

[Ranking System Optimizer Tutorial](#)

1. [Preparing Piotroski For Optimization](#)
2. [Setting Up An Optimizer Study](#)
3. [Using EXCEL With The Ranking System Optimizer](#)
4. [Pruning Nodes From The Ranking System](#)
5. [The Final Ranking System](#)

Ranking System Optimizer (Advanced)

1. [Advanced Ranking System Optimization](#)
2. [Restructuring The Advanced Ranking System](#)
3. [EXCEL Spreadsheet Rev 2](#)

Ranking System Conditional Nodes

1. [Using the The Portfolio123 Conditional Node](#)
2. [Conditional Node Versus Eval \(... \) Function](#)
3. [The Problem With Conditional Nodes](#)

Ranking System Design

October 26, 2013



I am about to embark on a new project that will set the course of my future stock portfolio development efforts. This effort is to create a brand new ranking system using all of the latest information and strategies I have collected over the last several months. I would like to invite readers to follow along so as to understand the thought/development process that has gone into this new project. While I will provide a detailed account of my activities, the actual (fundamental) stock factors will be left to the imagination (sorry - this is my livelihood).

There are (at least) two methods used to design a stock port/simulation. The first method depends on pre-existing ranking system(s). A stock simulation is designed and optimized using the ranking system, some buy/sell rules are put in place, and perhaps some sort of stop-loss and/or hedging. The developer

may have a target stock universe in mind but in the end, the universe is customized to give the "best", or should I say the "most optimized" results. There are several iterative optimization steps that usually occur, including selection of the "best" ranking system, tweaking the ranking system for optimal backtest results, tweaking the buy/sell rules and re-visiting the custom universe, all in the name of designing the "best" or "most optimized" simulation. The universe is quite often customized by setting limits on Market Cap and other parameters. Thus whatever the initial target stock universe eventual gets adjusted until there is a happy compromise between stock universe, ranking system, and backtest performance.

The second method for designing a stock portfolio is to start with a set of criteria, then providing an optimal design to meet that criteria. The ranking system is the heart of the system and is designed from scratch to meet the desired specifications.

There may be some merits to the first design method, it is certainly faster, and the ranking system may be "proven" by other stock models in use. But there will always be some doubt in my mind as to whether the customized universe is a form of cherry picking, or data mining. It is not my place or intent to provide a determination of whether this method of development is satisfactory and I will leave it up to the reader to decide for him/her self. This series of posts will be about the design of a new ranking system from scratch to match the developers specifications and will cover the following topic outline:

- Specifying the target stock universe
- Stock factor discovery
 - Test environment
 - Discovery process
- Stock factor selection process
- Ranking system optimization
 - Using the Portfolio123 RS optimizer
 - Out of sample verification
- Stock port/simulation using the new ranking system*

* This last step is proof that the effort was worthwhile. You can end up with the best looking Ranking System performance chart but if you can't practically use it then it isn't much good.

This will be a very aggressive design for a dynamic ranking system that is intended to adjust for interest rates. I don't know at this point in time whether I will be successful or not. It is a quest, not a "here's how I did it" exercise. The reader is asked for understanding in this matter.

Selecting The Target Stock Universe

October 27, 2013



As I outlined in the last post (overview), I will be performing several steps in this design-from-scratch ranking system project. This post describes the first stage of the design process and is the most straightforward. There are four items I am going to consider for the target universe:

1. Choice of standard Portfolio123 universe
2. Minimum liquidity
3. Minimum stock price
4. Ranking system design process

Choice of Standard Portfolio123 Universe

Since this is a brand new process I am inventing, I have decided to go with a fairly broad universe. I don't like Over-the-counter (OTC) stocks and I also don't want Master Limited Partnerships (MLPs). Therefore, my decision is to use the S&P 1500. All stocks in this universe are listed on a major US exchange with (I believe) no MLPs and all companies are either U.S. companies or international companies with headquarters in the U.S. For me this is preferable to trying to filter out Chinese companies, a rather difficult task.

Liquidity

I normally design very high liquidity models with at least \$5M \$Volume per day, sometimes a lot higher. For this project I am going to drop my requirement down to \$2M \$Volume per day. The lower \$Volume should give this ranking system better performance than I am accustomed to. My portfolio design will use a buy rule of $\text{AvgDailyTot}(60) > 2,000,000$ (minimum \$2M \$Volume per day on average). But this is an **average**, and the filter only applies to the days preceding the trade, not the actual day of trade so one has to expect that the \$Volume could be lower, either on trade day or while the stock is held. Thus my target universe will be set to \$1M, allowing stock liquidity to bounce around a little bit without dropping out of the universe.

Minimum Stock Price

I like to work with a minimum stock price of \$2. I find that this price gives very good performance in stock simulations without too much compromise on stock volatility. I know most R2G models buy stocks down to \$1 but I don't wish to go down that low. That is my personal preference and I don't care to try to justify it. If a developer is comfortable with buying stocks at \$1 then that is OK. You should keep in mind however that the stock price may drop down to penny stock status, and possibly fall off the exchange it is listed on.

So, if I set the minimum stock price at \$2 as a portfolio buy rule then I will need to test below this price as the stock price may drop below \$2. For example, I don't want to buy at \$2 and have to sell the next week because the stock price dropped to \$1.95. So I am going to set my minimum stock price for this exercise at \$1.50 in the target universe. As a general rule, I require the closing price to be above \$1.50 and also a 60 day moving average to be above \$1.50. The moving average requirement is to prevent stocks with an unusual price around the lower price from being bought.

One additional check that I like to include is to make sure the stock has been around for awhile i.e. no IPOs. For this filter I use $\text{Close}(500) > 1$.

Ranking system design process

As a developer, I need to have a basic understanding of the ranking system design process up front. This is important because I want to know how many stocks will be in each ranking bin which determines the reliability for the entire process.

The first step is to enter all of the rules for the target universe into a screen as shown in the figure below. The most recent date shows a total of 1440 stocks in the target universe. By sampling various dates, I found a minimum of 1233 stocks at one point. For the purpose of this analysis I am going to assume a minimum of 1200 stocks in the target universe, a little more conservative than the minimum number that I had found by sampling.

expand Search

WORDS Examples

TOTAL:
1135 factors and 195 functions

TIPS:
- Double click word/example to insert
- Use arrows and Enter key to navigate tree
- To search enter keywords in no particular order
- Detach reference to move it closer to where you need it

Hide Add Wizard Rule Add Free Form Clear As Of 10/26/2013 Run Totals 1440

Universe (SP1500)	1500
and AvgDailyTot (60) > 1000000	1461
and Close (0) > 1.548MA (60) > 1.54Close (500) > 1	1440

- Add criteria(s) using either "Free Form" rules or "Wizard" rules
- Try clicking on "Totals" to see how many stocks pass each criteria and to verify the syntax is correct
- Change the "As Of" date to run in the past using our trusted Point-In-Time database
- Click on "Save As" to give a name to this Screen and store it permanently

Out of curiosity I decided to repeat this experiment using the Buy rules for a potential port as shown in the figure below. By sampling different dates, I found a minimum of 1100 stocks that fulfilled the rules. As liquidity has increased over the years, my conclusion is that I could expect at least 1100 stocks that will meet portfolio liquidity buy rules at any given point in time in the future.

expand Search

WORDS Examples

TOTAL:
1135 factors and 195 functions

TIPS:
- Double click word/example to insert
- Use arrows and Enter key to navigate tree
- To search enter keywords in no particular order
- Detach reference to move it closer to where you need it

Hide Add Wizard Rule Add Free Form Clear As Of 10/26/2013 Run Totals 7014

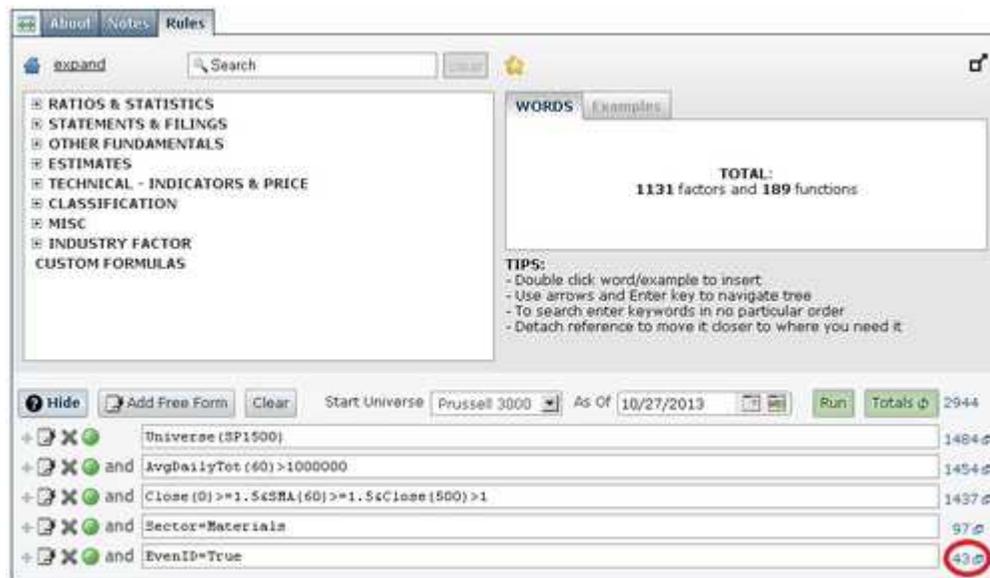
Universe (SP1500)	1500
and AvgDailyTot (60) > 2000000	1393
and Close (0) > 2.48MA (60) > 2.4Close (500) > 1	1372

- Add criteria(s) using either "Free Form" rules or "Wizard" rules
- Try clicking on "Totals" to see how many stocks pass each criteria and to verify the syntax is correct
- Change the "As Of" date to run in the past using our trusted Point-In-Time database
- Click on "Save As" to give a name to this Screen and store it permanently

Now getting back to the target universe analysis...

I will be analyzing the 10 sectors independently, and testing with odd/even stock IDs. Therefore, individual test universes have a minimum of $(1200 / 10) / 2 = 60$ stocks each. I generally test at a rank of 80 and higher, therefore I will be testing 20% of each test universe or $60/5 * 0.2 = 12$ stocks. I don't know if this will be a sufficient number of stocks for test but I am going to proceed with this. If I run into trouble there are some workarounds that I could use - I can't explain just now as I would be getting ahead of myself.

Below is a snapshot of the Test Universe with one sector specified. Already I am below my estimate of 60 stocks in each test universe as I forgot to consider the variation in number of stocks between each sector. Anyways, I will proceed on while keeping a close eye on this issue. Note that I chose the Even stock-IDs as there are more stocks than the odd stock-IDs by ~50 stocks.



