

That should come as no surprise since, as noted above, a Universe is a starting list created programmatically using rules, rather than typing or pasting user-selected tickers. That's the same task screening performs; use of rules to create a list of stocks. The difference between a screen and a universe is a matter of how you use the resulting list.

The default "All Stocks" universe seems impressive, numbering more than 8,000 stocks. But practically speaking, many of these are penny stocks. Most Portfolio123 users prefer to eliminate these from their models. There are many ways to do this. Figure 8 illustrates one way you might create a custom universe to generate such a list, which you can later apply to many, or all, of the screens you create.

Figure 8

There are three universe-creation rules here:

1. No OTC Stocks
2. Market Cap greater than or equal to $250 million
3. Share price greater than or equal to $5

I saved this universe under the name Basic.

Figure 9 shows another example, this one adding a sector-industry mix-and-match.
Here, I used the above-mentioned basic rules but added additional criteria excluding stocks in the Finance sector, excluding stocks in the Real Estate Operations and Miscellaneous Financial Services industries, and confining the list to those tickers that are tradable in the low-price “window” setup in the online brokerage firm FOLIOfn.com. I named this universe Enhanced Basic.

Both of these universes could just as easily have been created in the screener. And in the custom universe interface, I could add additional rules relating to growth, value, and so forth that are normally used in screening.

So how should one decide when to use which interface.

One consideration is convenience.

If the collection of rules you have in mind is one you believe you'll want to use over and over again, in screens or in ranking systems, use the universe functionality.

Figures 10 and 11 show how you can combine a universe with a one-off screen.

We start with a simple growth screen. I'll open the Setting area to make it visible; you'll see why shortly.
Do you see the difference?
The screen in Figure 10 started with the default All Stocks universe consisting of 8,198 stocks and wound up with 401 passing stocks.
The screen in Figure 11 started with the custom Enhanced Basic universe consisting of 2,358 stocks and wound up with 121 passing stocks.
Use of a custom universe made the second screen much easier to create. We needed only the four growth rules. We were able to dispense with the need to individually articulate the seven other universe-creation rules. Better still, the universe is also available for use with other screens.
There is another substantive difference.
Figure 12 depicts a growth screen designed to identify companies for which various growth rates have ranked in the upper half.

**Figure 12**

Notice that the first screening rule matches the Basic universe demonstrated above in Figure 8. As a matter of convenience, I’ll eliminate that rule and select Basic as my Universe.

**Figure 13**

Notice that the number of passing stocks is different!
Why is that? The three-part rule I eliminated at the top is identical with the three criteria used to create the Basic universe. Hence the results ought to match. Often, it will turn out that way.

Here, however, identification of universe has a substantive impact on the screen itself. All three growth rules seek companies ranked in the upper half. Actually, though, that is an incomplete explanation. We should ask: upper half compared to what.

The #All parameters tell us to compare each company’s growth rates to those of all others in the universe. Some companies may rank above 50 when their growth rates are compared to those of all others in the All Stocks universe, but fail when compared against the more restrictive Enhanced Basic universe.

Note, from Figure 12, that my use of Universe(NOOTC) as a screening rule did not count when it came to identifying the universe to be used when evaluating the FRank function. The latter looks only to the universe specified in the settings.

Pre-Defined Universes

Portfolio123 has pre-defined some universes. Those that may be of greatest interest, those based mainly on common stock market benchmarks, can be seen and accessed via the dropdown menu contained in the Settings area.

There is also the Universe function that can be specified as a screening rule. We already saw that a bit in Figure 12 with Universe(NOOTC). A universe specified this way will not be used to evaluate FRank and similar functions. Nevertheless you can use the rule to screen in useful ways.

The function can be seen through FUNCTIONS >> GROUPINGS >> Universe.

Figure 14

Be sure to click on the Full Desc link. For information on other more specialized choices.

Figure 15
Any pre-defined universe, whether or not included in the Settings drop-down menu, can be accessed by the Universe function within the screener. So you can, for example, confine yourself to American Depositary Receipts, by using the following universe-identification rule:

Universe($ADR)

ETF Universes

You can also use an automated interface to create ETF Universes.

This, essentially, is the same functionality as what you can get from the taxonomy based rules described in Part 5. You have the option, here, to click checkboxes in lieu of using functions like ETFMethod, ETFSectorSet, and so forth.

When you start, the interface looks like this:

**Figure 16**

To limit your universe to equities and fixed income, click on the Add button on the Asset Class row. Then, make your choices using the pop-up menu.
Notice, after you click on Update, how the universe has been re-defined from 731 ETFs to 658.

Here it is after a couple more sets of choices:

Suppose, now, I want to eliminate Municipal Fixed Income. That’s part of the Sector taxonomy. I could click to open that menu, but if I went that route, I’d have to check every sector except that one. That’s a lot of sectors to check. It might be a lot more convenient to simply use a screening rule: ETFSector!=MUNIS.
Hence you can mix and match between use of the interface and use of rules.

The only time it would make a difference is if you want to use FRank or a similar function and have it compute with reference to the universe. If that’s the case, you would need to do everything in the interface; universes saved that way are accessed via the drop-down menu in the Settings area. But that may not come up too often. ETF investors are more likely to prefer to rank relative to something like Asset Class instead of Universe.
Reports

Often Portfolio123 users don't focus on specific attributes of the individual companies and stocks that move into and out of their models. Performance characteristics of the overall model often suffice. But there are times when you will want to know more about the companies, and on those occasions the Portfolio123 screener reports give you a lot of valuable information.

The basic report

Figure 20 shows a simple screen I built to find stocks with reasonable PEG ratios and promising technical characteristics.

Figure 20

Figure 21 depicts what I see when I retrieve the results by clicking on "Run."

Figure 21

These are some good basics: latest price, market cap, rank (based on the system I chose), four-week share price performance, two measures of EPS growth, three versions of P/E, and yield. If you click on a column heading, the report will be sorted, in descending order, on the basis of that data item. Click again on the same heading and the sort will shift to ascending. Click again and the report will be re-sorted on a descending basis, and so on and so forth.

That's a good starting point and it appears as long as the "Report" drop-down menu has not been altered from its default status.

Change of pace

Suppose we are wondering about different aspects of the list. Being a PEG screen, growth is certainly a topic that could be top of mind. Let's change the report to give us more information along those lines.

Look just above the table that shows the default report.

Figure 22
Notice that you have an opportunity to select a different pre-defined Report. You can use the horizontal menu (click arrow keys on either side of the interface to scroll in that direction) or the drop-down menu.

Here’s what I see if I choose Quality.

**Figure 23**

I now get a completely different set of perspectives on the companies that pass the screen. Notice, too, that there’s a download link (just above the sixth column) that allows us to get the results in Excel format.

**Figure 24**

Notice that I activated the freeze-pane feature of Excel. This can make for much better usability, compared to an HTML web page, when working with many columns or rows.

**Custom reports**

We can also create our own reports.

Go into My123. Click on Reports and then on New.

**Figure 25**
Enter a name and click on Create.

Figure 26

This should look familiar; it bears a close resemblance to the free-form screener interface. Does that lead you to believe you’re getting an opportunity to select the same kinds of data items you used to build rules, perhaps to use them in custom reports? If you do get that impression, you’re on target. That’s exactly what’s happening here. When I select an item, it will appear in the box on the right, which collects those items that will appear in my report. Notice the buttons that allow me to move items up and down the list so I can get the sequence just the way I want it.

Here are the items I select.

Figure 27

Notice the last item, $StopLoss. This involves peeking ahead to the section on Custom Formulas. You can see from the description in the left portion of the interface that it’s based on:
This means closing price offset back by zero bars (in other words, the last close) divided by the high achieved in the past 10 bars (trading days). Figure 28 shows the report sorted, on an ascending basis, based on $StopLoss.

**Figure 28**

The stop loss concept here is for informational purposes only; it’s not an automatic sell trigger. Nevertheless a report like this, which spotlights stocks that would have been or are close to being stopped out can be very valuable. The other information can also be interesting. Look, for example, at Kodak, the stock most likely to be triggering stop-loss selling. We see from the reports that there’s already a lot of short interest and that analysts are pretty bearish. Note, though, that the current-year earnings estimate came up in the past four weeks. Is the bearishness overdone? Maybe. Remember, to make the screen, Kodak had to pass some technical tests based on exponential moving average. These are the kinds of supplemental food for thought that can be inspired by an interesting Report.

**Ticker Links**

Notice what happens I move my cursor near a ticker that I see in a report. A little window pops up.

**Figure 29**

The first three items are undoubtedly things you’ve already seen. They are present in Portfolio123 by default and will open for you a new browser window containing, respectively, data panels for the stock in question, a Portfolio123 stock profile, or the company’s web site.

The next three items are there because I went into the Ticker Link feature and set them up.

- **MSFnd** opens a browser window that shows me mutual fund ownership data as reported on the MoneyCentral.msn web site:

**Figure 30**
• **KeyDev** opens a different window on MoneyCentral.msn, one that shows me its report of a company’s “Key Developments” (a more selective news feed omits trivia and limits itself to stories that have been vetted for importance):

  **Figure 31**

  **Nucor Corp: Key Developments**

  - View: All Developments
  - Nucor Corporation Comments on Q2 2010 Guidance Conference Call

    *Nucor Corporation announced that for the second quarter of 2010, it expects improvement over that quarter of 2009 results. According to Reuters Estimates, analysts were expecting the Company to report revenues of $4.29 billion and EPS of $0.36 for the second quarter of 2010.*

    *Nucor Corporation Issues Q1 2010 EPS Guidance Below Analysts’ Estimates

    *Nucor Corporation announced that for the first quarter of 2010, it expects earnings to be in the range of $0.85 to $0.95 per diluted share (EPS). According to Reuters Estimates, analysts were expecting the Company to report EPS of $0.94 for the first quarter of 2010.*

    *Nucor Corporation To Form Joint Venture With Mitsui

    *Nucor Corporation announced that it has entered into an agreement with Mitsui & Co. (U.S.A), Inc. (Mitsui), a wholly-owned subsidiary of Mitsui & Co., Ltd., whereas will enable Mitsui to experience the benefits of Nucor’s technology in various steel and related activities, both in North America and globally. Concurrent with the Formation of Nucor will be the formation of Steel Technologies LLC, which will own all of the assets, operations and business currently held by Mitsui Steel.*

• **Talk** opens a window that takes me to a “fun” part of Yahoo! Finance, the message board for the company in question:

  **Figure 32**

These aren’t the only ticker links I created. They are just the three that I have activated (turned on) at the moment. Here is my full ticker-link collection:

**Figure 33**
Does anything here interest you? If so, feel free to copy it/them. All have been set for Public visibility.

Is there anything you’d prefer to see but don’t. That’s no problem. Create your own ticker link. Perhaps you have an interesting technical analysis. Here, for example, is a something I created on BigCharts.com using Bollinger Bands, the Ultimate Oscillator and MACD. I stored those settings in BigCharts so I’ll see them every time as a default view I go back there and input a ticker.

Here’s how I can turn it into a Portfolio123 Ticker Link.

I start by selecting Ticker Link from the My123 menu and then clicking on New.

**Figure 34**

The only mandatory fields are the first three.

- The first item, limited to 5 characters, is the name I’ll see in the window that appears when I’m in a report and move my mouse close to a ticker. You already saw MSFund, KeyDev and Talk. I’ll call this one BgCh, which stands for BigCharts.

**Figure 35**

- The second item is a plain English title.
The third item is the trickiest. It's the URL you want to see when you click on the link. To set the URL, I go to Big.Charts.com, retrieve a chart for NUE, set it up the way I want, and click on the button that saves my settings in BigCharts (those of you who use BigCharts should be quite familiar with this process).

Then, I go up to the address bar of the browser, copy the url, and paste it in as the third item in the Portfolio123 Ticker Link interface.

http://bigcharts.marketwatch.com/advchart/frames/frames.asp? symb=nue&time=8&freq=1

But there's a problem. Note the presence of nue in the url. That's the ticker I inputted. Every time this link is activated, we'll get the BigCharts price chart for NUE.

To get it to work for whatever ticker we click on in our Portfolio123 report, substitute TICKER for nue.

http://bigcharts.marketwatch.com/advchart/frames/frames.asp? symb=TICKER&time=8&freq=1

Don't worry about BigCharts knowing what to show you. A script in Portfolio123 will take whatever ticker you clicked on and swap it into the url in place of TICKER before actually retrieving the page.

Whether it's a BigCharts price chart, something on Yahoo Finance! or anything else, as long as you modify the destination url by substituting the word TICKER for the specific ticker, you'll get to the right place very time.

Here's what the completed Ticker Link looks like in the Portfolio123 interface.

Figure 36

For the most part, the optional inputs are self evident. But one requires explanation: the Hover URL.

A Hover URL, if used, tells you what you'll see if you move your mouse over the Ticker Link without clicking. Here's an example for NUE.

Figure 37
Sometimes, this alone will serve your needs. You may just want to look at the chart without necessarily having to go to a separate browser window containing the BigCharts page.

To get the hover URL, I start out on BigCharts with my NUE price chart visible. Next, right click from someplace within the chart. On the menu that appears, click on Copy Image Location.

Figure 38

The following url will be placed into the clipboard.


Go to the Portfolio123 Ticker Link interface and put your cursor into the Hover URL area and click paste.

Figure 39

Hunt around for the ticker of the stock you used. These hover URLs are likely to be long and complex so put your cursor into the box and move slowly and patiently until you find it.

Figure 40
When you do find it, substitute the word TICKER.

**Figure 41**

That all. Now you can save. If you want, you can go back and adjust the size dimensions of the hover url from the default values, 512 pixels by 288 pixels.

That’s all there is to it. Give it a try. Once you do one of them, you’ll see it’s really quite easy.

**Custom Formulas**

Strictly speaking, you don’t really need to use this custom formulas. But as ideas flow, you may come to see this capability as a great convenience, a faster and easier way to accomplish that which you already know how to do.

**A sample idea**

Suppose we want to create a screening rule that measures EPS acceleration. We want to favor companies whose recent, say prior year quarter (PYQ), EPS growth rates are much greater than their trailing 12 month (TTM) EPS growth rates.

The easiest way to accomplish this would be to create a screening rule based on:

\[
\frac{\text{EPS%ChgPYQ}}{\text{EPS%ChgTTM}}
\]

Actually, that could produce undesirable results. Suppose TTM EPS declined three percent while the PYQ growth rate was plus 12 percent. That’s a big improvement, so we expect to see a positive number. But if we divide 12 by minus three we get minus four, a large negative number.

We can fix this by using the following formula to compute a modified growth rate:

\[
\frac{x_1 - x_0}{|x_0|}
\]

"Abs" stands for absolute value, which means for \(x_0\), we look at the number only, acting as if it’s positive (whether or not it really is). Applying this to our screening rule, we would use:

\[
\frac{(\text{EPS%ChgPYQ} - \text{EPS%ChgTTM})}{|\text{EPS%ChgTTM}|}
\]

Now, an improvement from minus three to plus 12 calculates as:

\[
\frac{12 - (-3)}{3} = +5
\]

That’s more like it.

**Applying the idea to a screen**

We could create a screening rule that does this:

\[
\frac{(\text{EPS%ChgPYQ} - \text{EPS%ChgTTM})}{|\text{EPS%ChgTTM}|} \geq 1
\]

But it’s a less-then-great solution in two respects.

First, as easy as it seems to create the rule through typing and/or clicking, if we find ourselves doing things like this or working with even more complex expressions often enough, the whole process can get very cumbersome very quickly and the more cumbersome it gets, the more exposed we are to typographic error and the more discouraged we get.

Second, if we want to study our results using Portfolio123 reports, we’ll find we can look separately at \(\text{EPS%ChgPYQ}\) and \(\text{EPS%ChgTTM}\), but that we can’t see the overall acceleration values: There is no such data point as \((\text{EPS%ChgPYQ}-\text{EPS %ChgTTM})/|\text{EPS%ChgTTM}|\), so we can’t get the item into a report.
We can solve both of these problems by using Custom Formulas. We'll create the formula the hard way just once. Then we'll save it under a new name. Any time we need it in the future, we simply retrieve it. And the name we give to that formula will represent a new data point that can be used in a Portfolio123 report.

Creating a Custom Formula

Start by clicking into My P123 and then into the Custom formula area. Click on New to open the Custom Formula interface.

Figure 42

![Custom Formula Interface]

To create a custom formula . . .

1. Type in a name for your new item. Note that in Portfolio123, all custom formulas are signified by the $ prefix at the head of the name. You don’t need to type $; Portfolio123 will add it for you.

2. Create the formula exactly as you would in the screener by typing and/or pointing-and-clicking using the different TYPES, CATEGORY, and FACTOR/FUNCTION items. The only difference here is that you usually create the factor/function only. Be careful about going further and articulating and equalities, greater than relationships, less than relationships, and so forth.

This is a correctly articulated custom formula:

\[(\text{EPS}\%\text{ChgPYQ} - \text{EPS}\%\text{ChgTTM}) / \text{Abs}(\text{EPS}\%\text{ChgTTM})\]

Now, consider this:

\[(\text{EPS}\%\text{ChgPYQ} - \text{EPS}\%\text{ChgTTM}) / \text{Abs}(\text{EPS}\%\text{ChgTTM}) \geq 1\]

This may not be correct since it goes further and requires the factor to be greater than or equal to 1. But you won’t get an error message. If you save it this way, Portfolio123 will evaluate it as a true/false statement, and return 1 if it's true or 0 if it's false. Sometimes, that may be OK (or even preferable) for your purposes. Often it won’t be. Either way, make sure you’re aware of this issue.

3. Type in a description if you wish.

4. Click "Save" when you are finished.

Figure 43 shows what the interface looks like when you've completed your work.
Using the custom formula

Figure 44 shows an EPS Acceleration screen created to illustrate use of the custom formula. I eliminate extreme situations (cases where either the PYQ or TTM growth rate is below minus 30 percent or above plus 30 percent). Then, I require that for remaining companies, the EPS Acceleration factor, as defined in my custom formula, be equal to or above 1.00 (practically speaking, that means the PYQ growth rate should be at least double (100 percent greater than) the TTM growth rate.
Notice the way I got to the custom formula. In the screening interface, under TYPE, I click on CUSTOM FORMULAS, and then under CATEGORY, I click on MY FORMULAS.

Figure 45 shows a simple report I created for use with this screen. The columns are EPS %ChgPYQ, EPS%ChgTTM, and the custom formula named $EPSAccelTTM2PYQ. The report is sorted (in descending order) based on the custom formula.
Figure 45

Brainstorming

Notice again the last column of the Report depicted in Figure 45. It shows the custom formula, \( \text{EPSAccelTTM2PYQ} \). There’s no way I could have created that column, and used it as a basis for sorting, in Portfolio123. I’d have had to download to Excel and create a new formula in a new column within the spreadsheet. On a one-off basis, that’s not a big deal. But over time, it can become burdensome. Use of Custom Formulas in this manner is a much easier way to handle it.

This capability can get quite interesting if we let our imaginations run. Consider some of the technical-analysis relationships we can create and evaluate in this manner using custom formulas.

- **EMA(50)-EMA(200)**
  The excess of the fifty day exponential moving average over the 200 day exponential moving average

- **(EMA(50)-EMA(200)) - (EMA(50,20)-EMA(200,20))**
  The excess of the fifty day moving average over the 200 day moving average now versus where it was twenty trading days ago.

- **GapUp(5,100,20,0)**
  A true/false test that tells us whether or not the stock had a gap up of at least five percent with a 100 percent volume increase relative to the average of the last twenty days

- **MACDD(12,26,9)**
  The difference between the MACD (based on a 12 day exponential moving average minus a 26 day exponential moving average) and the MACD's nine-period exponential moving average

- **Etc. etc. etc.**

It’s not possible to quickly scan or sort 10, 20, 50 or 100 price charts. But those interested in technical analysis can quickly scan and sort 10, 20, 50 or 100 numeric indicators. Reports like this can help us set priorities in deciding which charts we want to study up close.

A good library of Custom Formulas can do quite a lot to enhance your experience with Portfolio123.

**Chapter 7 Researching Companies**
Your Portfolio123 models expose you to a lot of companies. And chances are, you will not have heard of many of these firms, or even if you have, you may not be up to speed on where they stand now.

That is usually a good thing. It's hard to make money always looking at the same stocks everyone else in the world is looking at. The corporate strangers are the ones that most warrant attention.

Portfolio123 offers two ways for you to get acquainted with the unfamiliar firms or up to date with firm's you’ve heard of.

**Data Panels**

You've probably seen company-specific data reports on the web; tables or charts showing annual and/or quarterly financial results, ratios such as growth rates or balance sheet metrics, valuation ratios, and so forth.

We have pretty much everything you’ve seen before at Portfolio123. Actually, we believe we have more. (Are you curious about how a PEG ratio might look if long-term growth expectations are too high and need to be slashed? We can show you that. Are you curious about how much better or worse the 50- versus 200-day moving average relationship is for the company you’re looking at compared to industry peers? We can show you that.)

Beyond the unique bits of information which you’ll undoubtedly discover by browsing, we offer something that's definitely unique, at least as of this writing: customization. You can choose which presentations you’d like to see and you can organize them any way like.

**Rankings**

The data panels present a good news-bad news scenario:

> The good news is that they give you a lot of great information which you can evaluate and interpret.

> The bad news, in some cases, is that you are the one who has to evaluate and interpret the information.

For some users, it may be a matter of not understanding the information in the panels. That, actually, is not a very serious problem. The panels contain descriptions, and more important, there were plenty of detailed descriptions covering the items you used to build your models, especially in the Rules Wizard. And if you need more, there are plenty of inexpensive books that can help.

A bigger problem may be time. You may know the kinds of financial data profiles most likely to inspire you to favor, or sell, a particular stock. But you may, simply, not have the time to piece it all together for every stock you consider, especially as the number of candidates grows.

Either way, the Rankings can be a tremendous help to you. This aspect has nothing to do with which ranking system if any, you use to narrow the results of a screen. This involves going directly to the Ranks interface, inputting one ticker, or two, or a whole bunch you pasted from a spreadsheet, or looking at a whole industry, sector or universe, and seeing at a glance, how “good” (or not good) a company is under whatever criteria interest you. In fact, everything you get in the Ranks interface is downloadable into Excel: besides being more convenient than large HTML displays, this, coupled with some Excel sorting, can even let you hunt for ideas without ever going near the screener!
Data Panels

When you look up a stock, you can choose one of the Ticker Links you created (see Part 6) or one of three permanently available presentations:

**Figure 1**

The first icon will open your data panels. That's the topic of this section. The second will open a pre-defined Portfolio123 snapshot. The third will open a browser window with the company’s web site (these can be a treasure trove of information).

Here’s what I see when I open my data panels:

**Figure 2**

This is a background page I created. The other tabs represent additional pages I set up. Here’s another sample.

**Figure 3**

At the end of this section, I’ll share with you what I put into each tab. The main point here, is to demonstrate how to set up such a presentation.

Here’s what you’ll see if you have not customized your panels.
Start by going to the upper right portion of the presentation and clicking on Manage pages/panels. This is where you'll wind up.

Most will want to Ignore the starting point: Existing panels (11). If you want to keep the default layout, do so and click on <Back to panels in the upper left. Otherwise, it will be easier to start from scratch.

Click on + Add page.
Now, we’re ready to go to work.

First, think about how many pages you’d like to have, and click on **Add page** enough time to give you all you need.

**Figure 7**

![Manage custom report](image)

Next, go back to Page 1 and click on **X Delete page**.

Here’s your fresh canvas:

**Figure 8**

![Manage custom report](image)

Click on **Change page name** and type the new name into the appropriate place.

**Figure 9**

![Manage custom report](image)

Save it.

**Figure 10**

![Manage custom report](image)
Go to each tab and do likewise.

**Figure 11**

Actually, on reflection, I don’t like the sequence. I want Annual Trends to immediately follow Quarterly Trends.

I click on Reorder Pages and drag the page into its proper position.

**Figure 12**

Click Save.

**Figure 13**

Now we’re ready to fill in each page.

As long as we’re on Comparisons, let’s start there. The process begins by choosing a category. In this case, I’ll select Key Ratios – Group Comparison.
When I put my cursor on a category, all the panels available there appear on the right. I can scroll down, look at the descriptions, see a preview if I wish, and click on add if I want to use the panel.

Notice that once a selection is made, the check mark for that panel turns green and I am now told that I can, if I change my mind, click in the same spot to Remove it.

Let's assume I'm satisfied with these selections. I go to the upper left and click on:

<Back to panels
I just notice that Margin is on top. That’s not what I want. I’d prefer to see Return on Capital as the first panel. So I scroll down (it’s now last), put my mouse into the horizontal blue bar running along the top of the panel, and drag it up to the top position.

That’s all there is too it.

Click on the tab signifying the next page you want to work on. Let’s assume it’s Financial Statements.

It’s blank because we haven’t yet put anything there. Click on Manage pages/panels to get started. Make your choices.
When you are satisfied, click on <Back to panels.

Go on to your next page, and keep going until you have completed all of them.

You are, obviously, free to choose whatever configuration of pages and panels match your preferences. If you'd like an example, here is the setup I use.

**Page: Background**

**Category: Company Basics**

- Profile
- Business Summary
- Financial Summ

**Category: News & Info**

- Yahoo! Headlines
- Financial Blogs
- SEC Quarterly Filings (10-Q)
- SEC Annual Filings (10-K)

**Category: Charts**

- 1 Year Daily Chart
- 3 Years Weekly Chart
Page: Quarterlies
  Category: Results – Quarterly
  Panels:
  Revenue - Quarterly Results Table ($ Mil)
  Revenue - Quarterly Growth Yr. over Yr. (%)
  Revenue - Quarterly Growth Yr. over Yr. (%)
  EPS - Quarterly Results Table
  EPS - Quarterly Growth Yr. over Yr. (%)
  EPS - Quarterly Growth Yr. over Yr. (%)

Category: EPS Estimates
  Panels:
  EPS Estimates
  EPS Surprise
  EPS Estimates Trend

Category: Rank vs Industry
  Panels:
  EPS Estimates % Revision – Rank

Category: Group Comparison
  Panels:
  EPS Estimates % Revision - Group Comparison

Page: Annual Trends
  Category: Key Ratios - Annual trends
  Panels:
  Fundamental Summary
  Profitability / Efficiency Ratios
  Financial Strength Ratios
  Per-Share Growth Ratios
  Valuation Ratios

Page: Analysts
  Category: EPS Estimates
  Panels:
  EPS Estimates
  EPS Surprise
  Average Analyst Recommendation Score
  EPS Estimates Trend

Page: Financials
  Category: Statements – Annual
  Panels:
  Income Statement ($ mill.)
  Balance Sheet ($ mill.)
  Statement of Cash Flows ($ mill.)
  Income Statement (% Revenues)
  Balance Sheet (% Assets)
  Statement of Cash Flows (% Cash From Oper)
Page: Comps
Category: Key Ratios – Group Comparison
Panels:
Growth Rates (%) - Group Comparison
Margins (%) - Group Comparison
Efficiency - Group Comparison
Return on Capital (%) - Group Comparison
Financial Strength - Group Comparison
Stock Valuation - Group Comparison
Technical Indicators - Group Comparison
Share Price % change - Group Comparison
Short Interest % float - Group Comparison
EPS Estimates % Revision - Group Comparison
Avg Analyst Rating (1=most bullish, 5=most bearish) - Group Comparison

Page: Indy Ranks
Category: Key Ratios – Ranks vs Industry
Panels:
Growth Rates (%) – Rank
Margins (%) – Rank
Efficiency – Rank
Returns on Capital (%) – Rank
Financial Strength – Rank
Stock Valuation – Rank
Technical Indicators – Rank
Short Interest % Float – Rank
Stock Price % Change - Rank

Page: Stock Metrics
Category: Key Ratios – Group Comparison
Panels:
Stock Valuation - Group Comparison
Technical Indicators - Group Comparison
Share Price % change - Group Comparison
Short Interest % float - Group Comparison
Avg Analyst Rating (1=most bullish, 5=most bearish) - Group Comparison
Analysis of LT Growth Expectations - Group Comparison

Page: Dividends
Category: Results – Quarterly
Panels:
Dividend - Quarterly Table
Dividend - Quarterly Growth Yr. over Yr. (%)

Category: Annual Trends
Panels:
Dividend-Related Ratios
Rankings

Suppose I want to check up on Apple but don’t want to study and interpret all the panels. There is another approach.

Assume, too, that I’m interested in focusing on the company’s growth characteristics.

I’ll open the page for the pre-defined Basic: Growth ranking system. It doesn’t matter right now whether I want to use this model to help me pick stocks. Whether I want to do that or not, this ranking system can definitely help me evaluate the growth characteristics of any stock I’d like to look at.

Here’s a summary of this ranking system’s factors:

Figure 21

Go into the left-side menu and click on Ranks.

Figure 22
Input AAPL into the ticker box. Notice the As of date in the upper left. It defaults to today, but you can change it. Leaving the date as is, here is what I see after inputting AAPL and clicking on Get in the lower right.

**Figure 23**

Generally, AAPL is every bit the growth firm people assume it is as of this writing. But we may want to make a mental note of the score for EPS Acceleration; 80.34 is fine, but it isn’t quite as high as the other growth items.

Let’s drill down a bit. Go to the Output drop-down menu just above the AAPL data. Choose Include Composite & Factor Ranks and click again on Get.

**Figure 24**

The first thing we notice is that there are a lot more columns in this view and working with an HTML page may be cumbersome. You can click on Download (in the lower right corner) to pull this information into Excel, where it’s a lot more convenient to work with large tables. But for purposes of this demonstration, let’s stick with HTML.

129
We definitely learn more when we drill down. The more recent instance of acceleration, the latest quarter compared with the trailing 12 months, ranks a mediocre 69.41. The better acceleration score occurred when we compare the trailing 12 month growth rate to that of the last five years.

Look, now, to the basic growth factors. The five-year rate is terrific, nearly as high as it can get. The trailing 12 month and latest-quarter growth rates, however, are pedestrian.

When it comes to EPS growth, AAPL’s glory may be over; the present looks mundane.

This isn’t the last word on AAPL, even in terms of growth. We still need to consider Sales growth, which we could do by scrolling to the right. But it should give you an idea of how effectively you can assess an issue and how quickly you can do it using ranking systems, regardless of whether you want to use this specific system to sort your screen results.

Let’s compare AAPL’s EPS growth characteristics to those of a few other stocks people who are interested in Apple might want to see.

Figure 25

Actually, notwithstanding the EPS growth concerns raised above regarding AAPL, when it comes to popular tech type stocks, AAPL may well still be better than most, at least in terms of EPS growth.

Let’s scroll to the right (in real life, you’d likely be doing this in Excel).

Figure 26
This confirms that AAPL is probably the best of the group right now when it comes to growth, and AMZN earns quite a bit of respect. But extending consideration to sales does seem to take YHOO, which looked good in terms of EPS, down quite a bit, enough so to make one wonder about the extent to which its recent EPS strength reflects unusual temporary factors. (I peeked at the panel; there had, actually, been a surge in Other Operating Expenses in 2008 followed by a return to more normal levels in 2009. This is an example of how the Ranks and Panels can work hand in hand.)

All of these observations could have been gleaned from the panels. But the Ranks got me there much more quickly.

Bear in mind this is just a small sample of insights. Imagine if, instead of the Basic: Growth ranking system, we’d have used Comprehensive: QVGM. Undoubtedly, that should be evaluated using Excel. But you get the point: everything we did here with growth we could also do with Quality, Value and Momentum.

Now that we see what can be done with a handful of tickers, notice our other choices.

**Figure 27**

As mentioned before, I can change the As of date. I can also use a different universe, or I can choose to see all stocks in a specific industry. By leaving the default settings for Universe (All Stocks) and Industry (All), and leaving the ticker box blank, clicking on Get will retrieve the ranks for all stocks in the database. (After I get the process going by clicking on Get, I’d definitely ignore the HTML rank presentation and go right to the Download button to get it into Excel!)

Now, watch this . . .

I use the broad-based Comprehensive QVGM ranking system and get everything into Excel (and use Freeze .
Now here’s what I do:

- A descending sort on Column AW (the overall Momentum score)
  - Delete all rows with scores below 90
- A descending sort on Column K (the PEG factor; part of the Value component)
  - Delete all rows with scores below 80
- A descending sort on Column Z (the Sales Growth score; part of the Growth component)
  - Delete all rows with scores below 80
  - I’m now down to 44 stocks
- A descending sort on Column AH (the overall Quality score)
- Start from the top looking at individual stocks

There you have it; the functional equivalent of a screen without ever having gone near the screener. (In real life, I’d probably have started with the NOOTC universe to eliminate the least liquid stocks.) This is not something you can backtest. But the approach may appeal to those who are looking, not for investable models but a set of ideas worthy of further company-specific research.

As you can see, these ranking systems are quite powerful, much more so than may have been apparent when you were just using them to sort screen results.
Chapter 8 Ranking Systems - The Basics

Ranking is the heart of Portfolio123, but for many newcomers this can be a perplexing endeavor. Ranking systems are out there, but detailed information on how they are built tends to be sketchy, and sometimes can create the impression that serious work here is best left to those with advanced degrees in mathematics. Besides, if you have a good screening application, and better still, one that includes backtesting, what more can one want?

We'll start by demystifying the area and show why it's valuable, no matter how good one is at screening.

A Simple Screen

Figure 1 shows a very basic growth screen.

Figure 1

It backtested adequately, growing from $100 on 3/31/01 to $236.05 by 11/29/10, versus $102.5 for the S&P 500 with four-week rebalancing. Whether or not one finds that to be satisfactory is, however, irrelevant because the screen often shows more than 400 names. That's too many to buy and even if one uses a screen simply to generate ideas for further research, the list contains too many names to evaluate.

Not every screen produces lists this size. Some have bigger result sets, but most lists are smaller. But they are rarely just right. As I screened over the years, I usually aimed for lists with about 50 stocks. But even a list this size can still pose a burden for those who want to dig further on individual candidates.

Because of lists that were usually too big to be bought in their entirety or reviewed in detail, during my tenure at Reuters.com, I wound up devoting far more elbow grease to figuring out ways to choose from a screening result set than I did creating screens.

A practical solution

Figure 2 shows the Settings area within the portfolio123 screening interface. Notice the lower right dropdown, the one labeled Ranking. This, coupled with the input box on the left (Max No. Stocks), can be used to solve our too-many-stocks problems.

Figure 2

For Max. No. Stocks, we input the number of stocks were willing to see in our result set.

For Ranking, we have three choices. The default is "no ranking," which we're not going to use; it presumes you won't want to limit the number of stocks in your result set. The other choices are "Ranking System" and "Quick Rank." We'll start with the latter, since it's simpler and will provide a quick sense of why it's helpful to work with rankings.

Figure 3 shows what the Settings are looks like after I select Quick Rank and make some choices.
I decided I’m willing to have up to 25 stocks appear in the result set. I may see less if fewer stocks make the screen, but under no circumstances will I see 25.

To get from the 400-plus stocks that usually make the screen to a final 25, I do a best-to-worst sort and select the 25 best stocks. In the above example, the criteria for choosing the best is SI1Mo%Chg, which means short interest, 1-month percent change. I can type that in manually, and/or I can point and click using the same Reference interface we’ve seen with screening (you can get to it by clicking on the notepad icon).

You always have to use the next dropdown to tell Portfolio123 how to sort the item, whether larger numbers are best or vice versa. Because I want to find growth stocks with the greatest degree of short covering, I selected “Lower is Better.” (A 1-month short-interest percent change of negative 10% is better, for my purposes, than a change of negative 3% or, say, plus 2%.)

Think about “Lower is Better” versus “Higher is Better.” The choice isn’t always as obvious as a quick impression might suggest. I wanted aggressive short covering. Someone else, however, may be a contrarian and want to buy stocks that are being pressured by large jumps in short interest, in which case “Higher is Better would be chosen.

Anyway, after backtesting, I see that my short-covering best-to-worst sort made for a very nice solution to the too-many-stocks problem. For one thing, the backtest results were much better. Now, $100 on 3/31/01 grew to $503.30 by 11/29/10. Better still, I achieved the improved performance using only the desired number of stocks, 25.

This is huge. Without that Quick Rank, my screen ultimately amounted to an interesting but useless conversation piece. Adding the Quick Rank gave me a legitimate investable model.

**Stretching The Quick Rank**

The Quick Rank feature is, actually, very powerful. I don’t, for example, have to work with just one factor, as I did in the short-covering example. I can combine factors to create formulas, such as the one in Figure 4, which ranks companies on the extent to which five-year return on equity exceeds the industry average.

![Figure 4](image)

We could get quite imaginative with our formulas. For example, we could rank on a combination of return on equity and return on assets with something like this:

![Figure 5](image)

There’s a lot more we could do. For example, we might combine a fundamental factor like P/E (i.e. ProjPECurFY) with a technical factor, like the relationship between the stock price and its 50-day moving average (close(0)/sma(50)).

But this would be quite cumbersome. PE is a number like 23 or 18.6 while the technical indicator is a ratio that might be 0.78, 1.24, or any number like that. We can’t combine them as easily as we did ROE and ROA because PE would overwhelm our weighted average calculation. We force the numbers into a consistent scale by, say, applying the FRank function to ProjPECurFY and
then again to close(0)/sma(50) and then averaging the Frank outputs. Now, however, our Quick Rank functionality has become anything but Quick, and it would get much worse if we add additional factors.

The good news is we don’t have to add complexity. It’s best to let Quick Rank be just that, quick, very quick. Use it for a single factor like ProjPECurFY, or an incredibly simple formula, like close(0)/sma(0). If you want to go beyond that, as most Portfolio123 users like to do, use the final choice offered by that drop-down menu, “Ranking System.” This is the heart of Portfolio123 and the place where you can do some exceptionally sophisticated ranking with remarkably little sweat.

**Introduction to Multi-Factor Ranking**

This is it, the big topic, the magic. There are lots of proprietary ranking systems out there: Money Central Stock Scouter, S&P, Value Line, TheStreet.com ratings, Market Grader, Schwab, the ratings you see in the Investors’ Business Daily Stock Checkup, etc. etc. etc. These are multi-factor ranking systems.

There’s a lot of mystique in this area, but don’t be intimidated. It’s just marketing. These and other big-name systems are just like the ones you can build on Portfolio123, and all of them are just like the turbo-charged approach to Quick Rank suggested above.

The difference between a simple Quick Rank and a multi-factor model is the number of factors used. Quick Rank involves just one. Everything else contemplates use of more than one factor. The significance of the Portfolio123 Rank capability is that it’s designed specifically for multi-factor ranking, sparing you the burden of trying to squeeze a round peg into a square hole, as we were starting to do with our more complex Quick Rank formulas.

**Ranking Versus Screening**

Thus far, we’ve thought of ranking as being ancillary to screening, a technique for reducing an unwieldy list down to manageable size. This is understandable. There are many simple free screeners available on the web so most investors inclined to use such platforms started by screening. Actually, though, once you really understand what a good multi-factor ranking system is doing, you might go so far as to say that screening is ancillary to ranking, that screening is a technique to choose among a large group of highly ranked stocks. This is the way Portfolio123 evolved. Ranking came first with screening being added later on.

To get a sense of how ranking can be used to generate ideas, let’s refer back to the simple growth screen with which we started.

**Figure 6**

This screen aims at inclusion/exclusion. It presents a rigid set of yes-no inquiries. The first two are designed to uncover indicators of trading liquidity. The others asked whether or not the company achieved results in excess of 20 percent in each of four growth factors:

1. **EPS%ChgPYQ**
   
   EPS growth in the latest period compared to the year-ago quarter

2. **EPS%ChgTTM**
   
   EPS growth in the latest trailing 12 month period
3. **Sales%ChgPYQ**  
Sales growth in the latest period compared to the year-ago quarter

4. **Sales%ChgTTM**  
Sales growth in the latest trailing 12 month period

Let's instead consider a ranking system based on the four growth four factors. To do this, we have to stop thinking in terms of inclusion/exclusion. Instead, every stock (assuming data is present) will be included and we will now aim to place each one somewhere on a best-to-worst scale. In contrast to the screen, which thought in terms of black and white, the ranking system will operate with shades of grey.

We'll start with EPS%ChgPYQ. We'll sort all companies (assuming the necessary data points exist) from best to worst based on this factor. We'll have to tell Portfolio123 that higher numbers are preferable; that will cause the application to execute the sort on a descending basis.

Now, each company has a rank based on where it stands in the best to-worst sort. Next, Portfolio123 will translate these ranks, which will number from 1 to whatever number of stocks is in the universe (8,000 or so) into standardized ranks between 1 and 100. A stock that is located exactly at the midpoint of the sort would have a score of 50. A stock near the top, with say only five percent of the universe being better, would have a score of 95. A stock near the bottom, with say 98 percent of the universe being better, would have a score of 2.

We'll repeat this process for each of the other three factors: EPS%ChgTTM, Sales%ChgPYQ, and Sales%ChgTTM.

After this is completed, each company will have four standardized scores, one for each factor. Here's an example of what the profile of an individual company might look like.
As things stand now, the ranking system is not very useful. We know where the company stands, on the best-to-worst scale, in each of our four criteria. But to make investment decisions, we need a single answer. So to make this useful, we need to combine these four scores into one. Table 2 illustrates the default approach wherein each factor is assumed to be equally important (equal weighting).

**Table 2**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Standardized Score</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS%ChgPYQ</td>
<td>63.5</td>
<td>25%</td>
</tr>
<tr>
<td>EPS%ChgTTM</td>
<td>82.7</td>
<td>25%</td>
</tr>
<tr>
<td>Sales%ChgPYQ</td>
<td>48.6</td>
<td>25%</td>
</tr>
<tr>
<td>Sales%ChgTTM</td>
<td>51.3</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Overall Score</strong></td>
<td><strong>61.53</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The formula for the overall score is:

\[
\text{Factor 1 Score} \times \text{Factor 1 Weight} + \text{Factor 2 Score} \times \text{Factor 2 Weight} + \text{Factor 3 Score} \times \text{Factor 3 Weight} + \text{Factor 4 Score} \times \text{Factor 4 Weight}
\]

Numerically, that works out to:

\[
63.5 \times .25 + 82.7 \times .25 + 48.6 \times .25 + 51.3 \times .25
\]

That's equivalent to:

\[
15.87 + 20.68 + 12.15 + 12.83 = 61.53
\]

That's all well and good assuming you have equal conviction about each factor. With screening, you are forced into this stance. But ranking is different in that it lets you assign different levels of importance (different weights) to each factor. The only constraint is that they all must add to 100.
percent. Table 3 shows how the rank would change if, for example, we decided to place primary emphasis on the EPS-related factors.

Table 3

<table>
<thead>
<tr>
<th>Factor</th>
<th>Standardized Score</th>
<th>Weight</th>
<th>Score * Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS%ChgPYQ</td>
<td>63.5</td>
<td>45%</td>
<td>28.57</td>
</tr>
<tr>
<td>EPS%ChgTTM</td>
<td>82.7</td>
<td>45%</td>
<td>37.22</td>
</tr>
<tr>
<td>Sales%ChgPYQ</td>
<td>48.6</td>
<td>5%</td>
<td>2.43</td>
</tr>
<tr>
<td>Sales%ChgTTM</td>
<td>51.3</td>
<td>5%</td>
<td>2.57</td>
</tr>
<tr>
<td>Overall Score</td>
<td></td>
<td>100%</td>
<td>70.79</td>
</tr>
</tbody>
</table>

Table 4 shows what the score would be if we chose to place the main emphasis on sales growth.

Table 4

<table>
<thead>
<tr>
<th>Factor</th>
<th>Standardized Score</th>
<th>Weight</th>
<th>Score * Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS%ChgPYQ</td>
<td>63.5</td>
<td>5%</td>
<td>3.18</td>
</tr>
<tr>
<td>EPS%ChgTTM</td>
<td>82.7</td>
<td>5%</td>
<td>4.14</td>
</tr>
<tr>
<td>Sales%ChgPYQ</td>
<td>48.6</td>
<td>45%</td>
<td>21.87</td>
</tr>
<tr>
<td>Sales%ChgTTM</td>
<td>51.3</td>
<td>45%</td>
<td>23.08</td>
</tr>
<tr>
<td>Overall Score</td>
<td></td>
<td>100%</td>
<td>52.27</td>
</tr>
</tbody>
</table>

As you can see, the weights (degrees of importance) you assign can make a big difference. So don't get so wrapped up in choosing factors that you brush too quickly past the weights, or worse, let them be assigned by default. Decisions regarding weights may be just as important as decisions regarding factors. Equal weighting is perfectly fine so long as it's a deliberate choice (as is often the case in my own systems), as opposed to something that happens by default.

We'll talk later about testing the ranking systems we design, but I will tell you up front that in these examples, the equally-weighted version successfully identified the weakest market performers but was largely ineffective in differentiating among the other 80% of the stock universe. The last version, where each of the sales growth factors was weighted 45% with the EPS growth factors weighted 5% each, again was successful in confining poor market performers to the bottom 20%. But the top 20% was just about as bad. The good stocks were, on balance, in the middle 60%.

The second version, with the EPS growth factors each weighted 45%, however, was a winner. The best performing stocks were, on average, clustered among stocks ranked in the upper 20%, the second best group consisted of stocks ranked in the next 20% And so on with the worst performers being the lowest ranked stocks. So again, weights should be taken seriously!

After you've chosen your factors and weights, you'll have an overall standardized score for each company in your universe. This is the basis upon which the list will be sorted.

Ranks versus screens

To review, we've so far seen two important distinctions between ranking systems and screens. First, we are dealing with shades of gray rather than black and white. A screen will give "yes" answers to a small subset of the universe and a blanket "no" to most stocks. But a rank will have something specific to say, for better or worse, about all of them. Because of this, a ranking
system can handle much more elaborate sets of factors. With screens, as you add rules, you'll quickly drive your result set toward zero (few stocks offer everything you can possibly want). With ranks, you can use as many factors as you want subject only to principles of common sense and sound judgment (we'll discuss these issues in subsequent installments).

Second, screens require you to treat each factor as if they were equally important. Ranks allow you to assign different levels of importance to different factors.

Next step

All ranking systems you create will conform to the above structure. They'll differ only in the number of factors you choose (including the possibility you may have so many, you find it convenient to organize them in sub-folders), the variety of factors you choose, and how you weight them. But regardless of how you address these issues, the underlying structure will be the same.

Now that we've seen what a multi-factor rank looks like, it's time to learn how to build it in the Portfolio123 platform.

Building A Multi-factor Ranking System

"Ranking" is one of the choices available in the horizontal menu that runs along the top of the page. After clicking on it, go to the button that says "Create New" and choose to build a Stock Ranking System.

You'll see the New Ranking system interface depicted in Figure 7.

Figure 7

If you want to use an existing ranking system as a starting point and then add your own modifications, use the prompt at the top of the interface to identify the name of the system from which you want to copy. If you want to start from scratch, as is the case in this example, name your system in the appropriate place.

You can now immediately click on "Create" at the bottom of the interface to move on to the next step. There is an important decision we must make regarding the handling of data items that come out of the database as NA, which means "Not Available." We'll come back to in a later installment, after we learn the basics of ranking-system creation.

After clicking on "Create," you'll be taken to the main ranking-system work area.

Figure 7
Notice in the right-hand portion of the page some sort of interface. Depending on the size of your browser window, you may want to “grab” it with your mouse by clicking on that grey square that sticks out of the upper right corner and move it anywhere else on the screen, closer, perhaps, to the content you see on the left, since you're going to be working with both.

Now, take a look at the left section. You see several links that make little sense to you now but which will soon become close friends. You also see the name of your ranking system and a “100%” label next to it.

That text is known as a node. These are the building blocks of your ranking system. There are four kinds of nodes:

- **Composite**
  These are folders, so to speak, that hold other nodes (factors, formulas, or sub-composites)

- **Factor**
  These are similar to the items you've already used with screening (example: EPS %ChgTTM)

- **Formula**
  These are combinations of factors, similar to those you might already have used in complex screening rules (example: Pr4W%Chg- Pr13WRei%Chg)

- **Conditional**
  This is an if-then statement that provides for different kinds of computations. We'll look more closely at this advanced capability later on

The items contained within a node are assigned weights all of which must add to 100%.

The starting point for every rank is a composite node that has the name you assigned to that ranking system. Since it is at the top level, the sum total of everything in your system, it, by definition, has a weight of 100%. That's what you're seeing in Figure 7: A node entitled “First Rank” that comprises 100% of the system.

Now, let's start putting some substantive things into this still-empty suitcase.

**Adding our first factor**

Recall from the examples discussed above factors we want to use:

- EPS%ChgPYQ
- EPS%ChgTTM
- Sales%ChgPYQ
• Sales%ChgTTM

All are stock factors. We'll add them one at a time.

At this stage of the game, we’re looking at the properties of the node. When we have more than one node, the properties seen will relate to whichever node our cursor is on. For now, we see that we’re looking at a Composite node and that our system is such that higher scores will signify better stocks. We also see, at the bottom, some opportunities for basic node alteration or maintenance which we’ll use later.

**Figure 8**

```
Node Properties | Add Node | Weights

Composite
Label: [Default]

Ranking:
- ↓ Lower values
- ↑ Higher values
- ∑ Summation only

Update or Copy/Paste...
```

For now, we’re going to keep things simple and put all four factors, or rather factor nodes, into this composite node. We’ll start by clicking on “Add Node.”

**Figure 9**

```
Node Properties | Add Node | Weights

Choose Node Type
```

The drop-down menu offers six choices as to the type of node you want to add:

- Composite
- Conditional
- Stock Factor
- Stock Formula
- Industry Factor
- Industry Formula

Figure 10 shows what you’ll see after choosing Stock Factor.

**Figure 10**
Much of this looks very familiar. It resembles the interface we used to create screens, custom universes, custom reports and custom formulas. Consistent with the way we used those interfaces, we click here on GROWTH RATES and then on EPS%ChgPYQ.

We'll put this factor into our system by clicking the "Add" button in the lower left corner of the interface. But before doing that, we need to address two issues specific to ranking-system creation.
First, note that a radio button labeled "Higher Values" is checked. This establishes the sort order. Portfolio123 is assuming that if we want to use EPS%ChgPYQ in a ranking system, we will want to favor companies with higher growth rates (i.e. execute a descending sort). If you click on something like a valuation ratio, you will see the "Lower" radio button checked and the label will suggest that lower values are to be preferred.

If you agree with this default choice, you need not do anything. Just make sure you are aware of what the default choice is. If you disagree, you can click on the other radio button. For example, you might be creating a short-term system based on a contrarian notion wherein you want to favor companies with the poorest growth rates (believing, for example, that the bad news is fully reflected in stock prices by the time results are reported and that when the numbers come out, a corrective contrary move will occur). We're not going to use that approach here. We'll stay, instead, with the default choices. Just be aware you can change things around if you wish.

Next, notice the three choices you have as to how you want to sort:

- Rank Factor vs. Stocks in its Universe
- Rank Factor vs. Stocks in its Industry
- Rank Factor vs. Stocks in its Sector

In the default choice, ranking the factor relative to the universe, Portfolio123 simply sorts all companies from best to worst based on the chosen factor.

If we choose to rank factors relative to industries, we will have approximately 100 separate best-to-worst sorts, one for each industry. The company's rank for this factor will depend on where the company stands within its respective industry sort. So, for example, Company A, a machinery company with a four percent growth rate that's strong relative to other machinery firms, would rank higher than, say, a software company with a 20 percent growth rate if most other software firms have better growth rates.