Stock Factor Discovery

October 27, 2013

At this stage of my development process, I want to find the best stock factors to use for the target universe (see previous post). For this purpose I have assembled a list of 107 stock factors. When I talk about "stock factors", I really mean "stock formulae" as I don't make a distinction between the two.

The 107 factors are located in a spreadsheet located here:

DE2 fx -6.7938						
	A	B	C	D	E	F
1	Date	Universe	FACT01	FACT02	FACT03	FACT04
2	3/18/13	-1.0832	-7.6115	-2.7182	-3.5564	-2.2799
3	12/17/12	8.5734	-1.1235	6.5837	8.518	6.3391
4	9/17/12	0.1968	-7.7296	-2.2908	-3.0896	-5.9974
5	5/18/12	12.0675	18.4566	19.2475	15.4506	15.7684
6	3/19/12	-9.0868	-13.5784	-11.8479	-14.9461	-12.2533
7	12/19/11	15.6833	13.0435
8	9/19/11	0.0722	-10.1042	Results from backtest of entire universe.		
9	5/20/11	-9.0545	4.8325			
10	3/21/11	-2.9297	-1.0511	2.4476	-10.5237	-3.1038
11	12/20/10	2.4799	-1.8743	4.6632	3.7942	1.952
12	9/20/10	14.9915	20.5674	16.2391	19.0474	15.8877
13	5/21/10	3.9684	16.0196	12.2438	1.801	0.6567
14	3/22/10	-0.7708	-6.2173	-12.7568	4.7373	0.9259
15	12/21/09	4.9073	0.5696	2.7819	3.5772	4.831
16	9/21/09	3.2418	2.2954	3.3858	2.0914	4.1145
17	5/22/09	26.6321	7.5978	28.0455	16.3085	6.1757
18	3/23/09	39.1265	18.6938	81.5908	21.5032	15.7784
19	12/22/08	-8.691	9.3324	-4.8771	-2.6355	1.0808
20	9/22/08	-37.3643	-43.7325	-44.9022	-47.0565	-29.1237
21	5/23/08	-3.3078	-24.4237	-27.9967	-21.3266	-15.1177

For the 2nd to 108th run, only the Ret% field is cut/pasted into the factor discovery spreadsheet. For these runs, each stock factor is tested individually by using a ranking system with one factor only. The screen has one Rule: **Rank>80**.

FACT01 80-100' Backtest Results

Screen Dt	Rank Dt	Price Start	#Pos	New Pos	Sold Pos	Turn	Ret%	Bench%	Excess%	\$100 Investment	\$100 m	Costs	Cash	Min % no slip	Max % no slip	StdDev
59 06/15/13	06/15/13	06/17/13	8	0	0	0%	-0.73%	4.74%	-14.47%	\$304.4	\$138.9	\$0.00	\$0.00	-35.95%	12.71%	16.37%
58 02/16/12	03/16/12	03/18/12	8	1	1	12%	2.27%	4.48%	-2.21%	\$337.2	\$132.7	\$0.00	\$0.00	-16.31%	12.33%	9.32%
57 12/15/12	12/15/12	12/17/12	8	1	1	12%	6.38%	10.41%	-4.03%	\$220.2	\$108.2	\$0.00	\$0.00	-17.95%	10.04%	10.04%
56 09/15/12	09/15/12	09/17/12	8	1	1	12%	1.42%	-3.54%	4.06%	\$220.2	\$108.2	\$0.00	\$0.00	-16.88%	10.12%	10.12%
55 06/16/12	06/16/12	06/18/12	8	1	1	12%	6.96%	9.16%	7.79%	\$220.2	\$108.2	\$0.00	\$0.00	-36.47%	13.84%	13.84%
54 03/17/12	03/17/12	03/19/12	8	1	1	12%	0.73%	-4.40%	-6.34%	\$220.2	\$108.2	\$0.00	\$0.00	-10.99%	15.23%	15.23%
53 12/17/11	12/17/11	12/19/11	8	2	2	25%	7.25%	15.12%	-7.87%	\$220.2	\$108.2	\$0.00	\$0.00	-42.89%	22.82%	22.82%
52 09/17/11	09/17/11	09/19/11	8	0	0	0%	-1.41%	0.39%	-1.80%	\$272.9	\$99.2	\$0.00	\$0.00	-34.36%	18.72%	15.59%
51 06/18/11	06/18/11	06/20/11	8	1	0	0%	-0.25%	-4.44%	4.20%	\$276.0	\$98.8	\$0.00	\$0.00	-29.95%	29.27%	17.78%
50 03/19/11	03/19/11	03/21/11	7	1	1	14%	3.50%	-0.79%	4.29%	\$277.5	\$103.4	\$0.00	\$0.00	-14.32%	18.36%	12.08%
49 12/18/10	12/18/10	12/20/10	7	1	1	14%	4.88%	2.88%	2.00%	\$268.1	\$104.3	\$0.00	\$0.00	-13.85%	22.07%	11.93%
48 09/18/10	09/18/10	09/20/10	7	1	1	14%	15.58%	10.58%	5.00%	\$255.7	\$101.3	\$0.00	\$0.00	-4.70%	29.37%	11.87%
47 06/19/10	06/19/10	06/21/10	7	1	1	14%	4.08%	0.34%	3.74%	\$221.2	\$91.6	\$0.00	\$0.00	-18.42%	18.47%	12.01%
46 03/20/10	03/20/10	03/22/10	7	2	2	29%	12.31%	-2.98%	15.29%	\$212.5	\$91.3	\$0.00	\$0.00	-0.00%	37.60%	13.18%
45 12/19/09	12/19/09	12/21/09	7	2	1	17%	5.10%	4.70%	0.41%	\$189.2	\$94.1	\$0.00	\$0.00	-19.23%	42.07%	19.64%
44 09/19/09	09/19/09	09/21/09	6	0	1	14%	4.09%	4.27%	9.82%	\$180.1	\$89.9	\$0.00	\$0.00	1.45%	25.76%	8.60%
43 06/20/09	06/20/09	06/22/09	7	2	1	17%	16.04%	16.44%	9.60%	\$157.8	\$86.2	\$0.00	\$0.00	1.34%	51.19%	18.16%
42 03/21/09	03/21/09	03/23/09	6	2	3	43%	16.97%	15.36%	21.61%	\$125.2	\$74.1	\$0.00	\$0.00	-8.34%	78.96%	44.38%
41 12/20/08	12/20/08	12/22/08	7	1	1	14%	2.90%	11.17%	14.07%	\$91.4	\$64.2	\$0.00	\$0.00	-35.41%	78.68%	38.49%
40 09/20/08	09/20/08	09/22/08	7	1	0	0%	0.25%	28.70%	-23.55%	\$88.8	\$72.3	\$0.00	\$0.00	-72.20%	-34.86%	16.47%
39 06/21/08	06/21/08	06/23/08	6	0	0	0%	-9.36%	-5.78%	-3.58%	\$186.1	\$101.4	\$0.00	\$0.00	-38.96%	40.03%	26.25%
38 03/22/08	03/22/08	03/24/08	6	2	1	20%	1.44%	-0.85%	12.29%	\$205.3	\$107.6	\$0.00	\$0.00	-12.89%	50.69%	23.51%

Date	Universe	FACT01	FACT02	FACT03	FACT04	FACT05	FACT06
3/18/13	-1.0832	-7.6115	-2.7182	-3.5564	-2.2799	-7.6115	-7.6115
12/17/12	8.5734	-1.1235	6.5837	8.518	6.3391	11.2088	0.197
9/17/12	0.1968	-7.7296	-2.2908	-3.0896	-5.9974	-2.5106	-9.2911
6/18/12	12.0675	18.4566	19.2475	15.4506	15.7684	20.4699	20.0896
3/19/12	-9.0868	-13.5784	-11.8479	14.0471	10.0553	17.1157	-15.1831
12/19/11	15.6833	13.0435	18.5618	14.0471	10.0553	17.1157	23.4456
9/19/11	0.0722	-10.1042	-8.3049	14.0471	10.0553	17.1157	-3.6834
6/20/11	-9.0545	4.8325	-6.2147	14.0471	10.0553	17.1157	0.534
3/21/11	-2.9297	-1.0511	2.4476	-10.5237	-3.1038	-3.6829	-1.8731
12/20/10	2.4799	-1.8743	4.6632	3.7942	1.952	3.5834	0.7675
9/20/10	14.9915	20.5674	16.2391	19.0474	15.8877	22.4292	18.7341
6/21/10	3.9684	16.0196	12.2438	1.801	0.6567	17.6674	16.305
3/22/10	-0.7708	-6.2173	-12.7568	4.7373	0.9259	1.3305	-1.3418
12/21/09	4.9073	0.5696	2.7819	3.5772	4.831	3.1187	4.278
9/21/09	3.2418	2.2954	3.3858	2.0914	4.1145	-2.9345	1.8161
6/22/09	26.6321	7.5978	28.0455	16.3085	6.1757	20.7212	19.4951
3/23/09	39.1265	18.6936	81.5908	21.5032	15.7784	59.6444	58.3521
12/22/08	-8.691	9.3324	-4.8771	-2.6355	1.0808	-9.3908	7.1866
9/22/08	-37.3643	-49.7325	-44.9022	-47.0565	-29.1237	-54.2056	-51.6601
6/23/08	-3.3078	-24.4237	-27.9967	-21.3266	-15.1177	-21.1123	-1.9294
3/24/08	5.8969	8.0835	28.0274	4.0724	11.8767	-0.2367	-4.2494
12/24/07	-9.4453	-14.7448	-6.7233	-17.4231	-19.618	-7.0929	-2.895
9/24/07	-1.3051	-6.4107	-1.777	-6.4271	7.2146	-9.7473	-2.292

This is a lot of work, isn't it? If someone out there has the programming skills to automate this effort then I would love to hear from you.

Sheet 2 (Rating)

On this worksheet, the delta between each factor and the target universe as a whole is calculated for each three month period. Then a rating is calculated for each stock factor. The rating is essentially a crude version of the **Sharpe Ratio**, **except it is not annualized and uses the target universe in place of the no risk return**. This sheet also determines and lists the **top 25 stock factors in order of rating**.