The third choice is similar to the second except for the fact that here, we have separate sorts based on sector.
For this example, we'll stick with the default choice and sort relative to the universe. The other choices will be discussed later when we get to ranking-system design.

Now, we're ready to click the "Add" button.

**Figure 12**

$$100\% \uparrow \text{First Rank}$$

$$0\% \uparrow \text{EPS\%ChgPYQ}$$

We now see the factor node EPS%ChgPYQ listed under our main Composite Node. It doesn't have a weight yet because we haven't assigned one. We'll do that soon. Be aware, though, that if we were to try to proceed further (testing or using the system) with all factors still showing weights of zero, Portfolio123 will assume that all are to be equally weighted. For the sake of good work habits, don't rely on that. We'll want to make a practice of always assigning weights, even if equality is what we ultimately choose.

**Building up our system**

When we put the cursor on the composite node labeled "First Rank," the work-oriented portion of the interface will look exactly as it did before. The other three factors can be added following the same process.

As we build up our system, it's important that we be aware of where, in the list section of the interface, we place our cursor. The work-section will always show choices relevant to the spot where the cursor lies. What we've seen before are the choices relevant to the composite node. Figure 13 shows the choices that will be relevant, if, after adding other factors, we leave our cursor on one of the subnodes.

**Figure 13**

The choices involve things we can do to a single subnode. Things that cannot be done are greyed out. What we really want to do right now is assign weights. That's not something that's relevant to an individual subnode, so the Weights tab is greyed out. We'll have to move our cursor up to the composite node and then click on "Weights."

**IMPORTANT NOTE:** If at any time you become frustrated because you cannot see a menu choice that allows you to do what you want to do, check to see where, on the left side, your cursor is located. Most likely, your cursor will be in a place for which your desired action is not
relevant, and you can solve your problem simply by relocating the cursor. If, for example, you find yourself unable to work with weights, check to see if you need to move your cursor to the composite node.

Assuming we want to add weights and that our cursor is on the composite node, we can click on Weights and see the following.

**Figure 14**

![Weights Interface](image)

If we want equal weighting, there is a button upon which we can click to easily make that happen. This may not be a big deal here, since we know equal weighting among four factors means 25 percent across the board. But sometimes, it won't be so intuitive, as would be the case if, for instance we had seven factors. We're not going to use equal weighting here. Instead, we'll manually input choices as shown in Figure 15.

**Figure 15**

![Manual Weight Input](image)

Notice that as we work, we will see a running total of the weights below the individual nodes. We will not be able to click "Update" unless the total equals 100 percent.

**Finishing touches**

Figure 16 shows what we'll see after we add in the weights by clicking the "Update" button.

**Figure 16**

![Final Weights Display](image)
Now, our system looks logical and complete.

- We see four factor nodes each of which has a weight.
- We also see the graphic symbol that matches our choice to sort relative to the universe, an industry or a sector.
- And we see an arrow reiterating our choice as to whether higher or lower numbers are to be favored (note that the up arrow indicates that higher numbers are favored as opposed to the direction of the sort which would usually be labeled descending).
- Finally, the four weights sum to the 100 percent total we need for the overall system.

We're finished. All that's left for us to do now is to click "Save."

If we want to work on this system in the future, we'd go to the "Saved Systems" section of the "Ranking" area and select "First Rank," which is the system name assigned here.

Now that we've built a system we have to wonder: Is the system we created worth using? Put another way: Can this system really help us distinguish between potential market leaders and laggards?

We'll address that in the next section, where we'll performance test this system.

**Measuring Ranking System Performance**

To illustrate the basics of performance testing, we're going to use the ranking system we just created. The ranks are computed as follows:

- **EPS%ChgPYQ** (45% weight, ranked relative to universe)
- **EPS%ChgTTM** (45% weight, ranked relative to universe)
- **Sales%ChgPYQ** (5% weight, ranked relative to universe)
- **Sales%ChgTTM** (5% weight, ranked relative to universe)
After you open the ranking system, click on “Performance” in the menu that runs down the left side of the page. Figure 1 shows what you'll see after you do that.

**Figure 1**

The top section of the interface, labeled “Date Range and Rebalance Frequency,” should be self-explanatory. It looks and functions like the one we’ve already used when we backtested screens. In this context, rebalance means re-computing the ranks as per the model we’ve created.

The next section is “Data Source.” As with screening, the default setup calls for use of prior-quarter information at times when the latest quarterly report does not yet provide everything you need to compute ratios used in your model. You’re also asked to select the Universe you’ll use for testing.

The “Universe” dropdown menu lists all available Portfolio123 pre-set universes and all custom universes you saved. As we saw with screening, the pre-set universes are based on well-known market indexes, size-based universes such as large cap or small cap, and universes based on trading exchange (or you can choose all exchanges except OTC). You can also choose a universe that reflects a single sector or industry. And as with screening, if none of the pre-set universes really match your preferences, you can select any of the custom universes you created and saved. Recall, too, that any screen you created can be converted to a custom universe by clicking on the “Save as Universe . . . ” button in the screening interface.

Universe has another function in the context of ranking. Recall that when creating a model, you specify, for each factor, whether you’d like to sort all stocks in the universe, the sector or the industry. If you choose to sort based on universe, the computation will be done with reference to whatever universe you select here. That will impact the stock’s ranks. It’s possible that a stock may rank, say 87.5 if the universe is “All Stocks,” but, perhaps, just 62.0 if the universe is a custom universe you create named, for example, “Liquid Stocks Only.” Because the universe can determine the rank scores, it’s important that the one you choose for testing be the same as the one you intend to use when you use the ranking system in connection with screens, simulations or portfolios.

The third section of the interface, labeled “Filters Applied Before Ranking,” allows you to fine tune the universe of ranked stocks before you conduct your test. You can limit this testing universe to only those companies that are in a particular sector, or to stocks selling at or above a particular
price. Many users simply accept the default choices for these two items: a minimum stock price of 3.0 and no sector-based limitation.

The fourth and final section of the interface is called “Output.” The choices you make here will determine how the results are presented to you.

Figure 18 shows the section where you choose which type of performance chart you’d like to see.

**Figure 18**

![Chart Type Selection](chart_type_selection.png)

Figure 19 shows what you’ll get if you run a test (accomplished by clicking “Show Graph” at the bottom of the interface) consisting of five buckets to be displayed through a “Historical Returns” graph.

**Figure 19**

![Historical Returns Graph](historical_returns_graph.png)

If you’ve had exposure to performance information on some commercially-available ranking systems, such as the Value Line Timeliness ranks, this output should look familiar to you. It’s the visual format Value Line uses to present its results.

The legend at the bottom tells you that the red line charts the performance of the S&P 500, that the turquoise line charts the performance of the stocks with the best ranks (between 80 and 100), that the violet line charts the performance of the second highest-ranked group, and so forth. You can see from the chart that all groups have had their ups and downs but also that at the end of the day, performance would have been best, by far, had you stuck entirely with top ranked stocks. So it looks like the model worked pretty well.

There is, however, a fly in the ointment. We’ve only used five groupings, or “buckets.” Depending on the size the universe you chose, this could mean you might have more than 1,000 top-ranked stocks. (Unlike Value Line, all of our five groupings are equal in size; Value Line limits its top grouping to 100 and allows other groupings to be larger in size.)

Hence a suggestion that one could have achieved strong performance by confining selection to top ranked stocks is, actually, a very tall order. Most users will probably use screens or simulation...
buy rules (which look just like screens) to narrow the choices. Chances are, though, that such protocols will limit list sizes to 50 stocks or fewer, 25 or less in many cases, and these selections will be made by sorting the ranks and picking from the top. So purchases will often consist of stocks ranked above 90 or even 95.

For that reason, it is often useful to use a larger number of buckets. The default setting calls for 20 buckets, meaning your top ranked stocks will comprise the best 5% of your universe. You can go up to 200 buckets, in which case, the top group will consist of the best 0.5% of the universe. Figure 20 shows what the performance chart would look like with a 20-bucket test.

**Figure 20**

![Performance chart with 20 buckets](image)

Is the model still usable? Probably. The 95-100 bucket, does pretty well, although it’s not necessarily the best performer. That honor would seem to go to the 90-95 bucket, and the 80-85 bucket makes a pretty good showing as well. We could account for this by adding to our screen a rule barring stocks ranked above 95. That would cause us to choose stocks from the 90-95 bucket. But such an approach should be handled with great care lest we fall into the data mining trap, a situation where we over-rely on past performance and give inadequate attention to the way the passage of time and changing conditions can impact the performance of our models (a topic we’ll discuss more at a later time). Note, for now, though, that you could fine tune this way if you choose to do so.

One thing you will notice from Figure 20 is that it’s not all that easy to read. You can get a sense of what’s happening at the top of your rank list, but it’s hard to see how effective your model is at separating winners from losers in the middle and lower groups. You may not want to reach that far down in your actual stock selection, but looking at these other buckets can go a long way toward showing whether your ranking system really is tuning into factors that influence future share price performance across the board, or whether it only works only at an extreme. Ranking systems that accomplish the former are, arguably, more likely to have the substance they need to work across a variety of conditions.

The other visual presentation, “Annualized Returns,” (the default choice, actually) presents a clearer picture of what’s going on among the full range of buckets. Figure 21 shows the same test presented in this format.
When we use this view, we can’t watch the ups and downs of performance as it unfolds with the passage of time, but if we’re willing to content ourselves with seeing the test period as a whole, this approach provides a much clearer picture of how the buckets stack up versus one another. (We can always look at smaller time periods by conducting additional tests for different date ranges.)

**A Critical Eye**

There was a fascinating article in the December 13, 2010 *New Yorker* “The Truth Wears Off: Is there something wrong with the scientific method?” It described how even some highly statistically significant findings were not able to be replicated in repeat studies and ultimately concluded that the initial studies were flawed insofar as they were slanted, often quite subtly, toward generating the conclusions desired by the researchers.

Think of this any time you feel tempted to stop work after quickly seeing a ranking system performance test result that looks like Figure 21. It’s not that we did anything wrong. The ranking system is what it is and the performance result is accurate.

But can we really use it? Go back to the test settings (Figure 17). Notice the Universe: “All Stocks.” Is this practical? If you look closely (go to the screener and download the default layout for a screen that includes all of the nearly-8000 stocks in the universe. Notice how many stocks are, for all practical purposes, untradeable.

Start adjusting the universe and repeat the test. Figure 22 shows how this same ranking system would have performed had the universe been limited to S&P 500 stocks.

**Figure 22**
We confirm that it really is a good idea to avoid the very worst stocks as defined by our model, but beyond that, we really aren’t getting much useful stock-selection guidance.

Think about this. It makes sense. The model was based entirely on historic growth rates. The investment world doesn’t work this way. We see that wherever possible, investors try to anticipate future performance and buy and sell stocks in advance of the earnings reports. This is especially so of S&P 500 stocks, which tend to be intensively blanketed by Wall Street research and financial-media coverage. So we really can’t expect much of a ranking system based entirely on the past.

Many of us aren’t, however, interested in confining our attention to blue chip stocks. Often, we want to be exposed to a far ranging variety of ideas. Figure 23 shows a new performance test using a larger universe I created that keeps many very small stocks and just eliminates the least trade-able issues (I omit all stocks that trade OTC, have market capitalizations below $250 million and share prices below $5).

**Figure 23**
Now that we’ve included many stocks that aren’t covered as intensively as the S&P 500 constituents, we see that historical growth is more useful as a predictor of stock price performance. But even here, it’s not perfect. The top two groups, especially the top group, didn’t fare so well. This too might be a sensible conclusion. If you go back to the screener and sort large groups of stocks based on TTM or PYQ growth rates, you’ll often see the top of the list dominated by some extreme numbers, growth rates that are probably computed with reference to some unusual development and which are likely not sustainable in the future.

The falloff at the top is even more apparent when we analyze performance using 100 buckets.

**Figure 24**

We’ve learned, here, that historical growth rates are usually relevant predictors of share price performance when we don’t have heavy analyst and media coverage, but that we do need to be mindful of extremes based on unsustainable aberrations at the high end of the range. More important, however, we’ve seen the importance of self criticism when it comes to ranking-system design.

Don’t be in a hurry to stop working as soon as you get a model that appears to work. Experiment with different universes. Experiment with different time periods! And, perhaps most important, try to find common-sense explanations for oddities you see, such as the weaker performance among the highest ranked stocks.

**This Is Do-Able**

The above exercise in ranking-system self-criticism may seem very intimidating. With so much to think about, is it really possible to create ranking systems that can actually work? The answer is “yes.”

For one thing, the ranking system we used here is incredibly superficial. We all know there are many things to consider when selecting stocks besides TTM and PYQ EPS and sales growth rates. In fact, we should be pleasantly surprised that such a simplistic set of criteria provided as much information as we saw in Figures 23 and 24. It should remind us that as we build further sophistication into our models, we ought not lose sight of basics like these.

Moreover, Portfolio123 makes it easy for you to modify and re-test your ranking systems as often as necessary. Portfolio123 also gives you considerable flexibility when it comes to the kinds of ranking systems you can create. Take advantage of these important capabilities.

Finally, be careful about how you define success in a ranking system. It’s tempting to aim for a perfect performance chart, where each bucket performs better than the one below it from top to bottom. Sometimes, you will achieve that. But remember, you’re almost always going to use your ranking systems together with a screen (or a set of simulation buy rules) and often, the latter will
play a big role in overcoming imperfections you see in ranking-system performance data. What you’re really looking for with your ranking system performance tests is for the results to be reasonable and explainable. Systems that work under this criteria are the ones that will most likely combine well with screens and simulation buy rules to produce successful investable models.

In the next installment of this tutorial series, we'll delve deeper into Ranking Systems and learn how to build more substantial models.

---

**Chapter 9 Advanced Ranking System Features**

The demonstration ranking system built in Part 8 was very simple, consisting of just four growth factors with just two of them (both relating to EPS growth) combining for a 90% weighting. Now, we're ready to learn how to use the advanced Portfolio123 ranking features to build much more sophisticated systems.

Assuming you're comfortable with the basics that were covered in Part 8, the material here will address the rest of your important “how to do it” questions. The next installment, Part 10, will turn to the “what to do” questions by focusing on Ranking System Design.

**Simple steps to complex ranks**

There are just four techniques you need in order to be able to create just about any sort of ranking system you want.

- Working with nodes based on composites and sub-composites (i.e. analogous to folders and sub-folders)
- Using formulas in addition to stand-alone factors
- Learning to create complex custom formulas
- Using special features (such as adjusting the impact of NA items and working with conditional nodes)

We'll tackle each topic in turn.
Organizing your composites (folders)

Figure 1 is a top-level view of a general purpose ranking system created for demonstration purposes. It has many factors distributed across many sub-composites. Some would see this as the type of system they'd like to create. Many would regard it as overkill. It was created for instructional purposes, to demonstrate the techniques to be discussed here.

Figure 1

Notice that there are no factors visible in Figure 1. All you see are composite nodes. The top-most composite bears the name of the ranking system and must, by definition, have a 100% weight since it includes everything.

Below that, we see four more composites each bearing the label of an investment style. (Labels for all sub-composites are assigned by the user). Recall that these sub-composites can be created by putting the mouse on a "parent" node, clicking on "Add Node" and selecting "Composite."

Each of the sub-composites I created has a weight and the four weights at this level sum to 100%. Notice, too, the "+" sign next to each one. This should be familiar; we've seen it in many directories including Windows Explorer. It means we can click on it and see additional content inside the "folder."

If you click on the "branches" link, all the sub-composites, factors, and formulas will become visible. Clicking again will cause all the lower nodes to close up. For purposes of clarity, we'll work with one small section at a time.

If you want to re-order nodes, click on the "Reordering" link. Here's what you'll see.

Figure 2

You can use your mouse to grab any of the four-arrow icons to the left of a node and move it to a different position.

Figure 3 shows what we see if we open (click on) the Growth sub-composite.

Figure 3
We're still not seeing any factors. Instead, we see more sub-composites. And again, the weights of all items (sub nodes) within the same level must sum to 100%.

Continuing on, we click on the Value composite.

**Figure 4**

- 25% **Value**
  - 10% **PEExcIXorTTM**
  - 25% **PEGLT**
  - 10% **Pr2SalesTTM**
  - 25% **Pr2BookQ**
- 30% **EV ratios**

Now, we see factors. Notice four things.

1. A particular level need not consist entirely of sub-composites or factors. We can mix and match.

2. The weights of all items (factors and/or sub-composites) within the same level must add to 100%.

**Figure 5**

- 25% **Value**
  - 10% **PEExcIXorTTM**
  - 25% **PEGLT**
  - 10% **Pr2SalesTTM**
  - 25% **Pr2BookQ**
- 30% **EV ratios**
  - 75% **Ev to EBITDA**
  - 25% **Ev to estimated EPS**

We see that the five items (four factors and one sub-composite) directly under the value composite add to 100%. Notice, too, how the two items within the EV ratios sub-composite add to 100%.

3. The direction of the sort arrows depends on the data-point. Higher growth rates are usually preferable to lower growth rates, so higher rates will be associated with higher ranks. On the other hand, we usually expect to see lower P/E ratios associated with higher ranks, hence the downward-pointing arrow that accompanies these items. But when it comes to ranks, greater number are preferable, so we see upward-pointing arrows next to all composites, even if there may be down arrows associated with some of the underlying factors.
4. Notice the "f(x)" symbols next to the factors within the EV ratios composite. That tells us that these are formulas rather than factors. We'll see more about formulas below.

Figure 6 presents a full view of the contents of the Growth composite.

**Figure 6**

- **25%**  
  - **Growth**

- **30%**  
  - **Relative to Industry**
    - 33.33%  
      - EPS%ChgPYQ
    - 33.33%  
      - EPS%ChgTTM
    - 33.33%  
      - EPS%YCGGr%

- **30%**  
  - **Relative to Universe**
    - 33.33%  
      - EPS%ChgPYQ
    - 33.33%  
      - EPS%ChgTTM
    - 33.33%  
      - EPS%YCGGr%

- **40%**  
  - **Acceleration**
    - 60%  
      - EPS PYQ over TTM
    - 40%  
      - EPS TTM over 5 yr

Figure 7 presents a full view of the Sentiment composite.

**Figure 7**

- **25%**  
  - **Sentiment**

- **60%**  
  - **Analysts**
    - 50%  
      - AvgRec
    - 50%  
      - Recommendation Changes

- **40%**  
  - **Others**
    - 35%  
      - Insider Buying
    - 65%  
      - SI1Mo%Chg

The Quality portion of the rank illustrates how we can pack a composite with lots of sub-composites and factors. Figure 8 provides an overall view of the Quality composite.

**Figure 8**

- **25%**  
  - **Quality**

- **45%**  
  - **Profitability**
    - **Relative to Universe**
    - **Relative to Industry**

- **25%**  
  - **Efficiency**
    - **Relative to Universe**
    - **Relative to Industry**

- **30%**  
  - **Finances**
    - **Relative to Universe**
    - **Relative to Industry**

Figures 9, 10 and 11 present details of the three main sub-composites within the Quality section.

**Figure 9**
Note that none of these sub-composites is really necessary. All factors (and formulas) could simply be listed under the primary composite. But use of sub-composites is a tremendous convenience.

As systems get larger, failure to use sub-composites would make them very difficult to manage. To get a sense of that, try to recreate this rank without using sub-composites, making sure each
individual item has the same weight impact as it does in the system presented here. For example, the weight of OpMgn%TTM works out to .014063. Most other items would have weights of similar magnitude. Next, consider what it would take to make the entire Quality group a bit more prominent. Just thinking about this is daunting, enough so that I suspect few readers will actually try to recreate the system without sub-composites.

Creating ranking formulas

Above we saw that we can use formulas in lieu of stand-alone factors within ranking systems. Accomplishing this is very easy. On the dropdown menu that invites you to add something within a composite, simply select "Stock Formula" (or "Industry Formula") in lieu of "Stock Factor" or "Industry Factor." Figure 12 shows the interface you'll see if you select Stock Formula.
The name must be typed manually. You can populate the formula box by typing, or you can click on the "Show Formula Builder" link and get an interface that should by now be very familiar to you.

The Formula box is populated the same way you would populate a screening rule. Notice the drop-down menu above the Category box. This is similar to one you've seen in the Screening Reference area. You can choose FUNCTIONS, STOCK FACTOR, INDUSTRY FGFACTOR or CUSTOM FORMULA.

You can enter your formula via point and click (using Type, Category and Variable). You can type. You can mix and match. Click the "Done Editing" button when you are finished.
Notice, too, from Figure 13, that just like screening, you can use custom formulas.

**Developing complex custom formulas**

We already learned the basics of custom-formula creation in Part 6 (My 123). There, we demonstrated the creation of a fairly simple formula for EPS Acceleration:

\[(\text{EPS}%\text{ChgPYQ} - \text{EPS}%\text{ChgTTM}) / \text{Abs(\text{EPS}%\text{ChgTTM})}\]

But in fact, our custom formulas can be considerably more complex than that. You can use up to 250 characters, which is more than what’s visible at one time within the formula box. If your formula is big, you can see other characters simply by moving your cursor (as you do that, different characters will scroll out of view). The key to creating complex custom formulas is to do so in a way that allows you to easily keep track of what you have and to easily edit.

We'll demonstrate by creating a custom formula for the Altman Z-score, a well-known predictor of financial default. The formula is as follows:

\[Z = (1.2 \times X1) + (1.4 \times X2) + (3.3 \times X3) + (.6 \times X4) + (.999 \times X5)\]

- X1 = Working Capital / Total Assets
- X2 = Retained Earnings / Total Assets
- X3 = EBIT / Total Assets
- X4 = Market Capitalization / Total Liabilities
- X5 = Sales / Total Assets

According to Altman, the lower the score, the greater the risk of default; 1.8 is often being seen as a critical threshold. Companies with scores of 3.00 or better are considered to the safest, from a financial standpoint.

We won't be thinking, here, in terms of cutoffs. We’re simply going to rank companies based on Z-score. (If you use something like this in a model, you can always add a screening rule requiring Z scores to be greater than or equal to a particular numeric value.)

Here is how it translates to a Portfolio 123 custom formula:

\[(1.2*((\text{CurAstQ}-\text{CurLiabQ})/\text{AstTotQ}))+\frac{(1.4*(((\text{IncAftTaxTTM}*(1-\text{PayRatioTTM})))/\text{AstTotQ}))}{\text{AstTotQ}}+(3.3*(\text{EBITTTM}/\text{AstTotQ}))+(.6*(\text{MktCap}/\text{LiabTotQ}))+(.999*(\text{SalesTTM}/\text{AstTotQ})))\]

That's an eyeful. If you try to input it directly into the formula box, the probability of error will be high and you'll find it difficult to keep track of and edit what you're doing. And bear in mind that even this is not the most complex formula you can create!

There are two keys to executing a task like this.

1. Don't work in the formula box. Instead, do the main part of your work in a word processor or text editor. When you are finished, transfer it to the formula box via conventional copy-and-paste.

2. Break your formula down to simple components, and then build it up gradually.

Let's demonstrate.

Start by translating everything into Portfolio 123 language.

- X1 = (CurAstQ - CurLiabQ)/AstTotQ
- X2 = (IncAftTaxTTM*(1- PayRatioTTM))/AstTotQ
- X3 = EBITTTM/AstTotQ
- X4 = MktCap/LiabTotQ
- X5 = SalesTTM/AstTotQ

By the way, you don't have to actually type those formulas manually. Instead, go to the screener interface, set up a new screen, and then create each formula using the same click-and-type combination you would if you were building a screen.

**Figure 14**
But instead of continuing on with your screen, simply transfer the rule to your word processor via copy-and-paste. After you've done that for each rule, here's what you'd have in your word processor.

\[
\frac{(\text{CurAstQ - CurLiabQ})}{\text{AstTotQ}}
\]
\[
\frac{(\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM}))}{\text{AstTotQ}}
\]
\[
\frac{\text{EBITTTM}}{\text{AstTotQ}}
\]
\[
\frac{\text{MktCap}}{\text{LiabTotQ}}
\]
\[
\frac{\text{SalesTTM}}{\text{AstTotQ}}
\]

Now, let's start building.

First, since we know we're going to combine each of these simple formulas into a single bigger formula, let's put parentheses around each item.

\[
((\text{CurAstQ - CurLiabQ})/\text{AstTotQ})
\]
\[
((\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM})))/\text{AstTotQ}
\]
\[
(\text{EBITTTM}/\text{AstTotQ})
\]
\[
(\text{MktCap}/\text{LiabTotQ})
\]
\[
(\text{SalesTTM}/\text{AstTotQ})
\]

Next, we'll multiply each expression by the amount (coefficient) required in the Altman formula.

\[
1.2 \times ((\text{CurAstQ - CurLiabQ})/\text{AstTotQ})
\]
\[
1.4 \times ((\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM})))/\text{AstTotQ}
\]
\[
3.3 \times (\text{EBITTTM}/\text{AstTotQ})
\]
\[
.6 \times (\text{MktCap}/\text{LiabTotQ})
\]
\[
.999 \times (\text{SalesTTM}/\text{AstTotQ})
\]

Because we're going to combine these items, let's again make our lives easier by surrounding each with parentheses.

\[
(1.2 \times ((\text{CurAstQ - CurLiabQ})/\text{AstTotQ}))
\]
\[
(1.4 \times ((\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM})))/\text{AstTotQ}))
\]
\[
(3.3 \times (\text{EBITTTM}/\text{AstTotQ}))
\]
\[
(0.6 \times (\text{MktCap}/\text{LiabTotQ}))
\]
\[
(0.999 \times (\text{SalesTTM}/\text{AstTotQ}))
\]

Don't worry about mathematical rules governing the order of operations. If we sometimes add parentheses that aren't absolutely necessary, that's fine. Our goal is formula construction convenience, not optimization of parentheses.

Since we know we'll be adding all these expressions, we'll next put a plus sign after each expression (except for the last).

\[
(1.2 \times ((\text{CurAstQ - CurLiabQ})/\text{AstTotQ})) +
\]
\[
(1.4 \times ((\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM})))/\text{AstTotQ})) +
\]
\[
(3.3 \times (\text{EBITTTM}/\text{AstTotQ})) +
\]
\[ \left( \frac{.6 \times (\text{MktCap}/\text{LiabTotQ})}{.999 \times (\text{SalesTTM}/\text{AstTotQ})} \right) \]

Now, all we need do is delete redundant line-breaks so we can make one large expression, instead of five smaller ones.

\[ (1.2 \times ((\text{CurAstQ} - \text{CurLiabQ})/\text{AstTotQ})) + (1.4 \times ((\text{IncAftTaxTTM} \times (1 - \text{PayRatioTTM}))/\text{AstTotQ})) + (3.3 \times (\text{EBITTTM}/\text{AstTotQ})) + (\text{.6 \times (MktCap/LiabTotQ)}) + (\text{.999 \times (SalesTTM/AstTotQ)}) \]

That's it. We're done. I saved this as a custom formula called \$Z\_Score and then referenced it in the ranking system formula box.

Figure 15

By the way, it's also a good idea to save the word processing file you used to build up the formula, in case you want to edit it later on.

The illustration shows a ranking system in which each company's z-score is evaluated relative to the universe as a whole. As with all ranking factors, you could choose to evaluate a company's z-score relative to industry and/or sector peers.

**Conditional Rank Nodes/Factors**

Let's assume you want to include value as one of your rank nodes and that you'd like to use Price/Book and Price/Earnings. Price/Book is pretty basic, but that's not necessarily the case with Price/Earnings.

How do you measure EPS? Many like to use forward PEs; i.e. price divided by a consensus analyst estimate of EPS for the current or next fiscal year. But how will the model handle companies that don't have analyst coverage? Those PEs will come back as NA (Not Available). And you might not be keen on using the estimated earnings if analyst coverage is skimpy, as is often the case for small- and micro-caps.

By setting up a conditional node, you can use the forward PE for companies that have reasonable analyst coverage, and switch to PE based on trailing-12 month EPS for the others.

When you select 'Conditional Node,' you articulate a formula under which there will be two composite nodes: one labeled True and the other labeled False. Depending on the formula evaluation for each stock being ranked it will pass through the rank of either the True or False composite rank.

Figure 16 demonstrates a conditional node that tests to see whether the stock has 3 or more analysts following it. If so, it uses the rank from the True branch than includes the forward-looking PE for the Valuation part of the system. If less than 3 analysts follow the stock, it uses the False node that works with trailing 12 month PE.

Figure 16
The motivation for this is to create a more flexible ranking system. Many times for example you may wish to rank large caps in a slightly different than small caps. Or you may want to use different factors for Financials, etc.

Handling “NA” Items

NA stands for “Not Available.”

In an ideal world, data would be available for every factor for every company. Unfortunately, that’s not the case in reality. We very often encounter situations where important data items are nonexistent for some companies. These are reported in portfolio123 as NA. A good example is PE, which is undefined for almost 60% of our nearly 8,000 stock universe (because of negative EPS or EPS at such low levels as to result of PEs in the hundreds or thousands).

When a screening rule encounters an NA item, it is assumed that the company failed the test and, hence, is omitted from the screen. Ranking systems present more complex challenges since, unlike screens, the factors are not all-or-nothing. All companies are ranked somewhere on a best to worst scale. We therefore need to decide what NA means in terms of best-to-worst. The traditional portfolio123 approach puts NA values at the bottom of the sort, in the worst position. But while we do penalize companies for NA items, we do so with a sense of moderation. When it comes to translating NA to a number, we don’t assign it a value of zero or one. Instead, for each factor in the ranking system, we consider all companies with NA as being in a tie, and the number assigned is just below the rank of the worst company that had meaningful data. The extent of the NA penalty varies from item to item. If NA is a rarity for a particular factor, a company that has one will be penalized sharply. If NA is commonplace, the penalty will be mild, but still a penalty.

Let’s examine this by ranking PEs in a hypothetical five-stock universe.

All ranks are on a 0-100 percentile basis. Because the universe has only five stocks, the possible scores will be 100, 80, 60, 40 and 20.

The lowest (best) PE earns the highest rank, 100. The next best merits a score of 80 and the third best is scored 60. Now suppose there are two companies whose PEs are NA. These two are tied, and they’ll get the numeric score that would have been assigned to the fourth company had it had a meaningful PE, which in this case would have been 20.

Table 1
As you see, NA values do count against a company when it comes to computing its rank. This can be important when rankings are computed relative to industries, some of which may be very small.

It can also have a more general impact. Financial companies in particular are prone to being pushed downward in ranking systems that use several factors that don’t exist for them because of the way they report (e.g., turnover). And where financials are still able to pass user models (because they are sufficiently strong in the non-NA factors), they’re more likely to hover near the borderline and fall out of portfolios more easily when rebalancing takes place.

Portfolio123 users can, if they wish, modify this situation and choose to have NA play a neutral role in rank computations.

The default status is as described above, with NAs having a negative impact on ranks. But if users opt for the alternative, the neutral approach, all NA values will, when the computation process begins, be put to the side. Percentile rankings from zero to 100 will be computed for all firms that have the necessary data. Then, at the end of the process, all NA companies will be assigned a rank in the middle of the valid ranks, a perfectly neutral score. The rank assigned to NA’s will usually be around 50, except when the there are very few ranked stocks (such as in a small universe or industry).

The more NA rank factors a company has, the harder it will be for the firm to appear in any of your rank-driven result sets. That’s because it will be harder for the company to come in near the top and harder for the company to come in near the bottom (as you might seek if you are looking to short poorly ranked stocks).

Let’s look how the example above changes.

Table 2

<table>
<thead>
<tr>
<th>Ticker</th>
<th>Ratio</th>
<th>Rank</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>80</td>
<td>Rank increment is 20 since there are 5 values: 100/5=20</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>NA</td>
<td>20</td>
<td>Rank never reaches 0 because of tie.</td>
</tr>
<tr>
<td>E</td>
<td>NA</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

This approach should not change long-oriented systems since they pick from the top, where you’ll mostly find stocks with valid values. This would be most useful is in a long/short system that buys top ranked stocks and shorts lower ranked stocks using the same ranking system. In this example a long/short system of the best/worst stock would go long A and short C, all with valid values. In the first example the long would be A, and the short either D or C (each with NA).

Functional Odds and Ends

As we moved through this material, we progressed from simple rank factors to complex formulas. So as you work it’s important that you know how to display these alongside the simple factors if you wish to view your work as a whole.

You probably noticed, among the links at the top of the rank interface, one labeled "f(x)." This allows you to show complete formulas, in addition to their names, in your display.

Figure 17
You may also have noticed, in the "Node Properties" section of the interface, a button entitled "Copy & Paste . . ." The Cut, Copy and Paste choices do exactly what you would expect, based on your general Windows experience. "Cut Sub-nodes" and "Copy Sub-nodes" lets you put your mouse on a node and do the cut or copy (and paste) operation only on the sub-nodes.

Those who are comfortable with HTML/XML-type code can input their ranking criteria more directly. One way to do this would be to click on the "text editor" link.

Figure 16

You can type directly into the text area, or type elsewhere (i.e. and HTML or XML editor) and copy into the interface.

The "Insert Node: menu at the upper right will give you a head start by allowing you to automatically input a template for the node of your choice.

Figure 17

<StockFactor Weight="0.00%" RankType="Higher" Scope="Universe">
  <Factor>FACTOR</Factor>
</StockFactor>
If you would like a more pure approach, without any scripts or templates, use the "raw editor (no ajax)" link instead.

Figure 18

Ready for the next step

This completes the how-to-do-it portion of our discussion of ranking systems. The next part of the tutorial series will move to a what-to-do discussion.

Chapter 10 Ranking System Design

The material presented up till now should have made you reasonably comfortable with the vocabulary of portfolio123 modeling (factors and formulas) and with the way to get things done in the screening and ranking interfaces. But knowing how to do things isn’t enough. You also need to know what to do.

When it comes to designing ranking systems, it is not possible to supply an exact recipe that will always assure success. But we can provide guidance that will help you recognize and constructively address all the important choices that need to be made. Besides doing that, we also supply some checklists and factor catalogs that can help you organize your efforts and avoid information overload.

For experienced investors, the concepts you’ll find here will not be earth-shattering. In fact, much will rehash things you already know about stock selection. The focus, here, is on organization,
how to approach the task of ranking system design in such a way as to help you see how ideas you already have can be expressed in the language of portfolio123, to help you easily identify the factors and formulas likely to be of interest to you, and perhaps most important, how to steer clear of concepts that aren’t compatible with your investment philosophy and thereby avoid information overload.

The topic of ranking-system design is, essentially, the same as what makes a good stock. Such a discussion can go on and on, as you can often see in our Community and elsewhere. Consider, for example, the differences in approaches advocated by the likes of Jim Cramer and Warren Buffett. If you listen and/or read carefully, you'll see that you could create ranking systems consistent with either philosophy. Both appreciate fundamentally sound companies so in either case you'll want some factors based on this. Beyond that, a Cramer-oriented system would require sensitivity to what's working now, or as he puts it, what can and cannot be owned. Hence it would contain significant helpings of estimate-based, recommendation-based, and price-based factors. A Buffett-based system, on the other hand, would tilt toward consistency. Such a system would use lots of three-, five-, or even ten-year factors as opposed to quarterly or trailing 12 month items and have heavier weightings of fundamental factors, as well as more sensitivity to valuation.

As is the case with many endeavors, the best way to enhance your rank-design capabilities is to practice, practice, practice. The preceding paragraph is an example of how you can do it no matter where you are, even if you are not logged into portfolio123. Any time you encounter someone’s investment philosophy, whether in conversation, while watching TV, while listening to the radio or a podcast, or while reading, consider, in your own mind, what sort of ranking system you might create to implement it. Don't worry abut getting it "right." There are usually many ways to implement a particular approach. The key is to hone your proficiency in translating investment philosophies into factors and formulas.

With that understanding of the nature of our task, let's now turn to specific steps that can help organize our implementation efforts.

**Choose your theme(s)**

This is crucial. Failure to specifically articulate one or more themes may well be the single most prevalent cause of frustration as you attempt to work with portfolio123.

Start by establishing a menu from which you will choose. Here's the one I use:

- **Growth**
  This is self explanatory. When working with this theme, I seek companies that grow more rapidly than others.

- **Value**
  This theme stresses the relationship between the stock price and one or more important fundamental metrics. I include income investing in this category.

- **Quality**
  This approach emphasizes factors and formulas that suggest we are dealing with a "good" company. That doesn't necessarily mean its stock is flying high, or even that its stock is reasonably priced at the moment. Nor does it mean that the company is performing well right now; even the best of firms have down periods. Quality-oriented investing can require more patience than usual.

- **Sentiment**
  Here, I don't care about the underlying merits of a company or the reasonableness of its stock price. I'm instead concerned with how key investment-community constituencies feel and more importantly, how they are acting. In contrast to quality, this approach opens the door to bad companies whose stocks seem likely to move (hopefully, quickly enough
This menu of themes involves combinations of considering a company versus its stock, and considering the here-and-now versus a longer-term perspective.

<table>
<thead>
<tr>
<th></th>
<th>Company</th>
<th>Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Here and Now</strong></td>
<td>Growth</td>
<td>Sentiment</td>
</tr>
<tr>
<td><strong>Longer Term</strong></td>
<td>Quality</td>
<td>Value</td>
</tr>
</tbody>
</table>

Obviously, the foregoing is geared toward fundamental analysis. That's because this is my background and the way I'm most comfortable working. If you're interested in technical analysis, the substance of what you do will, obviously, differ. But I suggest you take note of the process, which transcends differences between fundamentals and technicals. For example, if you were interested in technical analysis, as you would have to be to create ETF ranking systems, your thematic menu might look something like this:

- **Trending**
  This approach emphasizes prices action that more or less follows an identifiable trend. Your underlying assumption is that there are substantive reasons for this trend (which you may or may not care to articulate) and that it is likely to continue. The functions you choose for your rank formulas will generally be those that measure the strength of the trend, its persistence (longevity), and its sustainability (i.e. you'll likely establish criteria that are geared toward sending early warning signals of a potential change in trend).

- **Oscillating**
  This approach is based on the idea of mean reversion. It assumes that stocks move up and down but not far from some sort of central trend and that if it moves too far away, it's likely to reverse course and head back toward center. Stocks that move too far below a central trend are said to be oversold and ripe for purchase. Stocks moving too far above the trend are said to be overbought and vulnerable to correction. What about seemingly overbought stocks that are in fact, likely to shift toward new higher trading ranges? That is analogous to fundamental investors debating the merits of value versus growth. Discussions like that can go on and on and sometimes generate hostility, and at times, and in the hands of a creative ranking-system designer, actually be reconciled in models that accommodate both viewpoints.

- **Events**
  These are very near-term approaches that look for oddities like crossover, gaps or breakouts; events that suggest something interesting is afoot. Presumably, whatever it was that suddenly caught the market's attention will lead to a new trend in the direction of the oddity; for example, a new and perhaps more pronounced uptrend following a gap up. This theme lends itself well to Boolean (true-or-false) rank factors. For example, you may want to use, as a rank factor: GapUp(50,500,20,0), which means there was a gap up of at least 10% with a 500% volume increase from the 20-bar average. Stocks meeting this criteria will be ranked True, which merits a rank score of 100. Stocks that don’t meet the criteria will be scored zero. In a sense, this true-false approach allows you to bring a screening flavor into the ranking process.

The material presented here will use the fundamental thematic menu presented above. But you need not stick with it if it doesn’t appeal to you, as would obviously be the case if you use
technical analysis. What’s important is that you work form some sort of menu that’s relevant to you (perhaps you might use a different way to classify fundamental themes). Once you have your thematic menu in place, a useful first step in designing a ranking system is to state what theme(s) you will use. A system can confine itself to a single theme. Or it can use as many as you wish (even all available themes). If you use multiple themes, I suggest creating a composite (folder) for each as well as sub-composites for sub-themes.

Whatever your investment philosophy, I recommend you proceed step by step with the following six decision points:

1. Thematic Focus
2. Performance Sensitivity
3. Comparison Criteria
4. Sub-Themes
5. Specific Factors/Formulas
6. Weights

Let’s examine each of these decision points in more depth, using fundamental investing for purposes of illustration.

1. Thematic Focus

This is where you’ll decide whether you’re going to be a specialist or a generalist.

The decision is being made with reference to the ranking system as a whole, and with reference to each theme you chose to include. The goal here is to decide whether you’ll use a small or large number of factors. Specifically, the choices are:

- **Concentrated**
  This means being a specialist. Choose this if you want very specific types of companies, such as growth. This doesn't mean you'll spend your life investing in only one kind of company. You may have many specialized systems all seeking different things. What it does mean is that each individual system will be very particular about what it seeks. In practical terms concentrated ranking systems are those with small numbers of factors and/or formulas.

- **Diverse**
  This is probably the most mainstream approach. Such systems will reflect multiple themes, such as value-growth, and/or more than one way of expressing a particular theme. You'll have more than a few factors and/or formulas, but not so many as would raise eyebrows among others to whom you show your system.

- **Comprehensive**
  These are generalist eyebrow-raising systems containing very large numbers of factors and/or formulas spread across most or all of the themes in your menu. These are for investors who want companies they select to be good in some respects, but they don't care deeply about which respects those might be. It can be a controversial approach - statisticians frown on it since these systems are very likely to have many factors that correlate with one another, and, hence, can be deemed redundant. Practically speaking, it's easy when using such systems to wind up giving more weight to a particular characteristic than you might realize (you weight factor X by 1 percent, but have many other factors that correlate to it such that underlying characteristic in effect has a 10 percent weight in your system). Advocates of comprehensive systems could rest on the fact that data-driven analysis such as we, in effect, use when we build rankings systems, can be imprecise (since so many aberrant things can happen to individual companies).
Accordingly, it can be beneficial to be flexible in terms of how an individual firm demonstrates the general merit we seek.

2. Performance Sensitivity

This is another controversial topic in the area of ranking system design. Here, you are choosing the criteria by which you'll measure the success or failure of your system based on the performance tests you run.

Everyone wants a system where highly ranked stocks outperform poorly ranked stocks, regardless of how many "buckets" are used in the tests. You'll also want to see your well-ranked buckets outperform the market benchmark you choose. Those are the easy issues, the ones on which we can all agree.

The hard part is identifying a time period. Here are the choices:

- **Immediate environment**
  This means you'll want your performance tests to show that the system is performing well now, or in the very recent past. You understand that such a model may be geared toward an atypical investment climate and might not perform as well in many, or perhaps most, other periods. But you're willing to maintain an "adaptive" approach to your investments. In other words, you'll use different ranking systems at different times, based on "heuristics," (subjective judgments about what type of systems are most relevant to the present market environment) and/or other macro or timing models you create elsewhere. If you succeed at such an approach, you'll enjoy spectacular performance. The risk is that you get whipsawed; that you suffer poor performance as you always aim at the market environment from which we just emerged. Investors who follow this approach rarely use more than a one-year time frame for their testing, and many will use less.

- **Over a moderate time period**
  This is similar to the adaptive approach described above, except that it's implemented in a more casual manner. Here, you take a broader view of the market climate and recognize that your time horizon will include some transitions into and out of the conditions you deem most relevant. Accordingly, you will wind up with more instances of lackluster performance in your test results. But when you switch to live implementation, your exposure to whipsaw is diminished (although not entirely eliminated). Performance testing, here, is usually done in time frames ranging from one to three years.

- **Over a long time period**
  These are the users most likely to click on "Max" when inputting the time frame for their tests (or if not max, then perhaps five years). Such investors do not want to engage in any sort of timing (except, perhaps, for higher-level decisions as to how to allocate funds between stocks and other asset classes). When it comes to stocks, these people want systems that have demonstrated an ability to work more often than not over longer time periods. They are more tolerant of cold spells than those who use the other approaches, but they are more likely to enjoy consistency.

It doesn't matter which approach you choose. Interestingly, though, this decision can engender vigorous argument since most investors are passionate about whatever decisions they make in this regard (hence the antagonism between, for example, Cramer fans versus Buffett devotees who are at opposite ends of this spectrum).

What is important - downright critical in fact - is that you make a conscious decision one way or the other and remember it through your testing, and most importantly, as you invest real money based on it. The last thing in the world one who favors immediacy needs is to lose track of that determination and stay too long with a system designed for a very specific set of conditions. Conversely, one who chooses a longer-term approach needs to remember this in tough times, in
order to avoid self-induced whipsaw (moving out of a perfectly good system at the wrong time in response to a temporary cold period).

3. Comparison Criteria

If you experimented with the portfolio123 rank interface, you've already seen the choices:

- **Universe**
  Here, the company's rank for a particular factor or formula will depend on how it compares to all other companies in the universe as a whole.

- **Industry**
  In this case, a company rank will depend on how it compares in the relevant factor or formula only to other companies in the same industry. In this case, Company A, with a growth rate of five percent, may rank higher than Company B and its 20-percent growth rate. That could happen if Company A is in a slow-growing, or perhaps declining industry in which many companies have growth rates worse than five percent. Company B, on the other hand, may be in a hot industry wherein most peers grow faster than 20 percent per year.

- **Sector**
  This is similar to the industry approach except that here, companies are being ranked relative to others in the same sector. When using industry comparisons, semiconductor firms would be ranked only in relation to other semiconductor firms. Here, with sector comparison, semiconductor firms would be ranked relative to all those in the technology sector, which includes not just semiconductors but other areas such as computer hardware, communications equipment, electronic instruments and controls, and so forth.

As with other decisions we face, you can make one choice or mix and match as you see fit. What's most important is that you recognize the implications of the choices.

Industry, and to a lesser extent, sector-based approaches are most associated with longer-term approaches to investing, since you may find great companies that happen to be in cold industries getting the highest ranks. From an investment point of view, this can be an excellent thing. But it may require more patience.

This isn't inevitable. Such ranking systems can also produce better companies in hot industries. If you want this, and are willing to accept all that goes with having a more adaptive immediacy-oriented system, consider adding some industry factors into your model. In other words, don't content yourself to rank companies based on trailing 12 month EPS growth relative to their respective industries. Add a factor based specifically on industry average TTM EPS growth, where industries will be ranked relative to other industries.

If you rank companies relative to the entire investment universe, you will also bring more of an immediacy flavor to your models, since companies in hot industries will be more likely to rank well against the entire universe than will companies in cold industries.

With either of these immediacy leanings, stay sensitive to industry diversification. It's very easy to wind up with portfolios that are too heavily exposed to hot industries (another prescription for whipsaw). We can easily, and automatically, guard against this when we create simulations and portfolios. If you invest with real money before learning how to use those aspect of portfolio123, remember to stay alert on your own to the possibility of inadequate sector/industry diversification.

4. Sub-Themes

Now that you've made key decisions that will determine the general structure of your ranking system, it's time to get into the nitty gritty. This is where you will decide how to express the thematic decisions you made.
Suppose, for example, you are a growth investor. What, exactly, does growth mean to you? Do you want to see demonstrated track records of growth over three- or five-year time horizons? Or are you looking for growth in a trailing 12 month or perhaps one-quarter time frame? Maybe you want all of the above. All are valid expressions of the growth philosophy. This may seem like a difficult choice. Actually, though, assuming you gave proper attention to decisions regarding thematic focus and performance sensitivity, you should find it easy to gravitate to the sub-themes you want.

The hard part is keeping track of what sub-themes are possible. As with the main themes, each investor can come up with his or her own list. Below is the one I use.

- **Growth**
  - Near-term
  - Long-term
  - Acceleration

- **Value**
  - Performance (based on earnings, cash flows, etc.)
  - Assets (based on cash, book value, etc.)
  - Aggressive (may overlap other value sub-themes)
  - Conservative (may overlap other value sub-themes)
  - Dividend Current
  - Dividend Growth
  - Dividend Safety

- **Quality**
  - Near-term
  - Long-term
  - Acceleration
  - Balance Sheet

- **Sentiment**
  - Estimates
  - Ratings
  - Institutions
  - Insiders
  - Short Interest
  - Price/Volume

You may wish to set up sub-composites for each of the sub-themes you use.
5. Factors/Formulas
Now it's time to get specific. This is where you choose the specific factors and/or formulas you will use in your ranking system.

To the uninitiated, this can seem daunting. But if you set up folders and sub-folders for your themes and sub-themes, you should find the factor/formula selection process to be very comfortable. Rather than wading through the seemingly countless possibilities available to you on portfolio123, you will know what areas you want to go to.

To help you navigate the many choices available to you in portfolio123, catalogs of factors/formulas for each of the above mentioned themes and subthemes are offered in the Appendix. Feel free to copy any you want to use into your clipboard and paste directly into the ranking interface.

6. Weights
Weighting is the most judgmental (some might say trial and error) aspect of the process. There are statistical techniques available to calculate the best possible ("optimal") set of weights. I am not necessarily a fan of those approaches (which are not part of portfolio123). They raise a considerable risk of "data mining;" over-analysis of a specific time period to produce results that may not be relevant in other time periods. Producing "robust" models, ones that will work across many different market environments, remains a difficult task requiring, perhaps, as much or more art versus science.

Bearing in mind that the contents of each folder and sub-folder must have weights that total 100%, I suggest starting with equal weights across the board. Then, go through your items one at a time to determine how confident you are that better scores really are related to better stock price performance. Instances of more confidence can translate to higher weights and vice versa.

Mindful of the views of the quant/MPT crowd, I suggest that ultimately, everything you do here is based on confidence. If you have complete confidence in a particular factor, then you should use it alone with a 100 percent weight. (Similarly, if you have complete confidence in a stock, then you should invest 100 percent of your asserts in it.) We shiver thinking about doing such things for one reason and one reason only: because we do not have complete confidence. Notwithstanding all the fancy theory and higher mathematics, that is the essence of allocation/weighting/diversification decisions: adapting to the fact that our confidence levels do not warrant 100 percent commitments.

The dichotomy, here, is whether you measure your level of confidence through statistical studies of the past, or through your own judgment. Depending on who is in the crowd, those can be fighting words (as is the case with performance sensitivity choices, the issues here can be highly controversial). In my opinion, based on having worked with the statistical approaches, you aren't really missing anything when you don't optimize.

When I did work this way, I found myself constantly having to chase my own tail as all the seemingly good work I did collapsed as soon as I changed sample periods, and I'm not alone: some academics have been trying to enhance the Nobel-Prize-winning Capital Asset Pricing Model by working on something known as the C-CAPM (Conditional Capital Asset Pricing Model). Essentially, they're chasing their tails the way I did, after having seen how betas and risk premiums bounce around all over the place as different periods are examined. There's a lot of elitism attached to super-duper platforms that let you optimize but I really found this to have been a frustrating, miserable, and ultimately unproductive way to work. Do not feel all deprived by having to base factor selection and weightings on common sense judgment. In fact, you have the upper hand. (I firmly believe that had more quants been willing to ditch the high end platforms and use common sense, the financial system might not have crashed in 2008!)
Voila!

That's it. Now you have a ranking system. Run your tests, keeping in mind the performance sensitivity choice you made, and working in the spirit of self-critique described in Part 8 (i.e. don't stop the first time you see a performance graph that looks good), keep refining until you get the results that seem most compatible with your investment goals.

At this time, I want to offer some final words on data mining (a topic that has to come to mind any time we speak of optimization). Make sure every factor/formula you use is supported by common sense. It's entirely possible that you may see spectacular performance test results for a system based on something like average monthly trading volume divided by the three year sales growth rate multiplied by the number of analysts publishing estimates for next year's earnings all of which is divided by working capital plus the stock's 52-week high. But in terms of relevance to good share price performance, that example fails the common sense test. So no matter how promising a test result, don't use it to commit real money.