Date	Universe	IncPerEmp	SIRatio	ROA%[(TTM - PTM)]	LiabCurQ/MktCap	OpInco
7/06/99	N/A	-7.58	-4.48	3.25	11.91	0.50
4/05/99	N/A	7.89	3.95	-5.59	-12.27	17.89
1/04/99	N/A	-0.87	-0.83	-2.63	-9.77	-4.01
	Rating	-0.74	0.71	-0.83	-1.18	0.45

Factor	Description	P123 EQ	Rating
FACT16	Clean Income Statement	abs((SpdItems(0,Ann)+1.64	
FACT15	EPS Stability	EPSStableQ	1.56
FACT101	TACC_TTM	Eval(AstTot(3,qtr)- Cas	1.54
FACT07	ev / projected earnings	(mktcap + DbtTotQ - (C	1.38
FACT67	EPS Estimate Revision C	(CurFYEPSMean- CurF)	1.25
FACT57	Sales Acceleration - rec	(Sales%ChgPYQ- Sales	1.22
FACT97	CY Estimate Range	CurFYEPSHigh/CurFYEF	1.19
FACT54	Sales Percent Change, %	Sales%ChgPYQ	1.18
FACT68	EPS Estimate Revision C	(CurQEPSMean- CurQ)	1.15
FACT14	Pr2FrCashFITTM	Pr2FrCashFITTM	1.14
FACT80	Short Interest, One Mo	SI1Mo%Chg	1.06
FACT100	TATA	(EBITTM-FCFTTM)/(A	1.00
FACT88	Inventory Turnover, TTM	InvTurnTTM	0.90
FACT64	Current Ratio, Quarter	CurRatioQ	0.88
FACT13	Price to Cash Flow Per	SPr2CashFITTM	0.95

Top 25 factors based on rating

Sheet 3 (Correlation)

This worksheet calculates the correlation between each of the 107 stock factors based on the 3 month delta returns calculated on Sheet 2.

	FACT01	FACT02	FACT03	FACT04	FACT05	FACT06	FACT07	FACT08	FACT09	FACT10	FACT11	FACT12
FACT01	1.00	0.07	0.46	0.35	0.34	0.36	-0.01	0.42	0.42	-0.31	0.41	
FACT02	0.07	1.00	-0.05	-0.05	-0.43	0.23	0.52	0.05	0.43	0.26	0.29	
FACT03	0.46	-0.05	1.00	0.34	0.28	0.22	0.12	0.37	0.29	-0.18	0.28	
FACT04	0.35	-0.05	0.34	1.00	-0.15	-0.17	-0.19	0.29	0.18	-0.51	-0.10	
FACT05	0.34	0.43	0.28	-0.15	1.00	0.58	0.60	0.40	0.59	0.27	0.56	
FACT06	0.36	0.23	0.22	-0.17	0.58	1.00	0.33	0.13	0.37	0.20	0.94	
FACT07	-0.01	0.52	0.12	-0.19	0.60	0.33	1.00	0.50	0.68	0.39	0.34	
FACT08	0.42	0.05	0.37	0.29	0.40	0.13	0.50	1.00	0.74	-0.27	0.18	
FACT09	0.42	0.43	0.29	0.18	0.59	0.37	0.68	0.74	1.00	-0.06	0.41	
FACT10	-0.31	0.26	-0.18	-0.51	0.27	0.20	0.39	-0.27	-0.06	1.00	0.18	
FACT11	0.41	0.29	0.28	-0.10	0.56	0.94	0.34	0.18	0.41	0.18	1.00	
FACT12	-0.29	0.51	-0.25	-0.42	0.45	0.25	0.57	-0.09	0.16	0.78	0.26	1.00
FACT13	-0.32	0.32	-0.03	-0.42	0.40	0.55	0.47	-0.17	0.05	0.70	0.53	0.26
FACT14	-0.06	0.59	0.00	-0.25	0.49	0.40	0.55	-0.06	0.20	0.58	0.41	0.53
FACT15	-0.25	-0.07	-0.06	0.41	-0.30	-0.25	-0.03	-0.08	-0.01	-0.28	-0.28	0.41
FACT16	-0.06	-0.07	-0.06	-0.07	-0.19	-0.12	-0.03	-0.06	0.00	0.08	-0.04	-0.28
FACT17	-0.35	0.40	0.06	-0.23	0.39	0.29	0.40	-0.25	0.15	0.65	0.29	-0.04
FACT18	0.62	0.11	0.31	0.11	0.45	0.62	0.16	0.34	0.44	-0.18	0.65	0.29
FACT19	0.60	-0.04	0.39	0.41	0.26	0.33	-0.08	0.33	0.28	-0.47	0.33	0.65
FACT20	0.38	0.51	0.21	-0.08	0.72	0.79	0.47	0.29	0.48	0.17	0.79	0.33
FACT21	0.31	0.26	0.09	0.01	0.36	0.63	0.29	0.18	0.32	0.10	0.65	0.79
FACT22	0.20	0.37	0.11	-0.09	0.57	0.61	0.31	0.10	0.23	0.36	0.65	0.65
FACT23	-0.38	-0.51	-0.32	-0.15	-0.39	-0.26	-0.36	-0.13	-0.51	-0.13	-0.37	0.65

Sheet 1 (Summary)

The first worksheet lists the top stock factors with lower rated factors that are highly correlated to higher rated factors being "grey'ed out". Factors below a certain rating threshold are also grey'ed out. These thresholds are programmable.

			Thresholds	
			Rating = 0.75	Correl = 0.5
Description	P123 EQ	Rating	Correlation	
Clean Income Statement	$abs((\text{SpItems}(0,Ann) - \text{SpItems}(1,Ann)) / \text{SpItems}(0,Ann))$	1.44	FACT16	1.00
EPS Stability	EPSStableQ	1.36	FACT15	0.05
TACC_TTM	$\text{Eval}(\text{AspTot}(3,gr) - \text{CashEquiv}(3,gr) - \text{UsbCur}(\text{InstCap} + \text{DblTotQ} - (\text{CashPSQ} * \text{Sh}(\text{OutMR})))$	1.14	FACT18	-0.17
EV / Projected Earnings	$(\text{InstCap} + \text{DblTotQ} - (\text{CashPSQ} * \text{Sh}(\text{OutMR})))$	1.13	FACT07	-0.03
EPS Estimate Revision CY	$(\text{CurFYEPSMean} - \text{CurFYEPS4WkAgo}) / \text{Abs}(\text{Cur}(\text{Sales}(\text{NChgPYQ} - \text{Sales}(\text{NChgTTM}) / \text{Abs}(\text{Sales}(\text{CYEstimateRange} - \text{CurFYEPSHigh} / \text{CurFYEPSLow})))$	1.25	FACT67	-0.02
Sales Acceleration - recent	$(\text{Sales}(\text{NChgPYQ} - \text{Sales}(\text{NChgTTM}) / \text{Abs}(\text{Sales}(\text{CYEstimateRange} - \text{CurFYEPSHigh} / \text{CurFYEPSLow})))$	1.22	FACT57	-0.08
CY Estimate Range	$\text{CurFYEPSHigh} / \text{CurFYEPSLow}$	1.19	FACT97	0.05
Sales Percent Change, Most Recent	$\text{Sales}(\text{NChgPYQ})$	1.18	FACT59	0.16
			FACT68	0.27
			FACT14	-0.10
			FACT08	0.22
			FACT180	-0.06
			FACT98	0.12
			FACT64	0.00
			FACT13	-0.14
			FACT73	-0.12
			FACT12	-0.02
			FACT96	-0.02
			FACT17	0.00
			FACT46	0.01
			FACT91	-0.04

That's enough info for one post. Next time I will attempt to describe the test environment, or how the tests are set up to make it easier (on me) :)

Test Environment

October 28, 2013

I've changed my plan a little bit from what I described in yesterday's post. I realized that no I'm not Superman and I can't afford to spend several months on this project. In other words, a few simplifications were in order.

First of all, I decided not to test every sector for every factor. Instead I will test the entire target universe for all 107 factors, then afterwards determine if individual sectors are covered by the stock factors. If not, then I will further test those sectors.

In addition, I won't be testing for rising/falling interest rates at this stage but instead I will do so during RS optimization. A separate project will be initiated to discover what factors work best in various economic conditions.

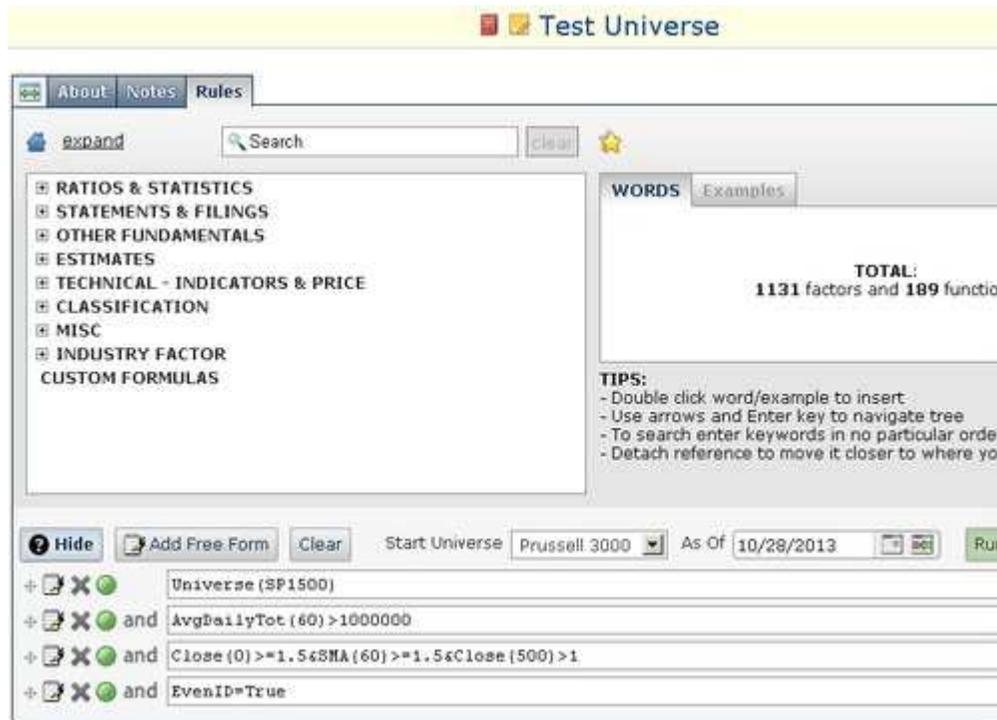
Stock Ranking Systems

So now I would like to show my "test environment". Believe it or not, I have 107 individual ranking systems, each with one stock factor corresponding to what is in the spreadsheet (see last post). Skeptics can view the screenshot below.

Name	Type	Category	#Port
FACT01	Stock	StockFactor 0	
FACT02	Stock	StockFactor 1	
FACT03	Stock	StockFactor 0	
FACT04	Stock	StockFactor 0	
...
FACT104	Stock	StockFactor 0	
FACT105	Stock	StockFactor 0	
FACT106	Stock	StockFactor 0	
FACT107	Stock	StockFactor 0	
FACT11	Stock	StockFactor 0	

Test Universe

The test universe is the same as I described in the last post except I have removed the sector rule.



The first step will be to backtest the complete target universe, even stock-IDs only. Note that the same screen is used to test the target universe as the individual stock factors. The Rule **Rank>80** is disabled for the universe backtest. The backtest setup and results are shown below. The stock universe backtest Alpha is 7.5% so individual factors have to perform much better to ultimately be chosen for the ranking system.

FACT Test

About
 Notes
 Main Settings
 Rules
 Hedge Rules
 Results
 Backtest
 Adv

- RATIOS & STATISTICS
- STATEMENTS & FILINGS
- OTHER FUNDAMENTALS
- ESTIMATES
- TECHNICAL - INDICATORS & PRICE
- HOLDINGS
- CLASSIFICATION
- MISC
- INDUSTRY FACTOR
- CUSTOM FORMULAS

WORDS

TIPS:
 - Double click w
 - Use arrows ar
 - To search ente
 - Detach referer

As Of

FACT Test

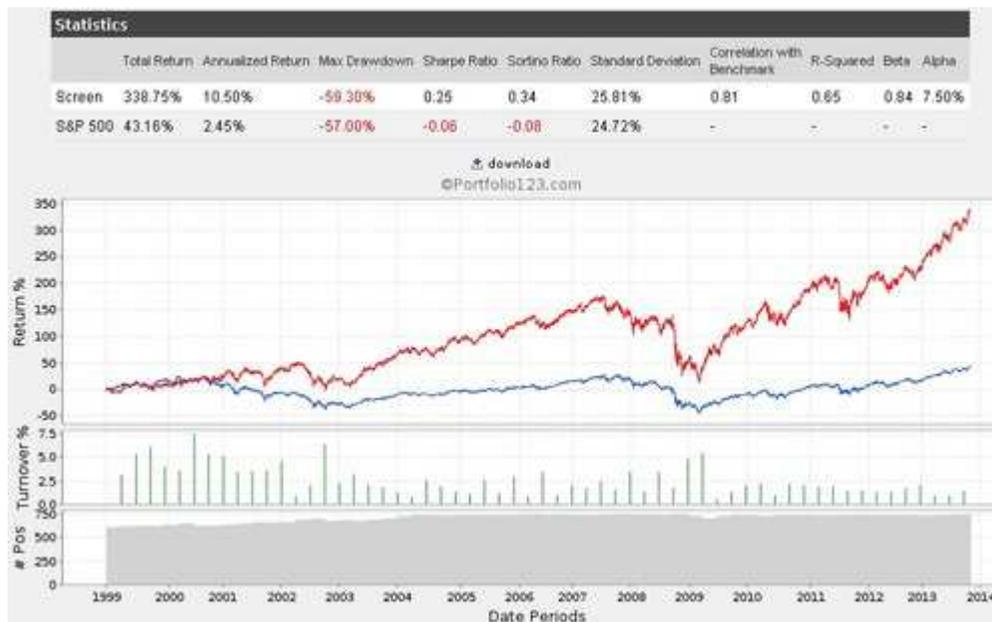
About
 Notes
 Main Settings
 Rules
 Hedge Rules
 Results
 Backtest
 Advanced Backtest

Price
 Start Date - End Date

Rank Tolerance
 Max Pos % (0-100)

Slippage %
 Carry Cost %
 Rebalance Frequency

Long Weight %
 Save Log



Stock Factor Tests

Once the universe results have been downloaded and cut/pasted into the factor-discovery spreadsheet (see previous post) then I can proceed with backtesting each individual factor. The ranking system is selected from the **Main Settings** Tab. The rule Rank>80 is enabled on the **Rules** Tab. The screen setup is shown below. The **Backtest** Tab setup is the same as for the universe backtest.

Universe: Test Universe

Method: Long

Ranking: Ranking System

Ranking System: **FACT01**

expand Search clear

- Released Ranking Systems (4)
- SFR Old (8)
- SFR Test (13)
- SingleFactors (107)
 - StockFactor (107)
 - FACT01**
 - FACT02
 - FACT03
 - FACT04
 - FACT05

And now I'm away to the races! I should be finished the first round of testing (all 107 factors) in 4-8 hours.

Ranking System Optimizer Tutorial

October 30, 2013



Alchemist

A number of [Portfolio123](#) members have been asking for a tutorial on the stock ranking system optimizer since it became available almost one year ago. P123 staff have been silent about its use ever since. Recently I became curious about it and decided to explore the feature to see how (or if) I could make use of it.

What I discovered was that the optimizer has some limitations that make it difficult to use without proper documentation. In addition, usage also requires use of EXCEL or other spreadsheet program in a fashion that is not very intuitive. But once the limitations and interface are understood then one can make effective use of it.

Just remember that it is only a tool and is only as good as the person using it. Optimization is not a science as some would like to believe. There is no correct end-point, or time to stop. Two people attempting to optimize the same ranking system will invariably come up with two different results.

In this tutorial I will attempt to optimize a popular stock ranking system, *All Stars: Piotroski*. It is the ideal ranking system to start with as there are only eight ranking factors and most investors are familiar with Piotroski.

The tutorial will be broken up into several parts as there are a lot of pictures, and google is already complaining about the load time of some of my articles :)

Preparing Piotroski For Optimization

October 30, 2013

I am going to attempt to optimize the [Portfolio123](#) ranking system *All Stars: Piotroski*. The Portfolio123 implementation of Piotroski's screening factors is different than the original but provides a reasonable implementation.

Limitation of Stock Factors/Functions

The ranking system consists of eight factors. This is important because the P123 Ranking System Optimizer can handle fifteen factors and not much more. If you try to optimize a ranking system with 20 factors, for example, the optimizer will give errors when you try to generate permutations. The ranking system is shown below.



The screenshot shows the 'All-Stars: Piotroski' ranking system interface. At the top, it says 'ranking method: Percentile NAs Negative'. Below that are navigation options: 'branches', 'f(x)', 'text editor', and 'raw editor (no ajax)'. The main content is a tree structure:

- 100% ↑ **All-Stars: Piotroski**
 - 50% [🌐] ↓ Pr2BookQ
 - 50% [📁] ↑ **Fundamentals**
 - 14.29% [🌐] ↑ GMgn%TTM - GMgn%PTM f(🔒)
 - 14.29% [🌐] ↑ OCFPSTTM-EPSPExcIXorTTM f(🔒)
 - 14.29% [🌐] ↓ DbtTot2AstQ - DbtTot2AstPYQ f(🔒)
 - 14.29% [🌐] ↑ CurRatioQ- CurRatioPYQ f(🔒)
 - 14.29% [🌐] ↑ AstTurnTTM-AstTurnPTM f(🔒)
 - 14.29% [🌐] ↑ ROA%TTM - ROA%PTM f(🔒)
 - 14.29% [🌐] ↓ ShsOutAvgTTM - ShsOutAvgPTM f(🔒)

Performance Baseline

Before getting started with this exercise it is a good idea to measure the performance of the ranking system as is. To do this, you need to select the All Stars: Piotroski Ranking System (as shown above) and then select the performance link on the left side of the screen as shown below.

The screenshot shows a web browser window with the URL https://www.portfolio123.com/rank_perf.jsp?rankid=90113. The website header includes the 'portfolio123' logo and navigation links: HOME, READY-2-GO, PORTFOLIO, BOOK, RANK, SCREEN, STOCK, ETF, TOOLS, COMMUNITY, HELP. Below the header is a dark blue bar with 'SYSTEMS' and 'SEARCH' options. On the left, a sidebar menu lists: Factors, Performance (highlighted with a red arrow), Rank, Correlation, Ri Select gineer, About, and Notes. The main content area features a toolbar with 'New', 'Select Ranking System', 'Save As', and 'Optimize' buttons. Below the toolbar, a yellow banner displays 'P123 Ranking Systems ▶ All-Stars' and 'All-Stars: Piotroski' with the ranking method 'Percentile NAs Negati'. The section is titled 'Historical Performance by Ranks' and includes a 'Period' selector with a date range from 01/01/1999 to 12/31/2012.

Once you arrive at the performance screen then the appropriate fields should be set up for the performance chart calculation. In this case, the defaults are going to be used. Click on the Run button to calculate the performance graph.

All-Stars: Piotroski

ranking method: Percentile NAs Negative

Period	<input type="text" value="01/02/1999 - 10/26/2013"/> <input type="button" value="1Y"/> <input type="button" value="5Y"/> <input type="button" value="10Y"/> <input type="button" value="Max"/>
Rebalance Frequency	<input type="text" value="4 Weeks"/>
Ranking Method	Percentile NAs Negative
Override Ranking Method	<input type="text" value="Percentile NAs Negative"/>
Rank Buckets (2-200)	<input type="text" value="20"/> Slippage % <input type="text" value="0.0"/> when a stock chang
Transaction Type	<input checked="" type="radio"/> Long <input type="radio"/> Short
Benchmark	<input type="text" value="S&P 500"/>

Filters (applied prior to ranking)

Universe	<input type="text" value="All Fundamentals"/> <input type="button" value="Refresh"/>
----------	--

Filters (applied after ranking)

Minimum Price	<input type="text" value="3.0"/>
Sector	<input type="text" value="-- ALL --"/>

Output

Chart Type	<input checked="" type="radio"/> Annualized Returns <input type="radio"/> Performance Graph
Chart Size	<input type="text" value="500"/> x <input type="text" value="500"/> pixels



Click on Run

The ranking system performance is shown below. With 20 ranking buckets, the highest ranking bucket **Rank > 95**, is the right-most bar on the chart and is 20% per annum calculated over the full data history starting in 1999.