If you honor common sense and make thoughtful choices regarding the above issues, maintain a willingness to engage in self-criticism as discussed in Part 8, and stay willing to accept performance results that may, perhaps, not look perfect so long as they are most explainable in common-sense terms, you're likely to do well. Ultimately, using Portfolio123 to support, rather than replace, common sense is the way to go.
Chapter 10 Appendix

NOTES

• \((x-y)/\text{abs}(y)\)

This formula is used to calculate a growth rate or % change where one of the numbers might be negative. If both numbers are positive, the result will be the same as the conventional formula, \((x/y)-1\). But the alternative formula will produce a more analytically useful answer minus signs are present.

• \(\text{Eval}(X >0,x*y,\text{NA})\)

This is a portfolio123 function that applies if-then logic. The above expression asks us to evaluate \(x\). If it is greater than zero, then the factor is \(x*y\) (this is just an example; it can be \(x\) by itself, or any formula involving \(x\). The key is that if \(X\) is zero or negative, then the expression should be set equal to \(\text{NA}\), which stands for "not available"). This is useful for avoiding meaningless calculations like negative P/E ratios. Note, though, that negative earnings yields are conceptually digestible.

• \($AAA\)

The "$" prefix indicates that AAA is a custom formula. Where those are used, the components of the formula are supplied.

• Overall Inclusiveness

The factor catalog below is not an exhaustive listing. While it offers more than enough for many users, many other factors are offered and countless additional formulas can be created. What's offered here should be taken as a sampling, a set of idea generators.

• Availability of Industry versions of factors/formulas

An asterisk following a factor or formula means you can create versions based on industry averages. For example, \(\text{EPS}\%\text{ChgPYQ} \ast\) indicates that you have two choices: \(\text{EPS}\%\text{ChgPYQ}\) or \(\text{EPS}\%\text{ChgPYQInd}\).
GROWTH IDEAS

- **Near-term**
  
  EPS\%ChgPYQ *  
  EPS\%ChgTTM *  
  Sales\%ChgPYQ *  
  Sales\%ChgTTM *  

- **Long-term**
  
  EPS3YCGr\% *  
  EPS5YCGr\% *  
  Sales3YCGr\% *  
  Sales5YCGr\% *  
  SusGr\%  
  LTGrthRtMean  

- **Acceleration**
  
  \[\frac{(EPS\%ChgPYQ - EPS\%ChgTTM)}{|EPS\%ChgTTM|} * \]  
  \[\frac{(EPS\%ChgTTM - EPS3YCGr\%)}{|EPS3YCGr\%|} * \]  
  \[\frac{(EPS\%ChgTTM - EPS5YCGr\%)}{|EPS5YCGr\%|} * \]  
  \[\frac{(EPS3YCGr\% - EPS5YCGr\%)}{|EPS5YCGr\%|} * \]  
  \[\frac{(LTGrthRtMean - EPS3YCGr\%)}{|EPS3YCGr\%|} * \]  
  \[\frac{(LTGrthRtMean - EPS5YCGr\%)}{|EPS5YCGr\%|} * \]  
  \[\frac{(Sales\%ChgPYQ - Sales\%ChgTTM)}{|Sales\%ChgTTM|} * \]  
  \[\frac{(SALES\%ChgTTM - SALES3YCGr\%)}{|SALES3YCGr\%|} * \]  
  \[\frac{(SALES\%ChgTTM - SALES5YCGr\%)}{|SALES5YCGr\%|} * \]  
  \[\frac{(SALES3YCGr\% - SALES5YCGr\%)}{|SALES5YCGr\%|} * \]
VALUE IDEAS

**Performance**

\[
\text{Eval}(\text{EPS}\%\text{ChgTTM}=0, \text{NA}, (\text{EPS}\%\text{ChgTTM}/\text{Price})\times 100)
\]

\[
\text{Eval}(\text{NextFYEPSMean}=0, \text{NA}, (\text{NextFYEPSMean}/\text{Price})\times 100)
\]

\[
\text{Eval}(\text{CurFYEPSMean}=0, \text{NA}, (\text{CurFYEPSMean}/\text{Price})\times 100)
\]

\[
\text{PEExclXorTTM}
\]

\[
\text{Eval}(\text{NextFYEPSMean}>0, \text{Price}/\text{NextFYEPSMean}, \text{NA})
\]

\[
\text{Eval}(\text{CurFYEPSMean}>0, \text{Price}/\text{CurFYEPSMean}, \text{NA})
\]

PEG

PEGLT

PERelative

Pr2SalesTTM *

Pr2CashFITTM *

Pr2FrCashFITTM *

\[
\$\text{EV}/\$\text{EBITDAttm} = \text{MktCap} + \text{DbtTotQ} - (\text{CashPSQ} \times \text{ShsOutMR})
\]

\[
\text{Eval}(\text{EBITDATTM}>0, \text{EBITDATTM}, \text{NA})
\]

\[
\text{Eval}(\text{NextFYEPSMean}>0, \$\text{EV}/\text{NextFYEPSMean}, \text{NA})
\]

\[
\text{Eval}(\text{CurFYEPSMean}>0, \$\text{EV}/\text{CurFYEPSMean}, \text{NA})
\]

**Assets**

\[
\text{Pr2BookQ} *
\]

\[
\text{CashPSQ}/\text{Price}
\]

\[
(\text{CurAstQ}-\text{CurLiabQ})/\text{MktCap}
\]

\[
(\text{CurAstQ}-\text{InventoryQ})/\text{MktCap}
\]

**Aggressive**

PEG

PEGLT

\[
\text{Eval}(\text{NextFYEPSMean}>0, (\text{NextFYEPSMean}, \text{NA}/\text{Price})\times 100)
\]

\[
\text{Eval}(\text{NextFYEPSMean}>0, \$\text{EV}/\text{NextFYEPSMean}, \text{NA})
\]

**Conservative**

\[
\text{CashPSQ}/\text{Price}
\]

\[
(\text{CurAstQ}-\text{CurLiabQ})/\text{MktCap}
\]

\[
(\text{CurAstQ}-\text{InventoryQ})/\text{MktCap}
\]

PERelative

**Dividend Current**

Yield *

**Dividend Growth**

\[
\text{Div3YCGr}\% *
\]

\[
\text{Div5YCGr}\% *
\]
• Dividend Safety

PayRatioTTM *
Payout5YAvg *
(PayRatioTTM- Payout5YAvg)/abs(Payout5YAvg) *
(Div3YCGr%-EPS3YCGr%)/abs(EPS3YCGr%) *
(Div5YCGr%-EPS5YCGr%)/abs(EPS5YCGr%) *
((Div5YCGr%*ShsOutMR)-CF5YCGr%)/abs(CF5YCGr%)
(Yield/YieldInd)/(Yield5YAvg/Yield5YAvgInd)
QUALITY CATALOG

- **Near-Term**
  
  GMgn%TTM *
  OpMgn%TTM *
  EBITDMgn%TTM
  ROA%TTM *
  ROI%TTM *
  ROE%TTM *
  (ROI%TTM-ROE%TTM)/abs(ROE%TTM) *
  AstTurnTTM *
  InvTurnTTM *
  RecTurnTTM *

- **Long-Term**
  
  GMgn%5YAvg *
  OpMgn%5YAvg *
  EBITDMgn%5YAvg *
  ROA%5YAvg *
  ROI%5YAvg *
  ROE%5YAvg *
  (ROI%5YAvg -ROE%5YAvg)/abs(ROE%5YAvg) *
  (CapSp5YCGr%- Sales5YCGr%)/abs(Sales5YCGr%) *
  (CapSp5YCGr%- CF5YCGr%)/abs( CF5YCGr%)

- **Acceleration**
  
  (GMgn%TTM- GMgn%5YAvg)/abs(GMgn%5YAvg) *
  (OpMgn%TTM- OpMgn%5YAvg)/abs(OpMgn%5YAvg) *
  (EBITDMgn%TTM- EBITDMgn%5YAvg)/abs(EBITDMgn%5YAvg)
  (ROA %TTM- ROA %5YAvg)/abs(ROA %5YAvg) *
  (ROI %TTM- ROI %5YAvg)/abs(ROI %5YAvg) *
  (ROE %TTM- ROE %5YAvg)/abs(ROE %5YAvg) *

- **Balance Sheet**
  
  CurRatioQ *
  QuickRatioQ *
  IntCovTTM *
  DbtLT2EqQ *
  DbtTot2EqQ *
  DbtTot2EqQ/DbtLT2EqQ *

**SENTIMENT CATALOG**

- **Estimates**

  - #AnalystsCurFY
  - #AnalystsNextFY
  - #AnalystsLTGrtRt
  - CurFYEPSMean-CurFYEst4WkAgo
  - CurFYEPSMean-CurFYEst8WkAgo
  - CurFYEPSMean-CurFYEst13WkAgo
  - (CurFYEPSMean-CurFYEst4WkAgo)/abs(CurFYEst4WkAgo)
  - (CurFYEPSMean-CurFYEst8WkAgo)/abs(CurFYEst8WkAgo)
  - (CurFYEPSMean-CurFYEst13WkAgo)/abs(CurFYEst13WkAgo)
  - NextFYEPSMean-NextFYEst4WkAgo
  - NextFYEPSMean-NextFYEst8WkAgo
  - NextFYEPSMean-NextFYEst13WkAgo
  - (NextFYEPSMean-NextFYEst4WkAgo)/abs(NextFYEst4WkAgo)
  - (NextFYEPSMean-NextFYEst8WkAgo)/abs(NextFYEst8WkAgo)
  - (NextFYEPSMean-NextFYEst13WkAgo)/abs(NextFYEst13WkAgo)
  - (LTGrtRtMean- EPS3YCGr%)/abs(EPS3YCGr%)
  - LTGrtRtMean-LTGrtRtEst4WkAgo
  - LTGrtRtMean-LTGrtRtEst8WkAgo
  - LTGrtRtMean-LTGrtRtEst13WkAgo
  - (LTGrtRtMean-LTGrtRtEst4WkAgo)/abs(LTGrtRtEst4WkAgo)
  - (LTGrtRtMean-LTGrtRtEst8WkAgo)/abs(LTGrtRtEst8WkAgo)
  - (LTGrtRtMean-LTGrtRtEst13WkAgo)/abs(LTGrtRtEst13WkAgo)
  - CurFYStdDev/ CurFYEPSMean
  - NextFYStdDev/ NextFYEPSMean
  - LTGrtRtStdDev/ LTGrtRtMean
  - CurFYUpRevLastWk
  - CurFYUpRev4WkAgo
  - NextFYUpRevLastWk
  - NextFYUpRev4WkAgo
  - CurFYDnRevLastWk
  - CurFYDnRev4WkAgo
  - NextFYDnRevLastWk
  - NextFYDnRev4WkAgo
  - (CurFYUpRevLastWk- CurFYDnRevLastWk)/ #AnalystsCurFY
  - (NextFYUpRevLastWk- NextFYDnRevLastWk)/ #AnalystsNextFY
  - Surprise%Q1

- **Ratings**

  - AvgRec
  - AvgRec4WkAgo
  - AvgRec8WkAgo
  - AvgRec13WkAgo
  - AvgRec-AvgRec4WkAgo
  - AvgRec-AvgRec8WkAgo
  - AvgRec-AvgRec13WkAgo
- **Institutions**
  
<table>
<thead>
<tr>
<th>#Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inst%Own</td>
</tr>
<tr>
<td>InstNetPurch</td>
</tr>
<tr>
<td>InstNetPurchPQ</td>
</tr>
</tbody>
</table>

- **Insiders**
  
  | InsOwnerSh%       |
  | InsNetTrans       |
  | InsBuyTrans       |
  | InsSelTrans       |

- **Short Interest**
  
  | SI1Mo%Chg         |
  | SI%Float          |
  | SI%Float- SI%FloatPM2 |
  | SI%Float- SI%FloatPM3 |
  | SI%Float/ SI%FloatPM2 |
  | SI%Float/ SI%FloatPM3 |
  | SIratio           |
  | SIratio- SIratioPM |
  | SIratio- SIratioPM2 |
  | SIratio- SIratioPM3 |
  | SIratio/ SIratioPM2 |
  | SIratio/ SIratioPM3 |

- **Price/Volume**
  
  | Beta            |
  | Price/ PriceH   |
  | Price/ PriceL   |
  | Pr4W%Chg        |
  | Pr13W%Chg       |
  | Pr26W%Chg       |
  | Pr52W%Chg       |
  | Pr4WRel%Chg     |
  | Pr13WRel%Chg    |
  | Pr26WRel%Chg    |
  | Pr52WRel%Chg    |
  | (Pr4WRel%Chg- Pr13WRel%Chg)/ abs(Pr13WRel%Chg) |
  | (Pr4WRel%Chg- Pr26WRel%Chg)/ abs(Pr26WRel%Chg) |
  | (Pr4WRel%Chg- Pr52WRel%Chg)/ abs(Pr52WRel%Chg) |
  | (Pr13WRel%Chg- Pr26WRel%Chg)/ abs(Pr26WRel%Chg) |
  | (Pr13WRel%Chg- Pr52WRel%Chg)/ abs(Pr52WRel%Chg) |
  | (Pr26WRel%Chg- Pr52WRel%Chg)/ abs(Pr52WRel%Chg) |
Chapter 11 Introduction To Simulation

Thus far, over the course of 10 parts of this tutorial series, we studied screening and ranking and have seen some very impressive testing capabilities. So why do we need simulation and its additional layer of testing? The answer, as we'll see, is that simulation is best able to recreate how a model would have performed had it been used in the past under practical real-world conditions and it's the most direct pathway to using implementing your models via Portfolio123's Portfolio capabilities.

Starting point: a sample ranking system

For a broad overview of how Simulation works, let's start with the following simple Growth rank created for demonstration purposes. It uses the following three factors:

- EPS%ChgPYQ (weight = 35%)
- EPS%ChgTTM (weight = 15%)
- EPS Acceleration (weight = 50%)
  - (EPS%ChgPYQ - EPS%ChgTTM) / abs(EPS%ChgTTM)

Figure 1 shows the results of a ten-bucket maximum-period performance test run against a "Basic" custom universe (Market Cap >=250, Price >=5, and no OTC stocks).

Figure 1

That's OK considering that the system was created for demonstration purposes.
Using the rank in a simulation

Figure 2 shows the performance of a strategy built around investing in the 10 top stocks as per the ranking system.

That's a bit disconcerting. Our once-promising strategy seems to have diminished when we tested it via the simulator. Figure 1 might have led us to expect that the top stocks would substantially outperform the S&P 500, but Figure 2 shows a very mundane level of performance.

Reconciling the ranks and the simulation

Part of the “problem” is use of 10 stocks in the simulator. That's less than 3% of the number of stocks in each of the buckets depicted in Figure 1. A ranking system that is effective in identifying the top 300 or so stocks may not work quite as well when we tighten our expectations and look only at the top 10.

But that's not the whole answer. Figure 3 shows a 100-bucket test of the ranking system.

This confirms that the ranking system does not perform as well for the smaller-size buckets at the top of the hierarchy as it did for some other groupings. But it's not as if the 100-bucket test is a complete disaster. The highest buckets do, as a whole, handsomely outperform the many of the lower ones. And the top bucket, which contains the top 10, significantly outperforms the S&P 500. So there probably are other key considerations being captured by the simulation.
The most significant difference is the one that’s inherent in the kinds of tests being done. It's one thing to compound over many time periods (rebalancing intervals). It's quite another to go in sequence, period by period. With the latter, it's not just the magnitude of each move that counts, but also the sequence in which they occur. Another big difference is transaction costs.

None of this is meant to suggest that the sample Growth rank is unusable. Instead, it tells us we need to add some bells and whistles to the strategy. We'd want to aim at the upper end of the ten-bucket test, which means finding some way, aside from a strict rank sort, of choosing 10.

**Simulation tasks**

At first glance, the simulation area may seem a bit intimidating. Actually, though, it’s quite straightforward.

Start by recognizing that the core of a simulation is a ranking system Once you identify a ranking system you want to use (i.e. the growth system referred to here), everything you else do revolves around tasks you’d expect to address as you make real-world decisions.

The interface organizes all these tasks into eight groups of parameters. You can address these in sequence or you can go back and forth at will.

- **General Parameters** – Chose a benchmark for evaluation, establish slippage and commission assumptions, etc.

- **Position Sizing** – Decide how many positions you want your portfolio to have.

- **Universe and Ranking System** – This is self-evident and similar to tasks you likely did in screener.

- **Buy Rules** – This is the most familiar part of the process. A set of buy rules is, for all practical purposes, a screen. To be eligible for purchase, a stock must pass all of your buy rules.

- **Sell Rules** – This looks like a screen in that it involves a set of rules based on the syntax that’s already familiar to you from screening and ranking. Now, however, you’re establishing Sell conditions. In contrast to the Buy rules (where a stock could be bought only if it passed all rules), a stock need satisfy only one of the sell rules in order to be jettisoned from your portfolio.

- **Stop Loss** – This is a set of rules that allows you to exit a position before the next scheduled re-balance date.

- **Hedging/Market Timing** – This allows you to apply market timing rules and pursue defensive alternatives when the market experiences bearish conditions as you define them.

- **Simulation Period** – Here you define the period to be examined, as you did when you tested screens and ranking systems.
Simulation vs. Screener Backtesting

The backtester in the screening section also overcomes two of the major limitations of the rank performance test. Backtesting gives us the same sort of period-by-period sequential analysis that we get in simulation. And as with simulation, backtests can include limits on the number of stocks (based on a rank sort) to be included in the test. But there are some important differences:

- **Trading Costs** – Backtesting and simulation can both accommodate slippage assumptions. Simulation goes a step further and allows users to plug in assumptions regarding commissions, based, presumably, on the cost structures of the brokerage firms where they trade.

- **Portfolio Size** – A screener backtest does not factor in the amount of money you assume you want to commit to the strategy. Such an assumption is part of simulation. It can be an important one. Assuming you deal with a per-trade commission structure (as many do nowadays), there can be a big difference between putting $100,000 into a 25 stock portfolio, versus investing, say, $3,000.

- **Selling** – A screener backtest presumes any stock not passing the screen is “sold” on the next re-balancing date. Simulation, on the other hand, presumes that all stocks continue to be held unless and until a sale is compelled by a separate set of sell rules which, depending on your choice, may or may not be equivalent to failure to meet the requirements of the initial screen (in simulation, the screen is referred to as a set of “buy rules”).

- **Diversification** – With screener backtesting, there is no way to prevent high sector or industry concentration. Simulation, on the other hand, allows you to set limits.

- **Portfolio Weightings** – With screener backtesting, it is presumed that all positions are set to equal weighting at the beginning of each re-balancing period. This isn’t necessarily the case with simulation, where no sizing adjustments occur for positions that are not sold (in other words, long-term winners can run and wind up with larger weightings); new positions are funded, in equal allocations, only with cash raised from selling.

- **Hedging** – You can do this in the screener to a limited extent (through use of complex if-then market-timing rules), but simulation allows you to go much further by making it easier to establish market exit and re-entry points, varying the extent of the hedge you’d like (in terms of percent of assets), and providing a variety of choice as to hedge vehicles.

- **Stop-loss** – With screener, once you “buy” a stock, you must hold it until the next re-balancing and even then, can exit only if the stock fails to continue to appear in the screen the next time it’s re-run. Simulation allows you to sell in between re-balancing dates based on a specific stop-loss rules you establish (which can be a trailing or entry-based stop).

- **Real-world Implementation** – If you want to invest real money based on a strategy you’ve developed with the screener and/or a ranking system, you’re on your own to remember to re-balance on time and to keep track of your transactions, positions, and performance. On the other hand, if you build a strategy using simulation, you can convert it into a real-time tool through a few mouse clicks that create a “Portfolio” based on the parameters in simulation. Simulation uses those parameters to tell you what would have happened in the past. Portfolio uses those same parameters to guide you in your real-time implementation of the strategy.
As you can see, Simulation gives you as realistic a picture of the real-world performance of a strategy as is feasible. Even so, it's important to retain perspective. As good a simulation can be, it's still not reality.

The main difference comes in the area of trading. The simulator has no way of knowing when, during the day, you would have traded had you been following the strategy in real life. It depends on database pricing. You can choose end of day, start of day, or the average of the day's high and low. There can be no assurance that any of those price protocols will match up precisely with what you'd have achieved had you traded in the past. Even if you habitually enter early orders to buy or sell on the open, there's still no assurance you'd have gotten the prices listed in the historical records as having been the opens for those days. If you deal in small stocks and enter large orders, you might have added upward or downward pressure to the opens that wasn't actually present on the historical days in question.

You don't necessarily have to see such variances as flaws. Your real-world experience may be worse than the simulated experience, but it could also be better. Assuming you were prudent in establishing the strategy (e.g., realistic trading cost assumptions and reasonable liquidity rules), the variances should be modest and simulation should deliver a very reasonable picture of reality upon which you can act subject to the most important factor in the development of any strategy: the possibility that the future will not unfold as it did in the past. (So as with screen and ranking-system testing, it's good to experiment with different time periods reflecting different sets of economic/market conditions as you run and evaluate your simulations and think about which historical conditions are likely to provide the best precedent for the future.)

The next part of this tutorial series will guide you step by step in setting up a simulation.
Chapter 12 Setting Up A Simulation

The last part of this tutorial series provided an overview of simulation. It explained why we do it (what it adds to the tests we’ve already learned to conduct on our screens and ranking systems) and introduced the steps. If this material isn’t fresh in your mind, I suggest you review it now before going further.

The material here will be presented in the sequence implied by the Simulation interface. Bear in mind, though, that you don’t have to follow it. You can go in any order you wish. You can launch the simulation any time you want from a button that says “Run Simulation” which is conspicuous in the interface for each step.

Now, let’s look in detail at each of the steps in the Simulation process.

GENERAL

When you opt to create a New simulation, the interface takes you first to the section of the interface referred to as General. It’s shown in Figure 1.

Figure 1

Most of this should be familiar to you from other sections of Portfolio123. Here are some new considerations. As you can see, selections have already been made for a Tutorial Demo that will be used here for illustration purposes.

Starting Capital

This is an important new element. It’s set at $100,000 as a matter of default. Be thoughtful about this and try to use a number that’s realistic in light of the amount you’re actually likely to invest based on the strategy. The size of your portfolio, coupled with the number of positions you want to hold (something that will be established in the next section) will be important factors, along with rebalance frequency, in determining whether trading costs (commissions plus slippage) are likely
to be burdensome to you. Assuming you have a $9.99 flat-rate commission on a portfolio with 25 positions that gets rebalanced every four weeks, the impact of trading costs can vary much depending on whether the portfolio size is $3,000 or $100,000.

**Commission each Trade**

This is separate from any slippage you might want to assume. Notice that the simulator can accommodate three different kinds of commission structures; flat fee, cents per share or % of total. Most users should be able to input an assumption that matches the fee structure of the brokerage firm they plan to use.

**Allow sold holdings to be re-bought at current rebalance**

To one who is experienced in screening, this would seem an odd question that would clearly have to be answered in the negative. The only way a stock could be sold at rebalancing is if it failed one or more of the screening tests; obviously, you would not want such a stock included in your portfolio going forward.

In simulation, the answer is not so clear since, as we'll see later, the sell rules are not necessarily going to match up with the screen.

Suppose, for example, a stock gets into your portfolio by having a rank of 98 and by passing all of your Buy Rules. Assume at re-balancing, the stock still has a still-good-enough rank (96 for example), but was sold is sold because if failed to satisfy a valuation-oriented rule that required selling of stocks with PEG ratios above 2.00. Assume, too, that there is no Buy Rule involving the PEG ratio. Unless you leave this parameter at the default "No" setting, there would be nothing to prevent the just-sold stock from coming right back into your portfolio.

For an example of a situation wherein you might wish to change the setting to "yes," recall from Part 11 that simulation allows portfolios to ride winners (thereby allowing their weightings to increase) while the screener backtest automatically presumes all weights are re-sets to equal at rebalancing. You can re-create the screening approach in Simulation with a single sell rule you can be sure will apply to every possible stock, such as RANK <=100. If you do that, and set this parameter to "Yes," your portfolio will be emptied at each rebalancing and refilled, in equal allocation, with all stocks that measure up as per your ranking system and buy rules, thereby emulating the screener backtest. (Don't assume this makes simulation redundant; there are still other important features that are absent from screener, such as commission, hedging and stop loss).

**Save Transactions**

This is an administrative parameter. The default setting is "yes," which means the simulation will keep detailed records of all the buy and sell transactions. Most of the time, this setting will be fine. But if your simulation is extensive (i.e. very frequent rebalancings) the storing will slow the processing time. If this becomes an issue, and you can live without seeing the transaction details, you can switch the parameter to "no," in which case, the simulation will run much faster.

**POSITION SIZING**

Figure 2 shows the Position Sizing interface.
This is where you determine how many positions you will hold. You can do this by inputting a target ideal percentage for each position or a fixed dollar amount. Figure 2 shows how you would aim for a 25-stock portfolio; you’d accomplish that by telling the simulator the ideal per-position stake is 4%.

**UNIVERSE & RANKING**

This is the heart of the simulation. This is the place where you identify the universe from which you’ll draw and the ranking system you’ll use.

As you can see, this particular simulation will draw from a universe I created called Basic (it aims to establish liquidity by excluding stocks that trade OTC, have market capitalizations below $250 million and share prices below $5).

The ranking system used here is the simple Growth model created for demonstration purposes and introduced in Part 11. It uses the following three factors:
Screening is very widely available on the web but that's not typically so with multi-factor ranking. Accordingly, many new Portfolio123 members are accustomed to thinking of screening as the main stock-selection protocol and tend to see ranking systems as a nice enhancement (i.e. to narrow the results of the screen).

Actually, though, whether ranks enhance screening, or whether screening enhances ranking systems (i.e. as a tool for choosing from among the many stocks ranked in the top bucket) is a matter of semantics; like the argument over whether the chicken or egg came first.