All-Stars: Piotroski

ranking method: Percentile NAs Negative

Historical Performance by Ranks

Period: 01/02/99 - 10/26/13

Rebalance Frequency: 4 Weeks

Ranking Method: Percentile NAs Negative

Slippage (% of trade amount): 0.0

Transaction Type: Long

Universe: All Fundamentals

Benchmark: S&P 500

Filters:

Number of Buckets: 20

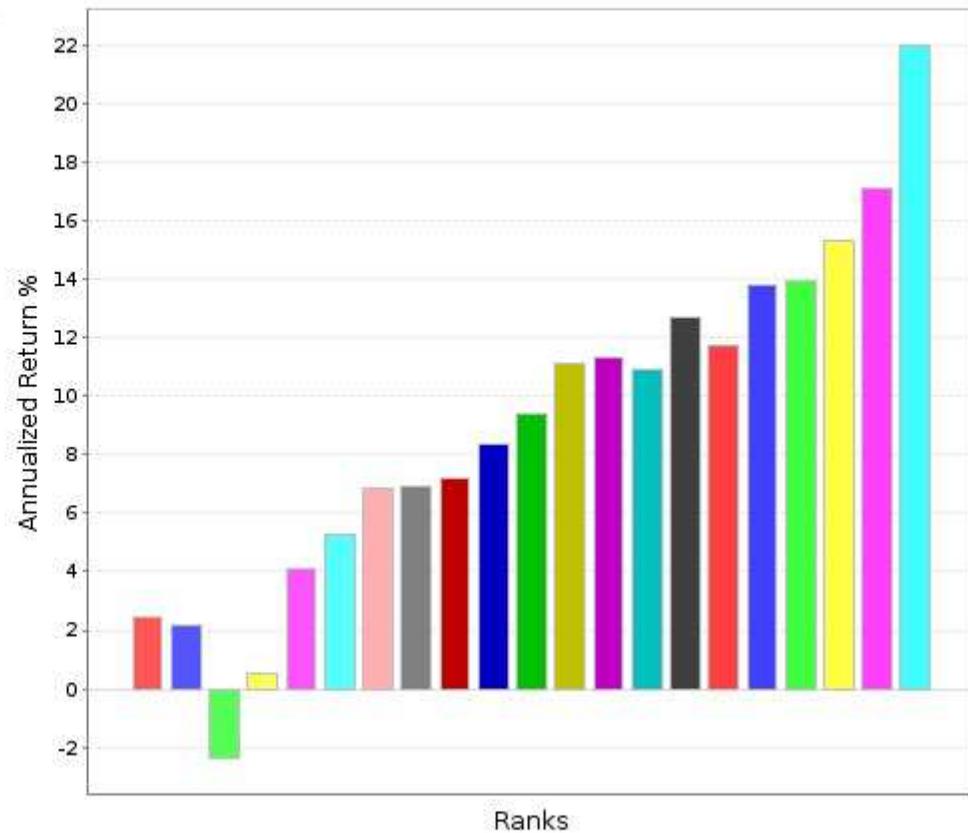
Minimum Price: 3.0

Sector: -- ALL --

Change Settings

Download

©Portfolio123.com



Now that we know the baseline performance is, let's massage the ranking system into a form that is compatible with the optimizer.

Node Limitations

The next limitation of note is that the ranking system optimizer cannot handle composite nodes such as the fundamentals node along with the 7 factors within the node. The optimizer also can't handle conditional nodes. **All complex nodes, apart from stock factor and formula, have to be eliminated.** In this case, the process is not too painful and can be done using either the text editor or the procedure described below.

Copying the Ranking System

All Stars: Piotroski is a P123 Ranking System and can't be edited directly. Therefore an editable copy must be created. This is done by clicking on **Save As**.
Change the name of the ranking system then click on **Save**.

The screenshot shows the main interface of the software. At the top, there is a menu bar with 'New', 'Select Ranking System', 'Save As', and 'Optimize'. A red arrow points to the 'Save As' button. Below the menu bar, the current ranking system is identified as 'All-Stars: Piotroski' with the method 'Percentile NAs Nega'. A tree view on the left shows the system's structure, including 'Fundamentals' and various financial metrics. On the right, a 'Node Properties' panel is visible, showing options for 'Lower values', 'Higher value', and 'Summation'.

New Stock Ranking System

Using modified settings from 'All-Stars: Piotroski'

Name	Stitts Piotroski	← Change Name ①
Ranking Method	Percentile NAs Negative	
Visibility	Public	
Category	Unclassified	

Save Cancel

↑ Click Save ②

Eliminating the Composite Node

After the ranking system has been copied and renamed, the composite node can be deleted. As mentioned before, this can be done by using the text editor (if you are a programmer). Otherwise, select Fundamentals and then cut the sub-nodes as shown below.



The screenshot shows the Stitts Piotroski ranking system interface. The top bar displays the name "Stitts Piotroski" and the ranking method "Percentile NAs Negative". Below the top bar, there are tabs for "branches", "reordering", "f(x)", "text editor", and "raw editor (no ajax)". The main area shows a tree view of nodes. The "Fundamentals" node is selected, and a context menu is open over it. The menu options are: "Update", "Label", "Ranking", "Copy & Paste", "Cut", "Cut Sub-nodes", "Copy", "Copy Sub-nodes", and "Paste". The "Cut Sub-nodes" option is highlighted. Red arrows and circled numbers indicate the steps: "1" points to the "Fundamentals" node, and "2" points to the "Cut Sub-nodes" option in the menu.

Now paste the sub-nodes at the top level as shown below.



The screenshot shows the Stitts Piotroski ranking system interface. The top bar displays the name "Stitts Piotroski" and the ranking method "Percentile NAs Negative". Below the top bar, there are tabs for "branches", "reordering", "f(x)", "text editor", and "raw editor (no ajax)". The main area shows a tree view of nodes. The "Stitts Piotroski" node is selected, and a context menu is open over it. The menu options are: "Update", "Label", "Ranking", "Copy & Paste", "Cut Sub-nodes", "Copy", "Copy Sub-nodes", and "Paste". The "Paste" option is highlighted. Red arrows and circled numbers indicate the steps: "1" points to the "Stitts Piotroski" node, and "2" points to the "Paste" option in the menu.

Now cut the **Fundamentals** node.

branches | reordering | f(x) | text editor | raw editor (no ajax)

100% ↑ **Stitts Piotroski** 1

- 50% [🌐] ↓ Pr2BookQ
- 50% [📁] ↑ **Fundamentals** ← Select Node
- 14.29% [🌐] ↑ GMgn%TTM - GMgn%PTM f(x)
- 14.29% [🌐] ↑ OCFPSTTM-EPSPExcIXorTTM f(x)
- 14.29% [🌐] ↓ DbtTot2AstQ - DbtTot2AstPYQ f(x)
- 14.29% [🌐] ↑ CurRatioQ- CurRatioPYQ f(x)
- 14.29% [🌐] ↑ AstTurnTTM-AstTurnPTM f(x)
- 14.29% [🌐] ↑ ROA%TTM - ROA%PTM f(x)
- 14.29% [🌐] ↓ ShsOutAvgTTM - ShsOutAvgPTM f(x)

Node Properties | Add Node | Weights | Ranking Method

Update [▼] 2

- » Cut
- Copy & Paste
- » Cut ← Cut Node
- » Cut Sub-nodes
- » Copy
- » Copy Sub-nodes
- » Paste

Label Fundamentals

Ranking

- ↓ Lower
- ↑ Higher
- Σ Summation only

We are going to start optimizing with equal-weighted stock factors/formula. Select the top level node **Stitts Piotroski**, then select the **Weights** Tab, click on **Distribute Evenly** then **Update**. These actions are shown below.

branches | reordering | f(x) | text editor | raw editor (no ajax)

100% ↑ **Stitts Piotroski** ← Select 1

- 50% [🌐] ↓ Pr2BookQ
- 14.29% [🌐] ↑ GMgn%TTM - GMgn%PTM f(x)
- 14.29% [🌐] ↑ OCFPSTTM-EPSPExcIXorTTM f(x)
- 14.29% [🌐] ↓ DbtTot2AstQ - DbtTot2AstPYQ f(x)
- 14.29% [🌐] ↑ CurRatioQ- CurRatioPYQ f(x)
- 14.29% [🌐] ↑ AstTurnTTM-AstTurnPTM f(x)
- 14.29% [🌐] ↑ ROA%TTM - ROA%PTM f(x)
- 14.29% [🌐] ↓ ShsOutAvgTTM - ShsOutAvgPTM f(x)

Node Properties | Add Node | **Weights** | Ranking Method

Node Weights 2 Select

Note: If all the nodes have the same weight, then all nodes are assigned equal weight.

Pr2BookQ	12.5	%
GMgn%TTM - GMgn%PTM	12.5	%
OCFPSTTM-EPSPExcIXor...	12.5	%
DbtTot2AstQ - DbtTot...	12.5	%
CurRatioQ- CurRatioP...	12.5	%
AstTurnTTM-AstTurnPT...	12.5	%
ROA%TTM - ROA%PTM	12.5	%

3 Select → 4 Select → Update

- Clear
- Distribute Evenly** ← Select
- Fill Zeros Evenly
- Normalize

Got all that? Good. Now save the ranking system.



My Ranking Systems ▶ Unclassified

Stitts Piotroski

ranking method: Percentile NAs Negative

branches | reordering | f(x) | text editor | raw editor (no ajax)

100% ↑ **Stitts Piotroski**

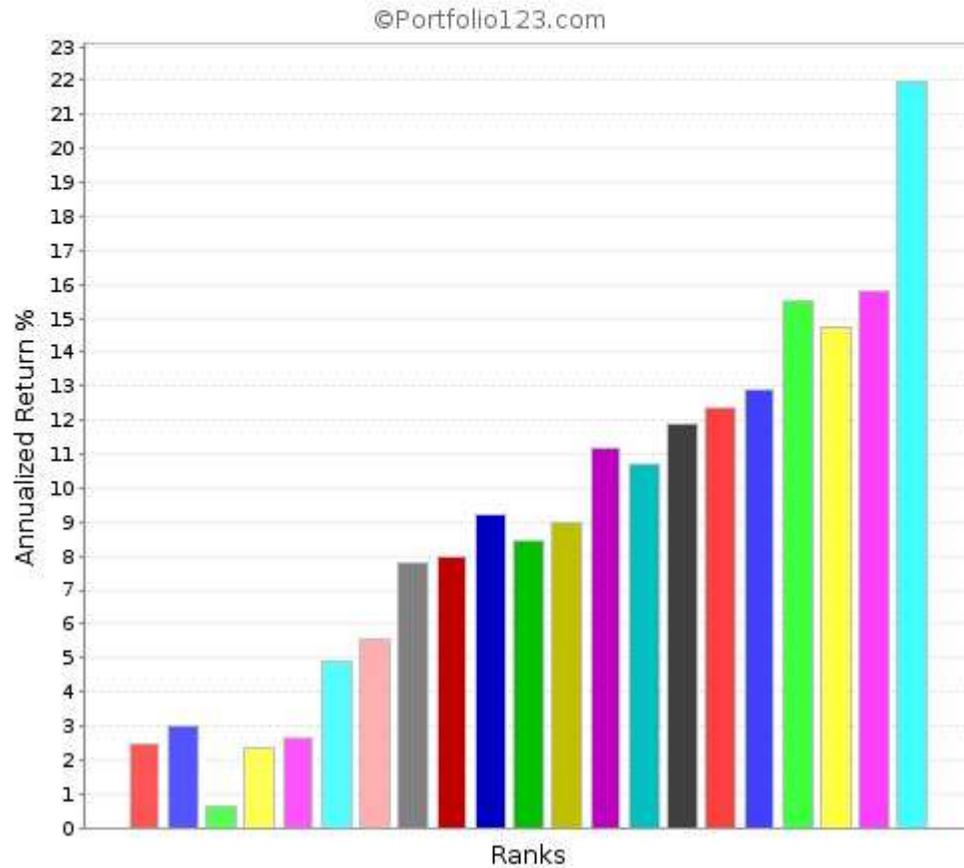
- 12.5% [Globe] ↓ Pr2BookQ
- 12.5% [Globe] ↑ GMgn%TTM - GMgn%PTM f(x)
- 12.5% [Globe] ↑ OCFPSTTM-EPSPExcIXorTTM f(x)
- 12.5% [Globe] ↓ DbtTot2AstQ - DbtTot2AstPYQ f(x)
- 12.5% [Globe] ↑ CurRatioQ- CurRatioPYQ f(x)
- 12.5% [Globe] ↑ AstTurnTTM-AstTurnPTM f(x)
- 12.5% [Globe] ↑ ROA%TTM - ROA%PTM f(x)
- 12.5% [Globe] ↓ ShsOutAvgTTM - ShsOutAvgPTM f(x)

Now lets check the performance of this new ranking system. Use the same procedure as before. Despite changing the node weights, the performance is pretty similar. The top bucket is still 22% per annum. (Click to enlarge).

Period: 01/02/99 - 10/26/13
Rebalance Frequency: 4 Weeks
Ranking Method: Percentile NAs Negative
Slippage (% of trade amount): 0.0
Transaction Type: Long
Universe: All Fundamentals
Benchmark: S&P 500

Filters:
Number of Buckets: 20
Minimum Price: 3.0
Sector: -- ALL --

[Change Settings](#) [Download](#)



The modification to the All Stars: Piotroski ranking system is now complete and we are ready to begin the optimization process.

Setting Up An Optimizer Study

October 31, 2013

In the last post, the ranking system was prepared by eliminating the composite node. The number of nodes (8) was not a concern as it was less than 15, one of the optimizer's limitations. The ranking system now looks like this:

Stitts Piotroski
ranking method: [Percentile NAs Negative](#)

branches | reordering | f(x) | text editor | raw editor (no ajax)

100% ↑ **Stitts Piotroski**

- 12.5% {↑} ↓ Pr2BookQ
- 12.5% {↑} ↑ GMgn%TTM - GMgn%PTM f(x)
- 12.5% {↑} ↑ OCFPSTTM-EPSPExcIXorTTM f(x)
- 12.5% {↑} ↓ DbtTot2AstQ - DbtTot2AstPYQ f(x)
- 12.5% {↑} ↑ CurRatioQ- CurRatioPYQ f(x)
- 12.5% {↑} ↑ AstTurnTTM-AstTurnPTM f(x)
- 12.5% {↑} ↑ ROA%TTM - ROA%PTM f(x)
- 12.5% {↑} ↓ ShsOutAvgTTM - ShsOutAvgPTM f(x)

Node Properties | Add Node | Weights | Ranking Method

Choose Node Type

choose

Start the Optimizer

Now click on **Optimize** to start up the ranking system optimizer.

HOME | READY-2-GO | PORTFOLIO | BOOK | **RANK** | SCREEN | STOCK | ETF | TOOLS | COMMUNITY | HELP

SYSTEMS | SEARCH

New | Select Ranking System | Save As | Delete | **Optimize**

My Ranking Systems ▶ Unclassified

Stitts Piotroski
ranking method: [Percentile NAs Negative](#)

A page called **New Ranking System Study** will be displayed where you can edit several parameters including the rebalance frequency, number of buckets, etc. For this tutorial, the default settings will be used. Click on **Save**.

Save Cancel



New Ranking System Study

Name	<input type="text" value="Stitts Piotroski"/>
Based On	Stitts Piotroski
Override Ranking Method	<input type="text" value="Use Ranking System Default"/>
Rebalance Frequency	<input type="text" value="Four Weeks"/>
Universe	<input type="text" value="All Fundamentals"/>
Filter: Min Price	<input type="text" value="3.0"/>
Filter: Sector	<input type="text" value="-- ALL --"/>
Number of Buckets	<input type="text" value="20"/>
Category	<input type="text" value="Unclassified"/>

Set the Date Range

Click on the little plus sign button to edit the date periods.

RankingSystem Permutations on

1 Total

collapse

Period

Date Periods 10/25/12 10/26/13

General

Ranking Method Percentile NAs Negative

Rebalance Frequency Four Weeks

Universe All Fundamentals

Filter: Min Price 3.0

Filter: Sector -- ALL --

Buckets 20

Stitts Piotroski 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12

↓ Pr2BookQ

↑ GMgn%TTM - GMgn%PTM

↑ OCFPSTTM-EPSPExclXorTTM

↓ DbtTot2AstQ - DbtTot2AstPYQ

↑ CurRatioQ - CurRatioPYQ

↑ AstTurnTTM-AstTurnPTM

↑ ROA%TTM - ROA%PTM

↓ ShsOutAvgTTM - ShsOutAvgPTM

The default date range is one year. We want to use the full data history. This can be done by editing the start date in the Current Date Periods, or clicking on the little calendar button shown below.

Current Date Periods

10/25/12 10/26/13

Update

Cancel

Add Rolling Period

Start Date

10/25/12



Period Length (weeks)

52

Pick Any Date Range

Number of Periods

1

Shift Dates by (weeks)

1

Add Period(s)

Select Max followed by Add Period(s) as shown below.

Current Date Periods

10/25/12 10/26/13

Update Cancel

Add Rolling Period

Start Date 10/25/12

Period Length (weeks)

Number of Periods

Shift Dates by (weeks)

1 Year

5 Years

10 Years

Max

Select

Start Date

Jan 1999

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Show Today

Current Date Periods

10/25/12 10/26/13

Add Rolling Period

Start Date 1/2/1999

Period Length (weeks) 52

Number of Periods 1

Shift Dates by (weeks) 1

Click on Add Period(s)

Add Period(s)

The end date for the maximum date range isn't correct. Delete the extra dates and leave the correct date range. Click on update as shown below.

Current Date Periods

~~10/25/12~~ 10/26/13
~~01/02/99~~ ~~01/01/00~~

01/02/99 10/26/13 **1**

Click on Update **2**

Update Cancel

Add Rolling Period

Start Date

Period Length (weeks)

Number of Periods

Shift Dates by (weeks)

The optimizer screen is shown below. We are now ready to start generating permutations.

RankingSystem Permutations on
1 Total
collapse

[-] Period	
Date Periods	+ 01/02/99 10/26/13
[-] General	
Ranking Method	Percentile NAs Negative
Rebalance Frequency	Four Weeks
Universe	All Fundamentals
Filter: Min Price	3.0
Filter: Sector	-- ALL --
Buckets	20
[-] 📁 ↑ Stitts Piotroski + 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12	
{🌐} ↓ Pr2BookQ	
{🌐} ↑ GMgn%TTM - GMgn%PTM	
{🌐} ↑ OCFPSTTM-EPSPExclXorTTM	
{🌐} ↓ DbtTot2AstQ - DbtTot2AstPYQ	
{🌐} ↑ CurRatioQ- CurRatioPYQ	
{🌐} ↑ AstTurnTTM-AstTurnPTM	
{🌐} ↑ ROA%TTM - ROA%PTM	
{🌐} ↓ ShsOutAvgTTM - ShsOutAvgPTM	

In the next post I will introduce a special spreadsheet I created in order to assist in the generation of permutations.

Using EXCEL With The Ranking System Optimizer

October 31, 2013

In the last post a new stock ranking system optimization study was set up. Now I am going to introduce you to a special spreadsheet that I have prepared that will make it a little easier to perform the optimization steps. The spreadsheet can be found here: [RS-Optimizer](#)

Setting Up EXCEL

When EXCEL is opened you will need to set Calculation to **Manual**. The spreadsheet should only perform calculations when you force it to. Follow the steps shown below to set manual calculation.

You will also need to add the **Calculate** button to your **Quick Access Toolbar** as shown below.

Spreadsheet Details

Now lets have a look at the spreadsheet.

The spreadsheet is designed for a maximum of 15 stock factor nodes and 10 optimization iterations. This is the maximum size that you should consider using.

There are several fields that you need to be aware of before using the spreadsheet.

Reference Node Weights - The 15 entries in this array represent the current weight settings for each factor. The starting value should be set to 10.

Randomized Array of Node Weights - this is an array of random weight values generated from the reference node weights when the EXCEL manual calculate is forced. This array will be eventually be copied and pasted into the [Portfolio123](#) ranking system optimizer.

Randomization Formula - this is the formula used to generate the randomized array (shown above). The formula takes the reference node weight and adds +/- random offset. The maximum offset is determined by the sensitivity setting. In the example above the sensitivity is 50% and as you can see the values in the randomized array range between 7.5 and 12.5. The range is 50% of the reference weight.

On the next post I will perform the first steps of the optimization.

Ranking System Optimizer: The First Iteration

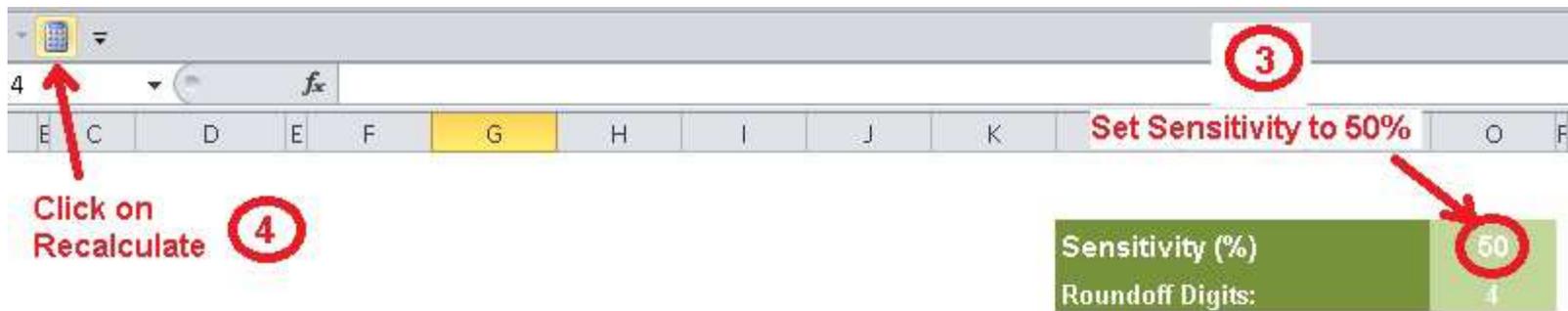
October 31, 2013

Up to this point, the reader has been introduced to the [Portfolio123](#) ranking system optimizer and also the custom spreadsheet that I have prepared. Now it is time to use them both together. If possible, you should try to use two monitors with your computer. You don't have to, but it makes this procedure a lot easier as you will be going back and forth between the optimizer and spreadsheet frequently.