The placement of rank selection within the theoretical simulation sequence is consistent with the vantage point that sees screening as a tool to enhance ranking.

**BUY RULES**

Figure 4, which depicts the buy-rules interface, should look very familiar. For all practical purposes, it's the same as the interface used in the screener.

Despite the familiarity of what we see, there are three things worth noting.

1. The first is substantive. Note the first two rules, one capping industry weight at 20% and the other capping sector weight at 30%. These rules are not available in the screener. As the simulator goes down the list of eligible stocks, from 1 to 25 in this case, if/when it confronts one that will (based on the higher ranking stocks already selected) push the industry or sector exposure over the limit, the stock will be skipped and the next highest stock from a non-excessive industry or sector will be selected in its place. As you work with either or both of these rules, assuming you choose to do so, you may notice that as you force more diversification, you're likely to depress returns. Don't be surprised. The point of diversification is risk-reduction, not return-enhancement.
2. The second item, a cosmetic feature, consists of the rule Names you see just to the left of the formulas. These are for your convenience. If you choose not to fill them in, Portfolio123 will name them Buy1, Buy2, etc.

3. The final item, also cosmetic, is the label “Implicit AND” near the top of the interface. This reminds us that we are, indeed, in a screening interface, one in which stocks must satisfy each rule in order to pass. The only exception, sort of, would be if one of your formulas contains an “or” expression, as is the case with screening.

This particular set of Buy Rules is much simpler than what we often see in many screens. In fact, assuming we don’t run into a case of excess sector or industry concentration, there’s only one filter, the one involving the PEG ratio.

But that’s just the case for this specific demonstration. Any collection of rules you create in the screener can be replicated as simulation Buy rules. In fact, if you want to use one of your screens as a set of Buy rules, you need not recreate the screen line by line. You can copy the rules directly from the screen by using the “Copy From . . . ” button toward the upper right portion of the interface. (Clicking on that button will also give you an opportunity to copy a collection of buy rules you’ve already stored in another simulation or in a Portfolio.)

Sell Rules

Now we’re getting into areas of the simulation that are radically different from what we’ve seen before.

At first glance, Figure 5, which depicts the Sell Rules interface, seems ordinary enough.

Figure 5

Look, however, at the label: (implicit OR). This underscores a feature that is very different from what we’ve seen in the screener or the Buy rules. A stock will be sold if it triggers any one of the rules.

Compare the Buy and Sell protocols:
• Since our target portfolio size is a mere 25 positions, it’s likely that stocks making the grade will be ranked 95 or higher. Notice, though, that a change in rank won’t trigger a sale until we get down below 80. So once we buy a stock, we’re willing to cut it some slack in terms of how much fundamental softening we’ll tolerate before we decide to sell.

• The Buy rules included one that required the PEG ratio (specifically PEGLT, which is computed with reference to the consensus estimate of the long-term EPS growth rate) to be no higher than 1.5. When we screen, we expect a stock to be dropped if, at a rebalancing occasion, its PEG winds up above 1.5. This simulation doesn’t work that way. Given that we’re dealing with a growth orientation, I’m willing to give a stock a chance to run a bit before dropping it, to allow it to even reach what many would consider a state of overvaluation.

• The other three sell rules resemble nothing that was considered in the buying phase. In addition to a big decline in the rank or escalation in the PEG ratio, we would also drop a stock if its 50-day simple moving average dropped below its 200-day average, if the overall consensus analyst recommendation score increased in the past four weeks (since these scores run on a 1 to 5, bull to bear scale, an increase implies at least somebody downgraded the stock), or if the consensus EPS estimate dropped in the past four weeks. Remember, the ranking system we used was based on historic data. The last three sell rules, one way or another, try to ferret out situations where the Street may be turning pessimistic about future prospects.

STOP LOSS

Figure 6 illustrates the simulator’s stop-loss interface.

Figure 6

The default state of affairs, illustrated above, is for no use of stop-loss, meaning stocks can only be sold at rebalancings if they falter under one or more of your Sell rules.

You can, if you wish, modify that by providing for a sale any day based upon a stop loss, which can be Trailing (the stock falls to a specified percent below the peak it achieved since the position was opened) or Entry Based (the stock falls to a specified percent below the purchase price).
Don’t always assume stop-losses enhance your results. Sometimes they backfire by pulling you out of stocks that could have recovered had you given them a chance. Whether or not this is the case depends on the type of strategy you use.

In this case, results would be enhanced by a 15% trailing stop. Compare Figures 7 and 8.

**Figure 7 – No Stop Loss**

**Figure 8 – 15% Trailing Stop Loss**

**HEDGE MKT TIMING**

Figure 9 shows the default state of affairs, where the Hedging-Market Timing functionality is disabled.

**Figure 9**

For now, I’ll leave this as is. These are substantial topics that will be treated separately in the Appendix to this document.
SIMULATION PERIOD & RESTRICTIONS

The most widely used section of this interface, the Start and end Dates, should already be familiar.

Figure 10

Exposure Lists (which you can set up in My 123 >> Lists >> Exposure), consist of one or more date pairings such as:  07/01/2004     07/31/2004

These identify periods for which you want the simulation to assume 100% cash. You can use these if you have an external program (separate from the market-timing section of the Portfolio123 simulator) that generates market timing signals.

The final two sections, Restrict Buy List and Restrict Sell List, consist of tickers you don’t want to buy or don’t want to sell regardless of how the stocks fare under the simulation parameters. If for example, you do not want to own Exxon (XOM) under any conditions, you would include XOM on a Restrict buy list.

You can enter such tickers directly into the interface as seen in Figure 10. If you have a set of tickers you want to use for Restrict Buy or Restrict Sell lists, not just for this specific simulation but for all your Portfolio123 models, you can go to My 123 >> Lists >> Restriction and enter them there. If you do that, you can reference them in individual simulations by having the “Yes” radio button checked in the “Load Global Restrictions” area at the bottom of this interface.

REVIEW

The final section of the interface, depicted in Figure 11, allows you to see everything you did in one place.

Figure 11
If you want to change any area, you can get to it by clicking on the appropriate tab at the top of the Review interface, or you can click on the section title, each of which appears in blue and serves as a link to that particular section.

**APPENDIX – MARKET TIMING AND HEDGING**

Portfolio123 users don’t have to jump ship or passively suffer when the stock market goes sour. The “Hedge / Market Timing” section of the simulator affords you an opportunity to act proactively to moderate losses, or even make money, when times turn bad. This is the sixth step in the Simulation process. It comes just after the Sell rules and just before you finish up with “Period & Restrictions.”

As we’ve seen, this functionality, is inactive, or rather, disabled by default. If you leave it like this, your simulations will proceed normally, assuming you want full exposure to equities or ETFs (those that pass muster under your simulation parameters) at all times.

Here’s what you’ll see if you click to “Enable” hedging.

**Figure A-1**
The sections of the interface are:

- **Hedge**

In this area, you decide how to implement your hedge; what you want to do with your portfolio when your timing rules determine that market conditions are bearish. The default choice is to go 100% into cash. Below, when we look more closely at this area, we'll see the other choices you have.

- **Rebalance Frequency**

This tells the simulator how frequently to run the timing rules and make portfolio adjustments, if necessary. At present, this must match the rebalancing choice you made for the simulation as a whole.

- **Entry Rules**

This is where you specify one or more screening rules that identify bear-market conditions. These rules tell the simulator when you wish to enter into a hedge.

- **Exit Rules**

This is where you specify one or more screening rules that identify normal-market conditions. These rules tell the simulator when you wish to exit any hedge that may be in place.

- **Rule Reference**
This is the standard Rule Reference you see throughout Portfolio123. As in other places, it’s there to help you create Free-Form rules should you choose to use that approach (you may, if you wish, stick to per-defined rules that can be accessed through the Wizard).

Note, though, that there’s one important thing unique to technical analysis rules when used in the hedging interface. All such functions operate, by default, on whatever has been selected as a benchmark. That means you can use all technical-analysis functions in your hedging rules; you are not limited to just those that accept the Series parameter.

Let’s now use an example to look more closely at the key sections.

**A Sample Simulation With Hedging Enabled**

I created a very simple simulation you can use to get acquainted with market timing and hedging. It’s called, appropriately, “Sample To Test Hedging” and it is visible to the Portfolio123 community.

Key aspects of the simulation are:

- Starting Capital: $20,000
- Commission: flat rate of $8.95 per trade
- Slippage: 0.25%
- Rebalance Frequency: Four Weeks
- Targeted Number of Positions: 30

You probably notice that this is not an appealing combination of capital, number of positions, and commission. It has been deliberately made so to help you gauge how the additional trading occasioned by hedging may impact your overall results and encourage you to design protocols that make sense in light of the specifics of your own account.

- Universe: The per-defined Prusselll 3000 universe
- Ranking System: The pre-defined Comprehensive: QVGM model
- Buy Rule: SecWeight < 30
- Sell Rule: Rank < 90
- Period: 8/11/07 – 8/11/10

Figure A-2 shows a summary of the performance of this simulation. Admittedly, it’s pretty poor, having been hammered in the 2008 crash and unable to enjoy the extent of the 2009 recovery. That’s OK. The goal, here, is not to demonstrate general portfolio strategy but to illustrate hedging under difficult transaction-cost assumptions. Figure A-2 is a baseline that can help us gauge the effectiveness of our hedging.

**Figure A-2**
Let's start hedging!

**Timing Rules: Entry and Exit**

Figure A-3 shows what we see after clicking on the "Add Wizard Rule" button.

**Figure A-3**

Here's what we see when we expand all the folders. Notice it differs from the screener wizard.

**Figure A-4**

Here is the SP500 Estimates Trend rule.

**Figure A-5**
Look at the description. It may seem familiar to some. It’s the standard Portfolio123 timing model. It’s bullish if the consensus estimate of S&P 500 companies is trending upward (5-week moving average above 21-week moving average) and if the S&P 500 risk premium is at least 1%. In free form, it looks like this:

\[ \text{close}(0, \#sprp) < 1 \text{ or } \text{sma}(5, 0, \#spepscy) \leq \text{sma}(21, 0, \#spepscy) \]

Notice, though, some interesting subtleties.

Usually when we discuss market timing on Portfolio123, we often talk mainly from the perspective of the bullishness, or at least, normalcy. We say we’re in stocks if . . . . Actually, though, hedging is an active step we initiate when we’re bearish. So our first thought is an entry rule. Look again at the above free form. It articulates the bearish condition; the risk premium being below 1% or the 5-week estimate moving average not being above the 21-week moving average. We’d see the bullish version of the rule when we look at Exit conditions.

Also, notice the drop-down menu. We’re specifically told, in all circumstances, if the rule we’re about to select is an entry or exit condition.

**Figure A-6**

This is important. The wizard is the same for entry or exit. So before adding a rule, check the drop-down to make sure the appropriate version, Bear (enter hedge) or Bull (exit hedge), is showing and switch to the appropriate choice if necessary.

Notice, too, the button that says “Add Entry / Exit Pair.” If you click that, you don’t have to worry about which choice from the drop-down menu you use. Clicking that button will automatically put the bullish and bearish versions of the rule in the appropriate place.

And as with the screener wizard, you can always click on “Show Free Form Code” to toggle to a view that shows the details (and, of course, back to the Wizard view).

**Figure A-7**
Figure A-8 shows what the interface looks like after I use the wizard to establish entry and exit rules based on this protocol.

**Figure A-8**

As suggested above, the pre-defined timing rules were conceived as matched pairs, an entry rule (bearish conditions) and a corresponding exit rule (bullish conditions). But you don’t have to follow the match. You could, for example, use one rule for entry and another for exit.

**Figure A-9**

You could also have more than rule for entry and/or exit and mix and match wizard and free form at will.

**Figure A-10**

For the rest of this tutorial, the standard Portfolio123 timing model will be used (Figure A-8).
The Hedge

Let's start with the simplest hedge, the one that goes 100% cash when conditions are bearish.

Figure A-11

That was a simple hedge, but it served us well.

This is also a very useful way to test your timing rules. Keep the all-cash assumption until you are satisfied in this regard. After your timing rules are set, then you can move on. When you do, there are three issues you will need to address:

1. The hedge vehicle
2. The type of trade
3. The percent allocation

The Hedge Vehicle

Click on the Hedge drop-down.

Now, you see four groups of additional hedge vehicles from which you can choose.

- Fixed Income ETFs

Three are offered; a short-term fund, an intermediate-term fund, and a long-term fund.
• Long (equity) ETFs

We offer standard, double leveraged, and triple leveraged ETFs based on the S&P 500 and the Russell 2000. We also include the ETF pegged to gold.

• Short (equity) ETFs

We offer standard, double leveraged, and triple leveraged short ETFs based on the S&P 500 and the Russell 2000.

• Indies

Here, you’ll find a variety of market induces. Obviously, you can’t use these directly, but if, based on your testing, you decide you’d like to work with one of them, you can substitute an ETF that specifically tracks the index of your choice or approximates it.

It seems likely that the leveraged and short ETFs will be popular choices as hedge vehicles. But you may notice a problem in this regard. They were first introduced in mid-2006 and many came out later than that. Does that mean your ability to backtest is limited? (Even the fixed-income ETFs debuted in 2002, suggesting they, too, would have some backtest limitation.)

Actually, you can test everything all the way back to 3/31/01!

The beauty of these ETFs is that they seek to passively track recognized indexes. Consider the short S&P 500 ETF (ticker: SH). It’s designed to deliver the inverse of the daily performance of the S&P 500. Regardless of when SH was launched, we know what the S&P 500 did every day from 3/31/01 (and, of course, much further back than that). And we can easily multiply each day’s performance by -1 to get a presumed inverse.

This isn’t perfect. All ETFs have tracking error (even the venerable SPY). But the tracking error on SH can be seen to be very, very modest, almost zero. We cannot assume that our effort to multiply historical daily S&P 500 percent moves by -1 will perfectly match what SH would have done had it existed from 3/31/01, but we believe the outcome is quite close; close enough to make for valid testing.

We multiplied the historic daily S&P 500 percent changes by -2 to imply price changes for the double short ETF, by -3 to imply prices for the triple short ETF, by +2 to imply prices for the double long ETF and +3 to imply prices for the triple long ETF. We made the same sorts of calculations to imply old prices for short, leveraged short and leveraged long ETFs based on the Russell 2000.

We performed similar calculations for the fixed income ETFs (based on highly-correlated Vanguard open-end funds with longer price histories) and even for GLD, the gold ETF (here, we estimated per-issuance pro forms historical pricing based on a regression model and the spot price of gold).
So the hedging tests should not be considered an effort to re-create an actual past. Instead, consider them as exactly what they are labeled as being, simulations (under laboratory-like conditions we created).

**The Type Of Trade**

Let’s assume the hedge vehicle we select is the S&P 500 short ETF (SH).

**Figure A-13**

<table>
<thead>
<tr>
<th>Hedge</th>
<th>ProShares Short S&amp;P500 (ETF) - SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Total (equity + cash)</td>
<td>50</td>
</tr>
</tbody>
</table>

Notice that as soon as we select a vehicle other than cash, some other aspects of the interface become visible.

Next to the vehicle itself, we’re asked if we want to make long purchases (the default) or sell short. Since, in this example, we’re dealing with a short ETF, we’ll make a long purchase (indeed, one important rationale for short ETFs is to enable investors to play the bear side of the market even through an account that is not able to sell short, such as is often the case with IRAs).

Below that, we see some choices regarding asset allocation. As illustrated above, the interface assumes we want a 50% hedge.

What that means depends on the type of transaction you want. If I check the margin box, I’d keep all stocks in my portfolio, and then use margin to buy SH up to the point where it totals 50% plus cash and equity.

I’m going to leave the margin box unchecked. That means that whenever I hedge, I’ll sell a portion of my portfolio (the same percentage portion of each stock in the portfolio) and use those proceeds to buy SH.

The results are shown in Figure A-14.

**Figure A-14**
That’s OK. It’s not quite as good as the all-cash approach, but it is dramatically better than not hedging at all.

Commissions are important when you hedge by selling part of your portfolio. Most of the difference between Figure 16 and the all-cash version is attributable to commissions. Assuming this is a problem for you and you do not wish or are unable to change the amount of capital, the number of positions you want to hold or the firm at which you trade, there are still some things you can do to moderate transaction costs.

1. Get as much bang for the buck as possible with each hedge-related trade.

   Since most firms charge flat rates, you don’t get much benefit from hedge trades if you spend commission money to sell just 10% of your positions, even if you buy a leveraged short ETF. You’re likely to get more bang for your buck by using a high hedge percent, maybe 70% or so, and using a less-volatile short vehicle like SDS (where you won’t be penalized so heavily for small timing errors).

2. Consider raising cash for the hedge by selling all or bigger portions of just a few positions.

   If you have so many positions that trading costs are impinging on your ability to hedge effectively, chances are the performance of your overall portfolio won’t be impacted much if you reduce the number of stocks just slightly. In other words, for this example, there’s a good chance the three lowest ranked stocks (out of 30) have performance characteristics similar to the portfolio as a whole.

   For example, when I reduced this test simulation to just 25 positions, the non-hedged performance was almost identical to that of the full 30-stock version. So even if I really do want to stick with 30 stocks under normal conditions, it seems likely that when hedging, I can raise cash by selling 100% of the lowest ranked stock, 100% of the second lowest ranked stock, and so on until I raise as much cash as I need for my hedge. That will definitely reduce the number of commission-able trades.

3. Consider switching to a short or margin strategy, where you don’t have to sell from your existing positions
Suppose you like the idea of a 10% position in SH but can’t really execute the strategy because trading costs will sink it. In that case, if your account so allows, try a 10% short position in the mirror image ETF, in this case SPY.

The Percent Allocation

Except when you hedge with cash (which must be a 100% hedge), you can choose to set the hedge amount and 10%, 20%, 30% and so on up to 100%.

Experiment thoroughly with the ways you can mix-and-match leveraged versus non-leveraged ETFs and different hedge percentages. Many think the benefit of leveraged ETFs is to increase volatility (and give you more reward for times when you are right in your timing). Actually, heavy exposure to leveraged ETFs can be dangerous because of the way these vehicles punish you for timing errors. The real benefit of leverage is to allow you to establish a respectable hedge with a low percent allocation (something you can only do if your commission arrangement so allows) and without using margin, something that cannot be done in some accounts.

Experiment, Experiment, Experiment!

Market timing and hedging are very new in the context of platforms such as Portfolio123. That’s especially so when we add in the pro forma ETF price data that allows us to test all hedge vehicles back to 3/31/01, whenever or not the actual ETFs had yet come into real-life existence.

We’re all going to learn a lot as we go along. Accordingly, we encourage you to experiment, experiment, experiment, and then experiment some more.

Needless to say, we’d love to hear how you’re doing and hope you’ll share your thoughts and experiences with the Portfolio123 community.
Chapter 13 Evaluating Your Simulations

In Parts 11 and 12 of this tutorial series, we saw how simulation adds much to the familiar testing capabilities we previously saw in screening and ranking, and we learned how to set up simulations. Another benefit to Simulation is the level of information we get regarding our test. We'll examine that here.

SUMMARY

As soon as a Portfolio123 finishes running a simulation, you are taken to the summary page, as depicted in Figure 1.

Figure 1
This material is self-explanatory. It gives you a quick sense of what the simulation has accomplished. Sometimes, you can look quickly at the performance graphs in the upper left and see right away that you need to go back to the drawing board.

In this example, it looks like we might have something which, although very much imperfect, is at least worthy further study. (In Part 12, we’ve already seen that we could improve results with a 15% trailing stop, and that we could likely have mitigated the 2008 drawdown via some very simple hedging.) But for purposes of illustration, I’ll assume we want to look more closely at what we have right now.

There are three kinds of information available to you:

- Information about the stocks that make it into the portfolio
- Information about the transactions executed by the simulation
- Information about performance (returns, risk, and trading data)

We’ll examine all of these items in the order presented by the menu that runs down the left side of the page.

**HOLDINGS**

This section provides information about the stocks that have made it into your simulated portfolio.

**Current**

If you click on “Current,” you’ll see a list of stocks you’d now be holding if you were actually investing with this model.

**Figure 2**
There are two especially noteworthy aspects of this display. First, note the download link just above the upper right corner. As is often the case in Portfolio123, you can download all of this information into an Excel spreadsheet. Notice, too, the “Yahoo! Quotes . . .” and “MSN Quotes . . .” buttons just above the table. Clicking either of these will open a separate browser window in which all of your current holdings are displayed in the portfolio module of the site you selected. If you like, you can save there and continue to monitor progress on the site you chose based on the content it offers.

Return and Fundamental

Like “Current,” these next two choices can be used to show the simulation’s current holdings, but using different report formats.

Figure 3 – Current

<table>
<thead>
<tr>
<th>Holdings - Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Figure 4 – Fundamental

<table>
<thead>
<tr>
<th>Holdings - Fundamental</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

Allocation

This presents a different view of your portfolio.

Figure 5
Recall from Part 12 that one of our Buy rules capped sector weight at 30%. We see in Figure 5 that Technology, at 28%, is bumping up against that limit. It’s possible that one more tech stock might put us over the top.

I decided to go back to the Buy rules, turn off the sector-limit rule, and re-run the simulation to see exactly what our diversification mandate did. I found that Technology jumped to 61% but the overall return increased very modestly: The present market value rose from $186,902.94 to $192,284.95. Speaking for myself, I’m not impressed with the overall gain. I don’t think it’s worth the extra risk inherent in the now-huge exposure to just one sector.

**Historical**

This gives you an opportunity to see what stocks were included in the portfolio previous points in time.

**Figure 6**
Ranks

Here, you can see the information about the rank for each stock that makes it into your portfolio.

Figure 7

![Ranks Table]

Notice the drop-down menu in the upper left area. This is similar to the one you’ve already seen in the Ranking area, which allows you to determine how much detail you’d like to see regarding the ranks.

Notice, too, the date menu in the upper right. You can use this to see rank information about groups of stocks previously held in the simulated portfolio.

Performance

Here, you can get good answers to the most basic question you’re likely to have about your simulation: How did it do?

Graphs

We can start the way investors often like to start when the how-did-it-do question surfaces: by clicking on Graphs. Figure 8 shows what we’ll see.

Figure 8
As you can see, the graphs present the value of a $100 investment, the % drawdown, and the % cash invested over time.

You can use the interface at the top to make adjustments that should already be familiar from other areas of Portfolio123; the time period and the benchmark. Another familiar feature to the right of that interface is the download link, that lets you create an Excel spreadsheet containing the data upon which the top graph is based.

Now let’s look at some less-familiar features.

Notice the check box to the right next to “Log Scale.” You can check this to see the charts presented according to a logarithmic scale. Figure 9 shows what a logarithmic price chart looks like.

Figure 9
With an ordinary numeric price chart, the distance between, say, 100 and 200 would look the same as the distance between 400 and 500. Numerically, both differences amount to 100.

With a logarithmic price chart, the difference between 400 and 500 (which amounts to 25%) would appear much smaller than the difference between 100 and 200 (100%). That is atypical of the way many news organizations and web sites present charts, but it is a more accurate reflection of performance.

Notice, now, the input box to the left labeled “Additional (search).” You can chart another ticker for comparison purposes, as a supplement to you chosen benchmark.

Figure 10 shows what this would look like if I choose to compare my simulation to, say, Berkshire Hathaway (BRK.A).

**Figure 10**

Notice that the drop-down menu next to the label “Position” is set, by default, to “Behind.” Figure 11 shows what you’d see with the other choice, “Above.”

**Figure 11**
Whichever view you prefer, I think we can say the result is intriguing. Berkshire seems to get the edge because it delivered comparable return with what appears to be less volatility. But the fact that we’re even in the ballpark makes for an impressive conversation piece considering this simulation was patched together quickly just for demonstration purposes.

Stats

The Stats menu choice starts out by giving us a numerical presentation that should be self-explanatory and familiar to anyone who has looked at a report of mutual fund performance.

Figure 12

<table>
<thead>
<tr>
<th>Performance</th>
<th>Model</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>90.18%</td>
<td>13.16%</td>
</tr>
<tr>
<td>Annualized</td>
<td>6.76%</td>
<td>1.27%</td>
</tr>
<tr>
<td>Year To Date</td>
<td>2.87%</td>
<td>3.10%</td>
</tr>
<tr>
<td>4 Week</td>
<td>2.39%</td>
<td>2.93%</td>
</tr>
<tr>
<td>13 Week</td>
<td>15.29%</td>
<td>9.66%</td>
</tr>
<tr>
<td>1 Year</td>
<td>28.18%</td>
<td>18.72%</td>
</tr>
<tr>
<td>3 Year</td>
<td>-7.83%</td>
<td>-4.23%</td>
</tr>
</tbody>
</table>

Scrolling further down, on that page, we can see the distribution of monthly (the default choice), weekly, or annual returns for our simulated portfolio and the S&P 500.

Figure 13
Notice the download link on the upper right. Figure 14 shows the Excel histogram you'll get if you use this feature.

**Figure 14**

![Distribution Chart](image)

It’s hard to say how widely-used this feature was when it was introduced on Portfolio123, but the 2007-08 financial crisis and the increased attention it brought not just to overall returns but the way they are distributed (particularly increased awareness of negative extremes) definitely brought this sort of inquiry to the forefront. As you can see, this particular simulated portfolio has been a bit more prone to particularly poor months, but not enough so to suggest cause for worry.

The monthly returns graph at the bottom of this page (Figure 15) and the spreadsheet we can download based on it (Figure 16) support this assessment.

**Figure 15**

![Spreadsheet](image)
The next group of items fulfill what can be described as an audit function. They allow us to look in depth at what, exactly, the simulation has done. All

This does exactly what the label suggests: It provides a record of all transactions executed in our simulated portfolio. Figure 17 shows a small portion of the total, those executed on the most recent re-balancing date.