Lets start with the EXCEL spreadsheet.

Zero Out Unused Nodes

The Stitts Piotroski ranking system has eight nodes (stock factors/formula) so it is a good idea to zero out the remaining nodes in the spreadsheet as shown below. You don't have to perform this action but it helps visually to prevent copying the wrong size array in the future. It is also a good idea to manually recalculate just to ensure that you are starting with good randomized data. I recommend starting with 50% sensitivity setting although you can always experiment with this setting.



15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	10.0000	8.1287	11.7076	12.4392	8.5270	11.6985	11.8121	10.5927	11.9470	12.3327	11.3984
2	10.0000	12.4732	10.6092	10.4324	9.7823	11.5922	10.2011	12.2476	8.1627	8.6441	8.2369
3	10.0000	8.6163	9.2449	8.5375	9.8947	8.3331	10.7718	11.4261	8.7484	10.2486	8.8756
4	10.0000	10.2573	9.8688	11.6705	7.9965	11.5288	8.1490	10.2675	8.7226	12.0271	9.8304
5	10.0000	9.7031	9.4508	8.3104	11.2894	10.1937	12.4035	10.1989	8.6081	7.6103	11.8129
6	10.0000	9.6746	11.1171	9.0075	9.3453	7.9360	8.1653	9.6791	11.0030	8.9195	9.6620
7	10.0000	8.3853	7.9534	8.9878	8.8928	12.1359	11.2033	12.4570	10.3671	8.1049	8.9366
8	10.0000	8.0309	8.3559	9.9873	10.6026	11.5608	7.6041	10.9293	8.2455	11.6008	12.4629
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Set Reference Nodes 9 thru 15 to Zero (1)

Set Randomization Array Nodes 9-15 to Zero (2)

Generate Permutations

Now open up the ranking system study if not already open. We are about to perform the first iteration of the optimization process. Click on the button with a "plus sign" as shown below to add permutations.

Stitts Piotroski

RankingSystem Permutations on

1 Total

collapse

Period

Date Periods 01/02/99 10/26/13

General

Ranking Method Percentile NAs Negative

Rebalance Frequency Four Weeks

Universe All Fundamentals

Filter: Min Price 3.0

Filter: Sector -- ALL --

Buckets 20

↑ Stitts Piotroski 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12

↓ Pr2BookQ

↑ GMgn%TTM - GMgn%PTM

↑ OCFPST **Click here to edit
the permutations**

↓ DbtTot2

↑ CurRatioQ- CurRatioPYQ

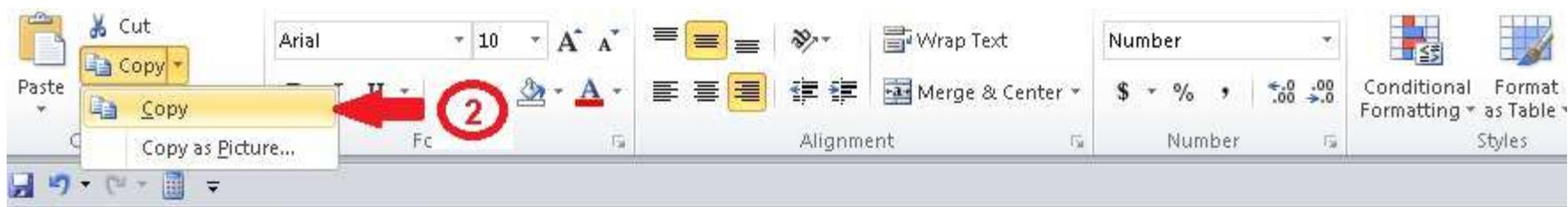
↑ AstTurnTTM-AstTurnPTM

↑ ROA%TTM - ROA%PTM

↓ ShsOutAvgTTM - ShsOutAvgPTM

Switch back to the spreadsheet and copy the array of randomized node weights.

WARNING: Be sure not to copy the reference weights and also do not copy nodes 9 through 15. Doing so will cause an error because the wrong amount of data would be pasted into the ranking system optimizer.



F7 fx =ROUND(\$D7+\$O\$2*(RAND()-0.5)/10,\$O\$3)

1 Block Select the first 8 nodes of the randomization array

		Sensitivity (%)	
		Roundoff Digits:	
		50	4

15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	10.0000	11.5894	9.0649	11.7977	9.8785	12.0342	7.8233	11.5249	9.5561	11.8492	11.1283
2	10.0000	12.1950	11.8433	9.5845	8.7468	7.9600	9.5727	8.9031	11.4996	12.1327	9.5081
3	10.0000	9.9284	9.7756	10.9421	12.3649	7.9134	10.6683	7.6293	7.8965	7.9301	11.4297
4	10.0000	7.8332	11.9471	8.8542	9.6598	11.5050	9.5356	7.5203	9.0616	11.9329	10.4958
5	10.0000	9.5273	11.8790	11.6468	8.0966	12.1098	9.0355	9.4434	8.7352	11.6977	7.6130
6	10.0000	11.1721	9.2182	12.4369	8.4495	11.5175	12.0916	9.0065	9.7781	8.0545	9.9439
7	10.0000	11.5018	11.2315	11.4912	10.0247	8.8644	11.1694	11.2074	8.5267	9.9507	11.7878
8	10.0000	11.9445	9.4397	8.5569	8.2275	12.2788	7.7010	7.6291	8.0362	9.0718	8.1583
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Now return to the ranking system optimizer. You should be on the screen "Add Permutation for Stitts Piotroski". Select all of the permutations listed as shown in the figure below. Paste the 8 rows by 10 columns of randomized data, overwriting the original permutations listed in the ranking system optimizer. Then click on **Update**.

New Weight Permutations

1

Block Select the Node Weights

{f} ↓ Pr2BookQ	0.12
{f} ↑ GMgn%TTM - G...	0.12
{f} ↑ OCFPSTTM-EPS...	0.12
{f} ↓ DbtTot2AstQ - ...	0.12
{f} ↑ CurRatioQ- Cur...	0.12
{f} ↑ AstTurnTTM-As...	0.12
{f} ↑ ROA%TTM - RO...	0.12
{f} ↓ ShsOutAvgTTM...	0.12

2

Right Mouse Click then Paste

Update Done

3

Now you will see the permutations listed as shown below. Click on **Generate Permutations**.

[New](#) ▾ [Select Study](#) ▾ [Save As](#) [Delete](#) → [Generate Permutations](#) → [Previous Results](#)

Studys ▸ Unclassified

Stitts Piotroski

kingSystem Permutations on
 ts Piotroski
total
 apse

Filter: Sector -- ALL --
 Buckets: 20

↑ **Stitts Piotroski** +

Updated Weights for 10 iterations

- ▾ 11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94
- ▾ 9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44 ✖
- ▾ 11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56 ✖
- ▾ 9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23 ✖
- ▾ 12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28 ✖
- ▾ 7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70 ✖
- ▾ 11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63 ✖
- ▾ 9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04 ✖
- ▾ 11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07 ✖
- ▾ 11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16 ✖

↓ Pr2BookQ
↑ GMan%TTM - GMan%PTM

Process the Permutations

Select **Run** to start processing the 10 permutations. Click on **Toggle Charts** to disable the display of charts as they are not necessary for this exercise.

New Select Study Save As Delete Edit Permutations Run Toggle Charts

My Studys Unclassified **Stitts Piotroski**

Perm	Date Periods	Stitts Piotroski	Min	Me	First
1	01/02/99 10/26/13	11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94			
2	01/02/99 10/26/13	9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44			
3	01/02/99 10/26/13	11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56			
4	01/02/99 10/26/13	9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23			
5	01/02/99 10/26/13	12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28			
6	01/02/99 10/26/13	7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70			
7	01/02/99 10/26/13	11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63			
8	01/02/99 10/26/13	9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04			
9	01/02/99 10/26/13	11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07			
10	01/02/99 10/26/13	11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16			

Select Run (1) Turn off Charts (2)

Choosing the Best Permutation

When the permutations are finished processing you will see the results. At this point in time you must choose the "best" result from the 10 permutations. Now this is very much a personal decision. I look at the last bucket first, and the Delta (highest bucket to lowest bucket) second. As you can see from the figure below, permutation #3 has the highest last bucket with 22.17%. However, permutation #5 is a fraction lower but has a much larger delta of 20.01 versus 18.90. Thus I decided that permutation #5 is the best permutation. As I said before, there is no right or wrong choice so don't get hung up on your decision.

Stitts Piotroski

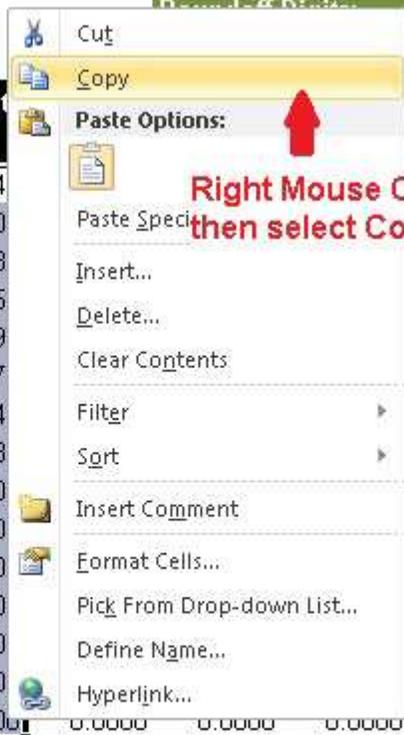
Perm ▲	Date Periods	Stitts Piotroski	Min	Median	Mean	Max	First	Last	Delta	Slope	StdDev
1	01/02/99 10/26/13	11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94	0.37	9.61	9.41	21.23	2.41	21.23	18.82	0.91	5.54
2	01/02/99 10/26/13	9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44	0.41	9.51	9.43	21.03	3.09	21.03	17.94	0.84	5.12
3	01/02/99 10/26/13	11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56	1.30	9.43	9.48	22.17	3.28	22.17	18.90	0.86	5.29
4	01/02/99 10/26/13	9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23	0.75	9.41	9.38	21.52	3.33	21.52	18.20	0.85	5.23
5	01/02/99 10/26/13	12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28	1.18	9.45	9.46	22.15	2.14	22.15	20.01	0.91	5.57
6	01/02/99 10/26/13	7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70	1.63	10.00	9.46	21.87	3.34	21.87	18.54	0.84	5.20
7	01/02/99 10/26/13	11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63	0.27	9.71	9.47	22.13	2.81	22.13	19.31	0.89	5.42
8	01/02/99 10/26/13	9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04	-0.51	9.93	9.46	21.73	3.54	21.73	18.19	0.87	5.38
9	01/02/99 10/26/13	11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07	-0.32	9.79	9.44	21.16	2.79	21.16	18.37	0.86	5.29
10	01/02/99 10/26/13	11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16	1.33	10.60	9.42	22.01	3.13	22.01	18.88	0.86	5.31

Updating the Spreadsheet

Now that I have chosen permutation #5 I can go back and update the spreadsheet. This is done by copying iteration #5 from the randomized array as shown below.