Figure 17
We see what was bought, what was sold, and probably most interestingly, why the sales occurred. ANN, for example, ran afoul of Sell rule 4 which, as we learned in Part 12, was an analyst rating downgrade. KYO was sold because its rank fell below 80, the sell threshold we chose.

There’s a lot of information here. Most users find it more convenient to use the download link at the top of the table to create an Excel spreadsheet.

**Figure 18**

*Realized*

This feature allows us to see all realized transactions.

**Figure 19**

Notice the drop-down menu at the top. It allows us to aggregate the individual items by symbol (often, individual stocks are bought and sold on several separate occasions), by Industry, by Sector or by Transaction Note or Sell Rule.
Figure 20 shows that the most frequently invoked sell rule was Sell3, the one involving a deteriorating moving average trend.

We also see, though, that the moving average sell rule wasn’t overly productive. The winner-loser ratio is unimpressive as is the average return. Perhaps we should consider eliminating that rule. The high-PEG ratio sell rule (Sell2) was invoked so rarely as to hardly be worth considering. The sell rules based on rank deterioration, recommendation downgrade and reduction in estimate seemed reasonably productive.

Figure 21, which depicts the sector aggregation, shows that while tech was important in terms of portfolio allocation, it’s not what drove positive performance. Services and Basic Materials were our primary winners.

By Symbol

This provides the ultimate drill-down. We can examine individual stocks, see the time(s) when they entered and exited the portfolio, and how well they did while they were held.

Here’s an example with Tyco Electronics (TEL), one of the stocks appearing in this simulation as of this writing.
The first time TEL entered the portfolio, August 16, 2010, it didn’t accomplish much. It was sold at the next (September 13th) re-balancing based on a diminishing moving-average trend and as often happened with that particular sell rule (see Figure 20), the experience was not productive. The stock came back at the next re-balancing (October 11th) and stayed through this writing (early 2011) and so far in its second tenure, it appears to be contributing well to portfolio performance.

**STATISTICS**

Although this is at the bottom of the menu, this section is arguably the most intriguing, offering up some of the most sought-after information.

**Trading**

This section, illustrated by Figure 24, presents information many traders cherish. It evaluates the simulation in terms of winners versus losers.

**Figure 24**

<table>
<thead>
<tr>
<th>Main Parameters</th>
<th>Trading Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting Capital $100,000.00</td>
<td>Total Buy Trades: 2,164</td>
</tr>
<tr>
<td>Total Cash Added: $0.00</td>
<td>Total Sell Trades: 2,199</td>
</tr>
<tr>
<td>Ending Market Value: $100,177.55</td>
<td>Annualized Turnover: 865.41%</td>
</tr>
<tr>
<td>Start Date: 03/31/01</td>
<td>Total Trading Cost: $42,986.97</td>
</tr>
<tr>
<td>End Date: 01/26/11</td>
<td>Realized Winners: 54.61%</td>
</tr>
<tr>
<td>Days Since Inception: 3658</td>
<td>Unrealized Winners: 72.00%</td>
</tr>
<tr>
<td></td>
<td>Overall Winners: 54.81%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Realized</th>
<th>Unrealized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trades</td>
<td>2,139</td>
<td>1,168</td>
</tr>
<tr>
<td>All Winners</td>
<td>971</td>
<td>18</td>
</tr>
<tr>
<td>All Losers</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Avg Return</td>
<td>1.03%</td>
<td>-11.68%</td>
</tr>
<tr>
<td>Avg Days Held</td>
<td>42.90</td>
<td>39.65</td>
</tr>
<tr>
<td>Biggest Winner/Loser</td>
<td>3,236.59</td>
<td>-5,491.12</td>
</tr>
<tr>
<td>Biggest Winner/Loser $</td>
<td>$106,699</td>
<td>$76,633</td>
</tr>
</tbody>
</table>

Generally, this content is self-explanatory. But there are a few points worth noting in terms of what all this says about the demonstration simulation.

Some may dream of getting a bigger percentage of realized winners but often, 50-50 is what most achieve over time. Here, the realized winning percentage is 54.6%, is actually quite reasonable.
Superior returns tend to come when average-winner gain dwarf average-loser declines. But among realized transactions, that’s not heavily present: We see an average gain of 11.09% for winners versus an average 11.08% loss for losers. This simulation’s performance was dependent, perhaps unusually so, on the win-loos percentage.

The balance among unrealized positions raises an eyebrow. The winning percent here is quite high, 72%, and the average percent gap is more appealing; +12.39% on average for winners, versus -4.06% on average for losers.

What happens between Realized and Unrealized? Is the present situation involving Unrealized transactions a fluke? Clearly, although the simulation has some good qualities, we’re not yet ready to pronounce if a finished product.

**Risk**

With this content, all the way at the bottom of the menu, Portfolio123 arguably saves the best for last.

**Figure 25**

<table>
<thead>
<tr>
<th>Risk Measurements - Since Inception: 03/31/01</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>31.30%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.16</td>
</tr>
<tr>
<td>Sortino Ratio</td>
<td>0.21</td>
</tr>
<tr>
<td>Correlation with S&amp;P 500</td>
<td>0.87</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.76</td>
</tr>
<tr>
<td>Beta</td>
<td>1.04</td>
</tr>
<tr>
<td>Alpha (annualized)</td>
<td>5.52%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Measurements - Trailing 3 Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>43.70%</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.07</td>
</tr>
<tr>
<td>Sortino Ratio</td>
<td>-0.09</td>
</tr>
<tr>
<td>Correlation with S&amp;P 500</td>
<td>0.93</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.86</td>
</tr>
<tr>
<td>Beta</td>
<td>1.12</td>
</tr>
<tr>
<td>Alpha (annualized)</td>
<td>-1.51%</td>
</tr>
</tbody>
</table>

Notice, here, the A-word: Alpha. It’s what every portfolio manager today dreams of. It’s a measure of how much annualized return the portfolio exhibits above and beyond the level of risk assumed by the portfolio manager. A manager who subjects the portfolio to above-average risk would have no right to brag about above-average returns unless the return was higher than what investors had a right to expect based on the excess risk. Conversely, a manager with below-average return would still earn respect if the level of conservatism was such as to generate an expectation that the returns would come in lower than what we saw.

In interpreting the data, be aware that Standard Deviation (a measure of the volatility of portfolio returns) is computed by Portfolio123 based on daily returns. Many other sources tend to use monthly numbers, which are typically much lower. It’s important to recognize this lest you be shocked by what at first might look like an unduly high standard deviation. The key is to focus on the comparison between the Model and the S&P 500. The same holds true of the Sharpe Ratio, return divided by standard deviation, and the Sortino Ratio, return divided by the negative portions of standard deviation (NOTE: Strictly speaking, these are Sharpe-like and Sortino-like ratios since, which differ from the classic versions in the we do not subtract the risk-free rate from the portfolio return). Use of daily computations will often make those ratios appear lower than they might if they were calculated using monthly returns. So again, the portfolio-versus-market return is the one upon which you should focus on.

Viewed from inception, this demonstration simulation produces good results in terms of Alpha, Standard Deviation, Sharpe Ratio and Sortino Ratio. The last three years, however, were not favorable, suggesting a need for more refinement, and possibly some use of market timing and hedging.
Correlation with the S&P 500 and R-Squared (the percent of portfolio changes that can be associated with movements of S&P 500) are unremarkable. Many like to see lower numbers, which would suggest a portfolio that tends to a larger extent to chart its own path as opposed to largely imitating the market. Beta is another indication of the extent to which the portfolio mimics the market. Our above-1.00 Betas tell us the portfolio is more volatile than the S&P 500 (only moderately so), which would be fine as long as we’re getting enough additional return to offset the increased risk (the Alphas tell us we have seen this on a long-term basis, but not during the past three years).

**IN CONCLUSION**

As you have seen from this material as well as Parts 11 and 12, Portfolio123 simulation is a very powerful tool. It's more intricate than the testing we do with screens and ranking systems, but the payoff is great in terms of the realistic way simulated portfolios mimic the market, the flexibility they embrace (hedging, sell protocols, stop loss) and the depth of information you get regarding your strategy.

**Chapter 14 Portfolios**

If you’re comfortable with the material presented in Parts 12 and 13 of this Tutorial series, which covered the ins and outs of Simulation, you already know a lot about Portfolio. In fact, if one looks at Portfolio in a casual manner, it might seem identical with Simulation.

The core of Simulation and Portfolio are, in fact, identical. The differences, one way or another, boil down to a matter of past versus future.

- Simulations are set to start running at some point in the past, and run through the present time. Portfolio is set to start at the present time and run into the future in real time.

- The information you get is largely the same the difference being that with Simulation you use the information to evaluate a strategy that has not been implemented in the real world. With Portfolio, you use the information to conduct ongoing evaluation of a strategy that’s being implemented live.

- Because simulation has run in the past, Portfolio123 can and does make all the hypothetical trades for you. Because Portfolio runs in real time and has been designed under the assumption that you’ll be implementing it with real money, all Portfolio123 can do for you is prompt you, at the appropriate time, to take action to re-balance the list and, if you are actually investing in the strategy, presume you follow through by making those trades in your account.
Because Simulation is a make-believe portfolio that has operated in the past, it’s fine to stick precisely with computer-generated assumptions about what will be traded, number of shares traded, and execution price. Because Portfolio is a real-time activity potentially with real money, it’s necessary that platform allow users to edit trade data to assure that the tracking and evaluation occurs on the basis of the trades as they were really made. Portfolio also gives users opportunities to reject trades proposed by Portfolio123 and/or to add new ones.

Much of this can be easily demonstrated by assuming we like the demonstration Simulation presented in Parts 12 and 13 and that we’d like to create a Portfolio which will be used to support real-money implementation of the strategy.

LAUNCHING THE NEW PORTFOLIO

Figure 1 shows what you see when you click on the appropriate prompt to create a new Portfolio.

Figure 1

That looks familiar!

Notice that default assumptions have been plugged in for some parameters. If you are basing your Portfolio on an existing Simulation, as we’re doing here, you need not bother inputting your parameters.

Notice the conspicuous prompt (set out visually by a yellow background) inviting you to copy from something else.

If you click on the prompt, you’ll see a small browser window that looks like this.

Figure 2
I’ll use the middle menu, “My Simulations,” to copy from the demonstration simulation with which we’ve been working.

Figure 3

Here’s what happens after I click on Copy.

Figure 4

Once again, we’re on familiar ground. Notice, for example, that the commission assumption has been modified to 9.99, as opposed to the 10.0 figure we saw by default. The only thing I’d like to do here is edit the Portfolio Name, to delete the words “Port Copy of.”

The next six sections, Position Sizing, Universe & Ranking, Buy, Sell Stop Loss and Hedge Mkt Timing, now look exactly as they did in the simulation.

There’s a slight difference in the next tab. The name has changed from “Period & Restrictions” to “Restrictions.” The interface, likewise, allows only for the listing of restrictions.

Figure 5
This makes perfect sense. There’s nothing for us to do in terms of “Period.” Portfolio123 already understands it will start now, and keep running indefinitely, until we decide we no longer want to use it, and delete it.

The final tab, “Review,” shows much the same content as we saw in Simulation. But in Portfolio, it plays a much more critical role. Notice, here, the absence of the “Run Simulation” buttons we saw in Simulation. Because Portfolio is meant to be a real-money strategy, we need to be much more careful about launching it. Instead of placing prompts all over the place, which could very easily be clicked by accident, this action is available only in final “Review” section.

Figure 6

**MAKING YOUR INITIAL PURCHASES**
Look again at Figure 6. Notice the drop-down menu and yellow-background prompt at the top of the interface. This is new to Portfolio.

The drop-down menu has three choices, “Get Recommendations,” the default choice, “Manually Enter Positions” and “Copy Positions”.

If you click to manually enter positions, Portfolio123 will set up the strategy but refrain from entering any stocks and wait for you to use the Edit interface (which we’ll see later) to do it on your own.

If you click to Copy positions, here’s what you’ll see.

**Figure 7**

Portfolio123 presumes you want to begin your live strategy with the most recent list of names generated by the Simulation that served as the basis for this Portfolio. You can fully translate the simulation by leaving the Copy Weights button checked. In the alternative, you can re-set the weightings to equal.

For purposes of this tutorial, I’m going to use the default “Get Recommendations” choice. Here’s what I see after clicking “Go.”

**Figure 8**

If I want to set up the portfolio based exactly on the list of stocks shown (which are the same the simulation would show if today is a re-balancing date), I can simply click on “Generate Portfolio.” Notice, though, that I am able to un-check a box next to any stock I don’t want to own. Actually, I’m going to leave all the boxes checked and click on “Generate Portfolio.”
Figure 9 shows what I see after the portfolio is generated.

Figure 9

Notice that nothing appears in the Performance Graph. That’s because the portfolio was just launched. There hasn’t yet been any opportunity to perform. Other performance-oriented tables will be similarly blank at this time.

Actually, though, we’ve come to a very important juncture.

If you aren’t going to invest real money (i.e. if you just want an out-of-sample test for a strategy you developed in Simulation), there is nothing more you need do at this time.

If, on the other hand, you are investing real money, you may not want to stop here. Notice in the “Last 10 Trades,” table, for example, that Portfolio123 assumed you bought 189 shares of AIMC at $21.11. This may not conform to reality. Perhaps you rounded up to 190 shares. Most likely, you got a price that differed from $21.11. If you want to track a real-life portfolio and get accurate information on your performance, it’s important that all the transaction information be accurate. So after you execute your trades, come back to this Portfolio, go to the Transactions section of the left-side menu, and click on “Edit.”

Figure 10
If you were unable to execute any of your Buy orders, use the check-box to delete the stock. As to the rest, make all necessary corrections. When you have finished, click the “Update” button at the bottom of the table.

Many users will be finished at this time, and need do nothing further until the next re-balancing date.

Others, however, may still have some work to do.

Suppose you decide to add another stock, something apart from the Portfolio123-generated list. (No matter how much we try to automate the process, it is, ultimately, your money and your portfolio, so it’s important that we give you all the opportunities you need to over-ride.)

Go to the Transactions section of the left-side menu and click on “Add.” Here’s what you’ll see.

**Figure 11**

![Image of a transaction form](image)

The first row of input boxes is straightforward. You can input the ticker, number of share and price associated with any additional buy or short transaction you make.

On the second row, you see a drop-down menu in Symbol column. That will allow you to choose the ticker symbol of any stock in your portfolio. Here’s an example:

**Figure 12**

![Image of a transaction form](image)
Since the portfolio has 220 shares of FL, the only valid action is to Sell (if it were a short position, the “Cover” button would become clickable). I can sell all 220 shares, or change that entry and sell part of the position.

We see the 1/28/11 date because the portfolio was just created. As the portfolio continues, you can add transactions for other dates.

Figure 13 shows what you’d see if you altered the drop-down menu at the top, the one that now says “Trade.”

Figure 13

![Figure 13](image13.png)

This gives you the opportunity to add new cash or withdraw cash (you’d signify a withdrawal by entering cash as a negative amount).

That’s it. You now have your portfolio, based on the strategy you developed in your simulation, the stocks recommended based on that model, your real-life transaction information, and any alterations you chose to make.

Now all you need do is review it as time passes and you accumulate a track record and, of course, re-balance at your chosen intervals.

**REBALANCING**

Portfolio123 will send you an e-mail reminded of when its time to re-balance, based on the parameter established in the “General” section of your Simulation/Portfolio.

You can start the re-balancing process by clicking on “Re balance,” the second item in the left-side menu.

I can’t demonstrate re-balance with the demonstration portfolio we’ve been examining because it was just set up. Instead, Figure 14 illustrates a re-balancing with a different (dormant) portfolio saved in my account.

Figure 14

![Figure 14](image14.png)
Note that the last re-balance was 127 days ago. This underscores that fact that notwithstanding the parameters you set, you can actually re-balance at any time. (Portfolio123 will send you e-mail reminders as to when it's time to re-balance based on the parameters you set, but you can choose to ignore them if you wish.)

Here's what I get after clicking on "Make Current."

**Figure 15**

<table>
<thead>
<tr>
<th>Last portfolio rebalance</th>
<th>01/28/11 (0 days ago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebalance frequency</td>
<td>Four Weeks</td>
</tr>
<tr>
<td>Next rebalance date</td>
<td>02/25/11 on Friday (in 28 days)</td>
</tr>
</tbody>
</table>

The recommendations will be based on fundamental data as of 01/27/11

![Get Recommendations, Commit, Reset]

Now that Portfolio123 and the user are in agreement that as to the timing of this re-balancing, we can click on "Get Recommendations."

**Figure 16**

Now that Portfolio123 and the user are in agreement that as to the timing of this re-balancing, we can click on "Get Recommendations."

**Figure 17**

These are the Buys and Sells the model wants you to execute. Remember, though, it's your money. As with the initial portfolio setup, you have the last word. If you're satisfied with the recommendations, you can click on "Commit."

**Figure 17**
We’re almost finished. Make sure you click on Edit (in the left-side menu) and input your actual execution (shares and price) data.

**Figure 18**

<table>
<thead>
<tr>
<th>Date</th>
<th>Symbol Name</th>
<th>Trade</th>
<th>Shares</th>
<th>Price $</th>
<th>Comm $</th>
<th>Slippage $</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-01-28</td>
<td>MLS Novellus Systems, Inc.</td>
<td>BUY</td>
<td>213.0</td>
<td>37.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>PCCC PC Connection, Inc.</td>
<td>BUY</td>
<td>873.0</td>
<td>9.03</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>KLD KLA-Tencor Corporation</td>
<td>BUY</td>
<td>176.0</td>
<td>44.68</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>SOLR GT Solar International, Inc.</td>
<td>BUY</td>
<td>705.0</td>
<td>11.17</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>AMAT Applied Materials, Inc.</td>
<td>BUY</td>
<td>488.0</td>
<td>16.10</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>MDN Metropolitan Health Networks, Inc.</td>
<td>BUY</td>
<td>1,640.0</td>
<td>4.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>PUDA Puda Coal, Inc.</td>
<td>BUY</td>
<td>626.0</td>
<td>12.56</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>CSH Searc Holdings, Inc.</td>
<td>BUY</td>
<td>74.0</td>
<td>104.94</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>AGP AMERIGROUP Corporation</td>
<td>BUY</td>
<td>149.0</td>
<td>25.72</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>KLIC Klucie and Soffa Industries Inc.</td>
<td>BUY</td>
<td>757.0</td>
<td>9.98</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>2011-01-28</td>
<td>XRTX Xyntex Ltd.</td>
<td>SELL</td>
<td>447.0</td>
<td>13.39</td>
<td>0.00</td>
<td>0.00</td>
<td>StopLoss</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>HRBR Helon Electric, Inc.</td>
<td>SELL</td>
<td>411.0</td>
<td>18.97</td>
<td>0.00</td>
<td>0.00</td>
<td>StopLoss</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>SCVL Shiva Carnival, Inc.</td>
<td>SELL</td>
<td>361.0</td>
<td>25.65</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell8</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>GII G-II Apparel Group, Ltd</td>
<td>SELL</td>
<td>241.0</td>
<td>35.49</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell8</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>LIX Lasmart International, Inc.</td>
<td>SELL</td>
<td>187.0</td>
<td>36.43</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell8</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>CVX Chevron Corporation</td>
<td>SELL</td>
<td>90.0</td>
<td>94.75</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell3</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>VLCCF Knightsbridge Tankers Limited</td>
<td>SELL</td>
<td>339.0</td>
<td>23.55</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell5</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>KVJR Quaker Chemical Corporation</td>
<td>SELL</td>
<td>223.0</td>
<td>39.59</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell8</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>PLUS ePlus Inc.</td>
<td>SELL</td>
<td>334.0</td>
<td>29.51</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell8</td>
</tr>
<tr>
<td>2011-01-28</td>
<td>ADM Archer Daniels Midland Company</td>
<td>SELL</td>
<td>214.0</td>
<td>33.43</td>
<td>0.00</td>
<td>0.00</td>
<td>Sell3</td>
</tr>
</tbody>
</table>

When you’ve finished, click on “Update.”

That’s it. The rebalanced has been completed. Now all you need do is review your performance (using the same presentations as we saw with Simulation) and wait till the next re-balancing occasion.

**IN CONCLUSION**

That concludes this tutorial series.

You now know how to build and test screens and ranking systems. You know how to expand upon them with Simulations and how to use Portfolio to help you implement your strategies in the real world.

Use as much of what we offer as you like. Some may want to keep it simple by, for example, building a screen with the Rules Wizard and maybe using quick rank to sort and focus on a specific number of stocks which will be examined case-by-case before a buy or don’t-buy
decision is made. Others will want to go full out with screens, rankings, full-out customization (lists, universes, formulas), advanced features such as line-item variables, simulations and portfolios. Most users will probably be somewhere in between the extremes.

The most important thing is that you work in way that is comfortable for you.

Chapter 15 Excel Add-In: Stefano’s P123 Manager

Stefano’s P123 Manager is an Excel add-in that adds considerable power and flexibility to your Simulation-development efforts. It doesn’t necessarily do anything you can’t do on the Portfolio123 web site. Instead, it does things much, much more quickly enabling you to do interesting things many of which you probably wouldn’t bother with if you don’t have the add-in.

This Tutorial presumes you are comfortable with creating, testing and evaluating Simulations in Portfolio123. If you need a refresher, you may wish to download Part 14 of the Tutorial Series, available in the Tutorials topic of the Help area (http://www.portfolio123.com/doc/SimulationEvaluation.pdf).

*          *          *          *          *

Essentially, the add-in allows you to see what your simulation performance results would look like with changes in key parameters. On the web, you would do one new trial at a time. With the add-in, you can run up to 100 trials at a time. Multiple trials would be on the following categories of parameter changes:

- Changes in Period (Start and/or End dates)

  This is the heart of the add-in. It allows you to examine many different trial periods, including periods that overlap. Besides providing full analyses of how your simulation performed under different market conditions, the flexibility you get with assigning dates helps you assess the robustness of your model; i.e. to determine the extent, if any, to which good or bad luck involving start and end dates might have impacted the sort of single trial you may have run on the web.

- Changes in Rules (Buy and/or Sell rules)

  Suppose you have a Buy Rule capping industry exposure at, say, 20%. Is that really best? Why not 25%, or 30% or 15%. With the add-in, you can examine all such scenarios at the same time, and have all the results appear before you in a way that enables you to make clear and easy comparisons.

  Suppose you have a Sell Rule requiring stocks to be eliminated from the portfolio if the rank falls below 80. Might 70 be better, or 90? Again, the add-in allows you to examine all such scenarios.
Moreover, you need not vary one rule at a time. You might, for example, work with different combinations of Sell threshold and industry exposure limit at the same time.

- Combination involving changes in both Period and Rules

You can combine the above kinds of inquiries by examining permutations that reflect different combinations of Periods and Rules.

Although examination of different Periods is often regarded as the heart of the add-in, the how-to material will start with examination of how to study different kinds of rules, simply because that is easier for new users to grasp. Once we've mastered that, we'll move on to consideration of changes in Period, and then on to the most complex use, the combinations involving Rules and Periods.

Before doing that, however, we'll consider what, exactly, an Excel add-in is (that context should help you better understand the workings of Stefano’s P123 Manager), review the installation process, and examine the interaction between simulation on the web site and simulation in Excel via the add-in.

**Introducing Excel Add-In**

Although Stefano’s P123 Manager is very easy to use, it can seem at first glance, to be very challenging. One way to master Stefano is to learn and memorize the definitions of the prompts and the steps. We'll accomplish that. But the task will be greatly simplified if we start, not by working on Stefano Step 1, but instead, by developing an understanding of what add-ins are and the role they play within Excel.

The roots of the Excel add-in go back to earlier generations of computer spreadsheets. Imagine you are faced with a simple but frequently-recurring spreadsheet task. Perhaps you’re tracking expenditures and need to add a dozen items. Assume, too, that at the end of every month, you need to copy the result to a separate area designed to record these figures. You also need set up a new column for the next month. It’s not complicated. That, actually, can be a problem. With Excel, excessive simplicity can lead to lapse in concentration and human errors. So you’d like an alternative to working cell by cell every month. You can address this through what is known as a “macro.”

You’d create the macro by recording your keystrokes as you go through the process once. After you finish, you’ll save the sequence of keystrokes and establish a means to reactivate it, a “hot key.” You may, for example, decide to assign Alt-N as the key combination you’ll use to activate the sequence of steps that records last month’s expense total and sets up a new expense column for a new month.

This is great for simple repetitive tasks. But it is limited . . . to just that, simple repetitive tasks.

The next step in macro development was to allow for use of logic. Non-programmers may immediately think about “if-then” capability. For example, if the month for which expenses are tallied is a quarter end month (March, June, September or December), copy the expense total in the usual place and also sum up the last three months’ worth of expenditures and copy it to a separate quarterly-journal area.

Those who do have programming background know “if-then” is just a drop in the bucket compared to the totality of what could be done. They might want to “nest” multiple if-then functions; if the month is the last in the year (December) the macro should also copy the sum of the prior 12 months’ expenses to a separate annual journal area. Come to think of it, should the macro even assume the fiscal year ends in December? Perhaps the user should indicate
somewhere which month is the last of the fiscal year. The logic should read this and adjust the quarterly and year-end schedule accordingly. Finally, we may not want one-key activation for the whole thing. Perhaps we’d like to put prompts on the Excel toolbar that let the uses activate individual sections of the program at the proper times (such as places where the user can click to create new journals).

There’s more, much more. Burt hopefully, this is enough to give you a sense of how much more powerful a macro can be if logic is incorporated. Microsoft permits macros in Office to incorporate logic; quite a lot of logic at that through VBA (Visual Basic for Applications), a full-fledged programming language that is incorporated into Office.

Suppose, though, that you are a professional developer and that you’d like to create logic-intense macros for use of (and preferably purchase by) others. VBA is a start, but you’d need more. You’d need to be able to pack your code in such a way that unauthorized users would not be able to see or modify it. You also need to be able to have other users install your code into their own spreadsheets. Once again, Microsoft obliges by allowing for the creation of these self-contained code packages. These are known as add-ins.

That is exactly what Stefano’s P123 Manager is; a highly logic-intense macro written in VBA that has been securely packaged in such a way as to be distributed to and used by others. Remember this as we proceed. Notwithstanding the Stefano features, we ultimately are working, not with a special program environment but with Excel spreadsheets, something with which many of us have been comfortable for years.
Installation

Stefano's P123 Manager comes to you as a collection of files packed together using a Zip utility. Here's what you need to do to install it.

- Completely close all instances of Excel
- Unzip the files to a folder you create in your computer
- Run the file entitled setup.exe; when prompted, click on "Install"
- When the installation is complete, a new window appears called "Stefano's portfolio123 Manager," which should be open at all times when the add-in is used.
- Click on "Install add-in" to install the Add-in within your copy of Excel
- Excel should open
- If no worksheets are open, start a new one from Excel

At this point the Add In menus should be visible or accessible within Excel. If that is not the case, go to View->Toolbars and check the box next to Stefano's P123 Manager. You should see 'Import Simulation' in the toolbar menu. If not close the worksheet and start a new one.

Our First Look At Stefano’s P123 Manager

We'll work with a simple Portfolio123 simulation created specifically to demonstrate Stefano's P123 Manager. It's publicly visible: http://www.portfolio123.com/port_summary.jsp?portid=763020

Here's a summary of the parameters:

General
- Starting Capital: 100,000.00
- Benchmark: S&P 500
- Commission: 10.00
- Slippage: 0
- Rebalance Frequency: Four Weeks
- Price For Transactions: Next Average of Hi and Low
- Allow Sold Holdings To Be Re-bought at Rebalance: Yes

Position Sizing
- 5% (approx. 20 positions)

Universe & Ranking
- Universe: No OTC Exchange
- Ranking: Portfolio 123 pre-defined Comprehensive: QVGM system

Buy Rules
- AvgVol(60)>5000
- Price>=5
- MktCap>=100
- Industry!=FSMISC
- Universe($ADR)=False

Sell Rules
- Rank < 90

Period
Figure 1 shows a summary of the simulation results.

Figure 1

Now, let's re-create this simulation in the add-in.

Start by accessing the add-in from the Excel. Then, in the Stefano interface, click on "Import Simulation."

Figure 2

Use the pop-up Stefano window to log in using your regular Portfolio123 user ID and Password.

Figure 3

Next, choose the simulation you'd like to import into Excel.

Figure 4
By the way, if you don’t see these windows, they may have found their way behind one or more larger windows you presently have opened. As with Windows in general, you can bring these covered-up windows by clicking on the program icon in the task bar which, for most users, is at the bottom of the screen.

**Figure 5**

Note that if the Stefano icon is flashing yellow, as depicted in Figure 5, that means it’s actively working and depending on the context, may be awaiting action from you, such as choosing which Simulation to import. After you click “OK” at the bottom of the Import Simulation window, the add-in will go to your Portfolio123 account and collect key information from the simulation and place it into a newly-created Excel spreadsheet.

**Figure 6**
This should look familiar. Almost all the parameters you set in Portfolio123 are here. The one exception is the Start Date. One the web site, it’s set as 3/31/01. In the add-in, we see 3/25/10. Regardless of what parameters are established on the web, the add-in defaults to an assumption that you want a one-year period ending with the present day.

You can use the Stefano interface to change the dates to match what you have on the web. But that’s going the long way. Remember, this is an Excel add-in, a super-charged macro. The information you see, here, is not equivalent to information you’d enter into other kinds of software using an input box. All you need do here is put your cursor into the cell you want to change and edit.

**Figure 7**

That’s it. The add-in (macro) is going to read and use whatever information it finds in that cell (assuming it’s recognizably formatted as a date, and that its earlier than the End Date; if not, the logic will be violated and you’ll get an error message). How the date gets there, whether via the add-in interface or manual typing, is irrelevant.

One instance where you really do need to use the add-in interface is to launch the simulation. Figure 8 show what the interface looks like after a simulation has been imported.
We can import a simulation or add permutations. We don’t need to import a simulation; we already did that. So obviously, the relevant menu item is “Add Permutations.” When we click on that, Stefano launches a script that sets the worksheet up to accept variations in dates and/or rules.

That’s what the add-in is meant to do. But we’re not going to do it right now. To nail down our understanding of what this spreadsheet is about, we’re going to stay for a while in familiar simulation territory and run it just once in its original form.

I’m going to cheat here and do something you’re not going to do in your regular use of the add-in, but which will help you get comfortable with the way it sits in Excel. The stronger your understanding of this, the easier a time you’ll have with the add-in as we get to what it’s really intended to do.

I need to find a way to get the simulation to run. To accomplish that, I’m going to do something I know will make the appropriate menu item visible. I’m going to copy one of my rules – it doesn’t matter which rule (any Buy or Sell rule will suffice) into Column D.

Once any content is placed in Column D on any the rows that hold rules or dates, the add-in will assume you’re ready to move on and activate an important new menu choice, “Create Permutations.”

By the way, it doesn’t really make a difference what we put in column D. It could even be the word “hello” or an “x.” In fact, it doesn’t even have to go into Column D. Type “x” in Column E instead, or even further out to the right. Also, it needn’t be in a row that actually articulates an existing rule. Try putting an “x” in Cell G39. Stefano presumes we’re going to add a new Sell rule there and shows us the “Create Permutations” menu option. The moral of the story is that once something, anything, goes into an area where the add-in is willing to accept new Rules- or Dates-related content, it will activate the “Create Permutations” menu choice. That’s all we want to accomplish right now. Don’t worry about triggering an error in the event the new content is gibberish. Stefano won’t actually try to work with it because it hasn’t yet been cued as to what it’s supposed to be. We’ll do that in the next chapter. For now, all we want to do is activate the “Create Permutations” menu.

After clicking on Create Permutations, you’ll see a lot of things happening in Excel. A new sheet will be created and named “Sheet1 Run.” This will be next to the original sheet, which was previously names by the add-in “Sheet1 Imp.”
Don’t worry about the content you see rapidly added to and removed from your view. What you’re seeing is a sequence of keystrokes that you could theoretically have handled manually but which have been incorporated into a script (complex, logic-intense macro). The purpose of the script is to examine the rows of your original import sheet, and organize the variations of the simulation that will have to be run. When the script finishes running, the variations will all be cataloged for you in the Run worksheet.

**Figure 11**

There’s nothing earth-shaking here. Rank < 90 was our original Sell Rule. No new variations are created because we didn’t ask for any. The only reason you see this particular rule is because this corresponds to the row I used to place new content in Column D of the original Import worksheet.

What about the extra copy of the Rank<90 Sell Rule copied into Cell D32 (Figure 9)? It was ignored because we didn’t give Stefano an important cue it needs that tells it to take the content seriously. That’s OK for now because we don’t want to take it seriously. We’ll do that in the next chapter. For now, all we need is to run the simulation once in its original form.

**Figure 12** shows the item that’s important to us right now; the menu that becomes activated after Stefano runs its permutation-creating script.

**Figure 12**

“Run All Permutations” is the item we now need. Clicking on it tells the add-in to run our simulation once for each permutation (variation) listed in our spreadsheet. For each of these runs, the add-in will use the Rules and Dates in Column C and again to reflect new information in columns to the right of C.

Since we have only one permutation that incorporates no new dates or rules, we should expect the add-in to run the simulation just one time and that the results we get should match the one’s we saw when we ran it on the web.

After clicking on “Run All Permutations,” you’ll see a pop-up window inviting you to choose the output information you’d like to see.

**Figure 13**
Make your choices, and then click on “OK” to start running the simulation.

While the simulation is running, you’ll be able to see on the Stefano window the same sort of progress information you see when you run a simulation on the web site.

**Figure 14**

If the window is behind others, you can bring it to the fore and monitor progress by clicking on the Stefano icon (which should be flashing) on the task bar.

After the run is completed, the results will be brought into the spreadsheet.

**Figure 15**

The information in you see row 3, as well as that contained in columns you’d be able to see if you scroll to the right, should match what you see for the simulation on the web site.

For now, don’t worry about the rows below 3. These are not useful for a single run. When there are multiple runs, as is the case when the add-in is appropriately used, the presentation will include the averages and standard deviations for each column.

Before moving on, let’s take a quick glance at one more aspect of the way the add-in can be used to set up simulations.
For the most part, the add-in assumes you will want to keep parameters other than rules and dates as they were when the simulation was last saved on the web. In Figure 6, light-green backgrounds are used for cells that display these supposedly non-changing parameters. Actually, though, if you want to change them, you can.

Figure 6 reproduces the cell containing the Universe parameter.

Figure 6

![Cell containing Universe parameter](image)

Actually, if we click on any of these green-background parameters, a menu will appear containing all the choices available to us if we'd like to make a change. Where applicable, the menu will contain both pre-defined and user-created items.

Figure 7

![Menu for Universe parameter](image)

Figure 18 is a variation on this theme.

Figure 18

![Cell containing commission assumption](image)

Here, to change the commission assumption, we get to choose the type of commission when we click on the green cell. To modify a number, we'd do it manually in Column C (just above the cell on which we clicked).

All this should give you a good sense of how Stefano’s P123 Manager works, a look under the hood. We cheated a bit in the way we caused it to activate the “Create Permutations” menu item. I think, though, it was worthwhile to do this. The exercise here, replicating an existing simulation,
gives us a good sense of how the Portfolio123 web site, Stefano’s P123 Manager, and Excel relate to one another and work together. That should make it much easier to grasp the upcoming material, where we’ll use the add-in as intended.

**Experimenting With Different Rules**

Now, it’s time to do some legitimate work with Stefano’s P123 Manager. We’re going to use it to examine how various rules changes will impact the performance of the “Add-in Demo” simulation.

To get started, let’s nail down the meaning of a word we’ve already encountered but not looked at closely: permutation.

A permutation is a variation on a basic idea. Usually we’re talking about more than one variation, and the word “permutation” is often used interchangeably with the word “combination.” Whether you think of permutations as variations or combinations depends on context.

Consider, for example, the simulation’s sell rule: Rank < 90.

Suppose we’d like to see how the simulation would perform not just with the sell threshold set at 90, but also at 70, 80, and 95. This is a “Group” consisting of four permutations. There is one original item (Rank<90) and three new variations.

To put this into Stefano, click on the “Add Permutations” item in the interface, and then click on “Add Group.”

Here’s what you’ll see:

**Figure 19**

You’re being asked how many values, or variations, will be in the group. One of them will always be the original variation (Rank<90 in this example). If you leave the default option, 4, you’ll be invited to add three new variations to go along with the one we start with. If we’d like to only add two more variations, that means the total (including the original version) will be 3.

Here’s what we get after we change “4” to a “3” and click on “OK.”

**Figure 20**
Nothing happened . . . right? That’s what you’d conclude if you’re looking at Row 32, which is where the Rank<90 rule is located. Actually, though, something very important occurred. Go back to Figure 20 and look at Row 1. Notice that we see “1” in the top rows under columns D and E.

Also, if you look at the task bar, you’ll see that the “Create Permutations” menu choice has been activated. That’s interesting. We knew we needed content beyond Column C in one of the relevant rows. In the last Chapter, we recognized that the relevant rows were those that contained Buy or Sell Rules. Now, we learn that Row 1 is also relevant, even though it’s not labeled.

The values added by Stefano to Row 1 are cues telling it to take seriously content it sees in columns beyond C. When Row 1 was empty, we could put any gibberish we wanted beyond Column C. Now, we need to be careful. The values in Row 1 tell Stefano to look at the information beyond Column C and use it in Portfolio123. If it’s gibberish, something not recognizable in Portfolio123 (based on the same syntax you use on the web site), the simulation run will be interrupted and we’ll get an Error message.

What happens if we don’t add any new information? Let’s click on “create Permutations and find out.

**Figure 21**

That does not seem informative. In fact, if we were to go ahead and run the permutations, we’d see the original simulation run three times. Stefano always knows to run the simulation once with the factors listed in Column C. It also knows to run the simulation two additional times using variations specified in Columns D and E. Since no such variations were specified here, it wound up using the same parameters all three times.

Let’s now get serious and give Stefano two additional variations.

**Figure 22**
The original version of the simulation called for a stock to be sold if the rank was less than 90. One variation calls for sale if the rank falls below 80. A third version, the most lenient, won’t sell until the rank falls below 70.

We can state the rule variations in Columns D and E by typing from scratch. Or we can copy Rank<90 from Cell C32 into D32 and E32, and then edit the latter two cells.

If we click on “Create Permutations” now, we’ll wind up with something that suggests we’ll get more interesting results.

Figure 23

We now expect to see three runs of the simulation, one with our original Rank<90 sell rule and two others; one with a sell threshold of 80 and another with a sell threshold of 70. Indeed, that’s exactly what will occur if we click on “Run All Permutations.”

Figure 24

Suppose we also want to vary one the Buy Rules, the one specifying a minimum price. It might be tempting to do this:

Figure 25
Let's click on “Create Permutations” and see if it works.

**Figure 26**

![Image](image1.png)

It won’t give rise to an error. There are three versions of the simulation Stefano can ask Portfolio123 to run. But is it what we REALLY want?

We can get a simulation using our original Price>=5 Buy rule and our original Rank<90 Sell rule. But if we want to see a simulation using Price>=8 as a Buy rule, we cannot see how it would run with our original Rank<90 sell rule. The only sell rule with which it can be combined is Rank<70.

To get a simulation that reflects all the different combinations (permutations!), we need to treat each set of variations on a particular rule as a “Group;” this being the phrase used by the Stefano interface.

To vary two rules, we need to establish two Groups. We do this first by establishing one Group, which we’ll use for variations in the Sell rule. Then, we’ll establish a second Group, which we’ll use for variations in the minimum-price Buy rule.

Here’s a step by step illustration:

Start by loading the simulation, with the original parameters, into Stefano.

**Figure 27**

![Image](image2.png)
Next, ask Stefano to create a three-variation group (one of which will use the original parameters and two of which will use variations).

Figure 28

Figure 29 shows what we’ll wind up with after clicking on OK.

Figure 29

Thus far, we’ve been in familiar territory. Now let’s do something new. Go back to the interface and again click “Add Group.”

Figure 30

Figure 30 shows the cues for Group 1 in Columns D and E of the first row. Compare this to Figure 31, which shows what happens after we click on OK again to tell Stefano to add the second group (which will have three price-rule values, one for the original Price>=5 Buy rule and two new variations).

Figure 31
See Row 1. Columns D and E continue to show the markers for Group 1. And now, Columns F and G show markers for our new group, which Stefano refers to as Group 2.

Let’s fill in the variations.
Figure 32

This is vastly different from what we had in Figure 25, when we tried to squeeze both sets of rule changes into a single group. Notice that now, clicking on “Create Permutations” gives us all the rule combinations we really want to see.

Figure 33

This time, we have nine permutations reflecting every possible combination of price and sell rule. We'll have to wait a bit longer after clicking on “Run All Permutations” because Stefano is asking Portfolio123 to do more work. But we'll get a lot more information!

Figure 34
Note, by the way, we did not have to create all of your groups before inputting all the rule variations. We could have created Group 1, typed in our new Sell rules, gone back to the interface to create Group 2, and then typed in the new Buy rules.

Moreover, we didn’t even have to use the Stefano interface at all to articulate the groupings. Remember, this is, first, last, and always, Excel. All we want are to have Row 1, Row 21 and Row 32 look as they do in Figure 32. We’re free simply type everything manually if we wish. (The extension of the green background we see in Row 19 is purely cosmetic; it has no bearing at all on the results we’ll get.)

Finally, note that the groups do not have to be the same size.

Figure 35 illustrates a sheet in which I manually established three groups: Group 1 has three variations on the Sell rule (the original plus two new ones); Groups 2 was expanded and now has four variations on the minimum price Buy rule (the original plus three new ones); and I added a Group 3 which has two variations (the original plus one new version) on the minimum-market cap Buy rule.

**Figure 35**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Simulation Parameters</td>
<td>Simulation name</td>
<td>Add-In Demo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Screen</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Buy 1</td>
<td>Avg第二天:=500000</td>
<td>Price&gt;=5</td>
<td>Price&gt;=3</td>
<td>Price&gt;=8</td>
<td>Price&gt;=12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Buy 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Buy 3</td>
<td>MaxCap&gt;=100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Buy 4</td>
<td>Industry=IF(ISMIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Buy 5</td>
<td>Universe(SADR)=False</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Buy Rule 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Buy Rule 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Buy Rule 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Buy Rule 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Buy Rule 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Buy Rule 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Buy Rule 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: Sell Rules</td>
<td>Rank</td>
<td>Rank &lt; 30</td>
<td>Rank &lt; 80</td>
<td>Rank &lt; 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How many possible combinations (permutations) will this involve? This, actually, is the sort of question that causes students starting out in statistics to reach for the Tylenol. Fortunately, we don’t have to calculate the number of permutations. All we need do is click on “Create Permutations” and let Stefano do the work for us.

**Figure 36**
By counting rows in Excel, we see that the three groups produce 24 possible combinations, or permutations.

This is pretty impressive. We can get a lot of information out of Portfolio123 quickly and conveniently because Stefano is taking care of the grunt work. Yet this is not really the most advanced part of Stefano. That would involve the variations we can create based on dates. We started with rules variations because of the way it helps us improve our understanding of what the Stefano add-in is and how it works. Having accomplished that, let's move now to date variations.

**Experimenting With Different Dates**

For now, let’s stop experimenting with rules and focus only on changes involving start and end dates. (In the next, and final, section we'll work with rules and dates simultaneously.)

I had previously suggested that this is the more difficult aspect of Stefano. Actually, though, by now you already know almost everything about the add-in that you’ll need to work with date-variations and to work with date-and-rule variations (the next section). The more challenging aspect is the decisions you’ll make as you decide what you want Stefano to do for you.

Let’s run quickly through the process of establishing date variations. Once again, we’ll work with the simulation named “Add-In Demo.” Figure 37 shows the default setting for the dates.

**Figure 37**

This calls for a single test, starting 3/28/10 and ending 3/28/11. Figure 38 shows the pop-up window you’ll get if you go into the “add Permutations” menu and click on “Add Dates.”

**Figure 38**
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1: Simulation Parameters</td>
<td>Simulation name</td>
<td>Add-In Demo</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Buy5</td>
<td>Universe[SADR]!False</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Buy Rule 6</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Buy Rule 7</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>Buy Rule 8</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>Buy Rule 9</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>Buy Rule 10</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Buy Rule 11</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Buy Rule 12</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>4: Sell Rules</td>
<td>Rank</td>
<td>Rank &lt; 90</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>Sell Rule 2</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td>Sell Rule 3</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>Sell Rule 4</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td></td>
<td>Sell Rule 6</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>Sell Rule 7</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>Sell Rule 8</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Sell Rule 9</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Sell Rule 10</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Sell Rule 11</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td></td>
<td>Sell Rule 12</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>5: Simulation Period &amp; Restrictions</td>
<td>Start Date</td>
<td>3/28/2010</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>End Date</td>
<td>3/28/2011</td>
</tr>
<tr>
<td>46</td>
<td></td>
<td>Restrict Buy List</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td></td>
<td>Restrict Sell List</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set Dates:
- Start date: 7/01/2009
- End date: 3/28/2014
- Max Simulation duration (weeks): 52
- Shift start and end date by (weeks): 4
- Number of periods: 10

Periods:
- 1/20/2010 - 3/28/2010
- 4/1/2010 - 6/28/2010
- 7/1/2010 - 9/28/2010
- 10/1/2010 - 12/28/2010
- 10/1/2011 - 12/28/2011
- 1/1/2012 - 3/28/2012
- 4/1/2012 - 6/28/2012
- 7/1/2012 - 9/28/2012
- 10/1/2012 - 12/28/2012

10 = 10 permutations will be created
The first two active items are self-evident.

- The first input box shows the today as the end date.
- In the next input box, Stefano presumes you will want to conduct a 52-week test.

Both of these are default Stefano assumptions. They will be there regardless of the date settings saved on Portfolio123 for your original simulation and regardless of whether you amended the spreadsheet cells containing date information.

The next two default entries, the 4-week shift and the use of 10 periods, is best understood by looking at the periods Stefano planning to use, based on the default settings, as spelled out in the bottom of the add-dates pop-up window.

**Figure 39**

![Set Dates](image)

To understand the last two items, look at the top two trials in the Periods window.

- The most recent one runs from 3/29/10 through 3/28/11. This is a 52-week period.
- The next one starts 3/1/10 and ends 2/28/11. This, too, is a 52-week period. This and the prior 52-week period are as per the “duration” input box.
- Note though that the start date of one period is 4 weeks earlier than the start date of the next period. The end dates are likewise four weeks apart. This is quite different from the typical “backtest.” Usually, we’d think about consecutive periods; by way of example, we might consider 3/29/09 – 3/28/10 and then 3/29/10 – 3/28/11.

Here, however, our periods are not consecutive. They overlap for 48 out of 52 weeks.

What we have, here, when we start in the “Add Dates” pop-up window, is an assumption that we want ten completely independent 52-week tests. It is further presumed that each 52-week tests begins four weeks after the prior one.

To help us visualize what’s happening, I’m going to change the last input box to assume only 3 periods.
Now, experiment with the date-shift drop-down menu and see how it changes the tests that will be run.

Here’s what one-week date shifting looks like.

Notice how the start dates, 3/15/10, 3/22/10, and 3/29/10, are now one-week apart.

Figure 42 shows how five independent two-year tests, each of which start a week after the prior one, looks.
Figure 42

Figure 43 shows what happens if I accept this last group of dates and click “OK.”

Figure 43

This should have a sort-of familiar ring. We see that Stefano created a group to hold date variations. But there are two important differences:

- With the rules-based groups created in the last chapter, each group addressed a single rule; when it comes to date, each rule addresses a date pairing (involving a start and end date)

- With the rules based groups, one variation consisted of the original rule, the one that was specified in Column C when we got started. With dates, the most recent pairing will go into Column C even if Stefano has to change what was originally there.

Clicking “Create Permutations” produces this outcome.

Figure 44
Figure 45 shows what we get after we run the permutations.

**Figure 45**

That’s it. That’s all there is to the Stefano date variations. That seemed pretty easy, but only because of the way our understanding of what add-ins are and of how Groups work was developed in the previous sections. Actually, though, it’s good that the Stefano steps are easy. We want to save our energy for interpretation, for deciding whether the performance differentials we see here are meaningful, or attributable to market oddities relating to the start of this period; the beginning of the climb from the 2007-08 crash.

Before leaving date variation, I want to nail down once more the fact that what’s most important here is the data in Excel and where it’s located. How the data got there is unimportant. You don’t have to use the “Add Permutations” interface. It’s there for your convenience should you choose to use it, as I strongly recommend if you want to create a large number of variations. In any case, though, you don’t have to follow the hierarchy of the pop-up windows if you don’t wish.

**Figure 46** illustrates a completely odd-ball set of start-end dates I created.

**Figure 46**

**Figure 47** shows what we get after creating the permutations.

**Figure 47**

**Figure 48** shows the simulation results.
This manual mix-and-match approach can, actually, be pretty useful. Quants like to assume a model should be robust, that it should produce more or less the same kinds of results in all periods. Indeed, the traditional use of the Stefano date-variations is to assess this sort of robustness. Actually, though, conditions in the real world can vary so wildly, that perfect robustness may be just a pipe dream.

We may, therefore, choose to separately examine several noteworthy market periods, such as 2001-02 (tech crash), 2002-03 (post-crash recovery), 2004-06 (more or less normal market), 2007-08 (general finance-led crash), 2009 (post-crash recovery), and 2010-2011 (recent period) perhaps, some or all of which may include the typical time-shifted multiple runs. In this case, manual creation of the date-variation group can be preferable. (Remember to put one of your variations in Column C and identify all other columns as being part of Group 1.)

Now, we’re ready to finish by combining rule variations and date variations. That would have seemed horribly complicated at the beginning, but based on what we now know about Stefano and Excel, it should seem quite easy.

**Experimenting With Different Rule And Date Variations**

The key to combining date and rule variations is to remember that in all cases, we’re just dealing with groups. It doesn’t matter which group is numbered 1, which is numbered 2, etc. All that matters is that each group be properly identified in Row 1.

Here’s a simple example in which we’ll use three variations on the sell rule (one of which will, of course, be the original) and five simulation periods set to start and end four weeks apart.

Let’s start with the Sell-Rule variations.
Next, in the interest of convenience, let's use the menu to add our date variations.

**Figure 50**
Notice how in this case two new rule-variation columns were added (to bring the total, including the original rule) to three, and how four new date variation columns were added (to bring the total, including the original pairing) to five. The rule-variations are Group 1 because that’s the one I input first. The date variations are group 2.

Here’s what we get after clicking to “Create Permutations.”

Notice how we have 15 possible combinations (permutations) of date-pairings and sell rules. Figure 52 shows what the sheet named “Sheet1 Imp” looks like if after I manually add a third group to address minimum-price Buy Rule variations. (Notice Row 1: Don’t forget to label the group!)
That’s going to boost the number of permutations to 45, as we (partially) see in Figure 53.

Stefano does the grunt work in arranging all the permutations. All we need do is keep the groupings straight on the “Sheet1 Imp” worksheet.
How far can this be pushed?

Stefano’s P123 Manager can run up to 100 simulations at one time. So actually, the set of permutations illustrated in Figure 53 is a bit less than half as large as it can be.

But there is another constraint: your ability to absorb and evaluate the output. Each user will have a different threshold. I suspect, though, that it’s much easier to approach the 100 limit if you’re dealing with one large date-variation grouping, or perhaps one date-variation grouping and one more to explore variations of one rule. Ultimately, though, this is a matter of personal preference. So long as you don’t exceed 100 permutations in all, you can mix and match as you wish.