15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	10.0000	11.5894	9.0649	11.7977	9.8785	12.034	7.960	7.9301	11.4297	11.1283	11.283
2	10.0000	12.1950	11.8433	9.5845	8.7468	7.960	7.9301	11.4297	11.1283	11.283	9.5081
3	10.0000	9.9284	9.7756	10.9421	12.3649	7.913	11.9329	10.4958	11.6977	7.6130	7.9301
4	10.0000	7.8332	11.9471	8.8542	9.6598	11.505	11.6977	7.6130	8.0545	9.9439	11.9329
5	10.0000	9.5273	11.8790	11.6468	8.0966	12.109	11.517	11.517	8.0545	9.9439	11.6977
6	10.0000	11.1721	9.2182	12.4369	8.4495	11.517	8.864	11.517	9.9507	11.7876	11.517
7	10.0000	11.5018	11.2315	11.4912	10.0247	8.864	12.278	10.0247	9.0718	8.1583	8.864
8	10.0000	11.9445	9.4397	8.5569	8.2275	12.278	0.0000	0.0000	9.0718	8.1583	12.278
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000



Right Mouse Click then select Copy

Block Select Weight Iteration # 5

Now paste the weights from iteration #5 into the reference array.

WARNING: Make sure that you paste **Values Only** into the reference array. In the past I have succeeded in completely locking up my spreadsheet by pasting values and formulas. It isn't easy to recover from such an event.

07 fx 10

										Sensitivity (%)	50
										Roundoff Digits:	4
										Weight / Iteration	
Node	Reference	3	4	5	6	7	8	9	10		
1	10.0	7.77	0.0795	12.0242	7.8233	11.5249	9.5561	11.8492	11.1283		
2	10.0	10.0	9.5727	8.9031	11.4996	12.1327	9.5081				
3	10.0	10.0	10.6683	7.6293	7.8965	7.9301	11.4297				
4	10.0	10.0	9.5356	7.5203	9.0616	11.9329	10.4958				
5	10.0	10.0	9.0355	9.4434	8.7352	11.6977	7.6130				
6	10.0	10.0	12.0916	9.0065	9.7781	8.0545	9.9439				
7	10.0	10.0	11.1694	11.2074	8.5267	9.9507	11.7876				
8	10.0	10.0	7.7010	7.6291	8.0362	9.0718	8.1583				
9	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
10	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
11	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
12	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
13	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
14	0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		

1 Block Select Reference Weights

2 Paste Special

3 Paste Values Only

**** Important ****

One iteration of the optimization process has now been completed. This will be performed over and over again, starting with **Manual Calculation**.

Click on Recalculate Button

Sensitivity (%)	50
Roundoff Digits:	4

15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	12.0342	11.5894	9.0649	11.7977	9.8785	12.0342	7.8233	11.5249	9.5561	11.8492	11.1283
2	7.9600	12.1950	11.8433	9.5845	8.7468	7.9600	9.5727	8.9031	11.4996	12.1327	9.5081
3	7.9134	9.9284	9.7756	10.9421	12.3649	7.9134	10.6683	7.6293	7.8965	7.9301	11.4297
4	11.5050	7.8332	11.9471	8.8542	9.6598	11.5050	9.5356	7.5203	9.0616	11.9329	10.4958
5	12.1098	9.5273	11.8790	11.6468	8.0966	12.1098	9.0355	9.4434	8.7352	11.6977	7.6130
6	11.5175	11.1721	9.2182	12.4369	8.4495	11.5175	12.0916	9.0065	9.7781	8.0545	9.9439
7	8.8644	11.5018	11.2315	11.4912	10.0247	8.8644	11.1694	11.2074	8.5267	9.9507	11.7876
8	12.2788	11.9445	9.4397	8.5569	8.2275	12.2788	7.7010	7.6291	8.0362	9.0718	8.1583
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

That completes this portion of the ranking system optimizer tutorial. The next post will focus on pruning the nodes and completing the optimization.

Pruning Nodes From The Ranking System

November 1, 2013

Recap of the Optimization Sequence

In the last post I described the sequence of actions required to generate new permutations, run the optimizer and select the best permutation. This is repeated over and over again until you decide you can't improve the performance any further. Before going any further I would like to recap the iterative optimization process.

From the spreadsheet you start by clicking on the manual calculate button. This causes new randomized data to be generated from the reference weights. Then block select the randomized data (8 nodes x 10 iterations). Copy the data.

Click on Manual Calculate

1

2 Block Select Randomized Weights

3

15 Nodes (Max.), 10 Iterations (Max.)		Weight / Iteration									
Node	Reference	1	2	3	4	5	6	7	8	9	10
1	10.3827	10.1846	10.4268	10.8671	10.7570	10.3032	10.2038	10.1018	10.577	10.6330	9.7193
2	10.3710	10.0005	10.5947	10.6165	9.9781	9.9157	10.3634	9.8786	10.352	9.6330	9.7193
3	10.1040	9.9668	9.9534	10.1660	9.6769	10.3947	9.6202	9.8132	10.414	9.6330	9.7193
4	9.9769	9.9009	10.4148	9.5162	10.0963	10.2525	9.6540	9.8201	10.407	9.6330	9.7193
5	10.1176	10.1347	10.4370	10.0430	9.6779	9.9834	10.5631	10.4348	10.182	9.6330	9.7193
6	9.7446	10.1597	9.9357	9.9977	9.5695	9.9861	9.8006	10.0583	10.240	9.6330	9.7193
7	10.3009	10.7752	10.5480	10.0338	10.4840	10.0935	10.4241	10.7290	10.099	9.6330	9.7193
8	9.7126	9.5690	9.5413	9.5980	10.1541	10.0625	9.4814	9.7902	9.6057	9.5172	9.9403
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

At [Portfolio123](#), select **Edit Permutations** if you are still at the last optimizer results page. Otherwise skip this step.

HOME READY-2-GO PORTFOLIO BOOK RANK SCREEN STOCK ETF TOOLS
 MARKET FACTOR OPTIMIZE TICKER LINKS REPORTS LISTS CUSTOM FORMULAS

New Select Study Save As Delete Edit Permutations Run Toggle Charts

My Studys ▶ Unclassified

Stitts Piotroski

Perm	Date Periods	Stitts Piotroski	Min	Median	Mean	Max	First
1	01/02/99 10/26/13	11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94	0.37	9.61	9.41	21.23	2.41
2	01/02/99 10/26/13	9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44	0.41	9.51	9.43	21.03	3.09
3	01/02/99 10/26/13	11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56	1.30	9.43	9.48	22.17	3.28
4	01/02/99 10/26/13	9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23	0.75	9.41	9.38	21.52	3.33
5	01/02/99 10/26/13	12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28	1.18	9.45	9.46	22.15	2.14
6	01/02/99 10/26/13	7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70	1.63	10.00	9.46	21.87	3.34
7	01/02/99 10/26/13	11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63	0.27	9.71	9.47	22.13	2.81
8	01/02/99 10/26/13	9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04	-0.51	9.93	9.46	21.73	3.54
9	01/02/99 10/26/13	11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07	-0.32	9.79	9.44	21.16	2.79
10	01/02/99 10/26/13	11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16	1.33	10.60	9.42	22.01	3.13

Click on the small plus sign button to modify the ranking system weights.

Stitts Piotroski

RankingSystem Permutations on - WARNING: Editing study permutations will delete existing results.

Stitts Piotroski

10 Total

collapse

Ranking Method	Percentile NAs Negative
Rebalance Frequency	Four Weeks
Universe	All Fundamentals
Filter: Min Price	3.0
Filter: Sector	-- ALL --
Buckets	20

 Stitts Piotroski 	<input type="checkbox"/> 11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94
 	<input type="checkbox"/> 9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44 ✖
	<input type="checkbox"/> 11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56 ✖
	<input type="checkbox"/> 9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23 ✖
	<input type="checkbox"/> 12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28 ✖
	<input type="checkbox"/> 7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70 ✖
	<input type="checkbox"/> 11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63 ✖
	<input type="checkbox"/> 9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04 ✖
	<input type="checkbox"/> 11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07 ✖
	<input type="checkbox"/> 11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16 ✖

 Pr2BookQ

 GMgn%TTM - GMgn%PTM

Block select the permutations that are already there. Right click with your mouse and overwrite the existing permutations with the new iterations. Save the new permutations.

New Weight Permutations

Pr2BookQ	11.59	9.06	11.80	9.88	12.03	7.82	11.52	9.56	11.85	11.13
GMgn%TTM - G...	12.19	11.84	9.58	8.75	7.96	9.57	8.90	11.50	12.13	9.51
OCFPSTTM-EPS...	9.93	9.78	10.94	12.36	7.91	10.67	7.63	7.90	7.93	11.43
DbtTot2AstQ - ...	7.83	11.95	8.85	9.66	11.51	9.54	7.52	9.06	11.93	10.50
CurRatioQ- Cur...	9.53	11.88	11.65	8.10	12.11	9.04	9.44	8.74	11.70	7.61
AstTurnTTM-As...	11.17	9.22	12.44	8.45	11.52	12.09	9.01	9.78	8.05	9.94
ROA%TTM - RO...	11.50	11.23	11.49	10.02	8.86	11.17	11.21	8.53	9.95	11.79
ShsOutAvgTTM...	11.94	9.44	8.56	8.23	12.28	7.70	7.63	8.04	9.07	8.16

Update Done

Save new permutations

1 Block Select Permutations

Undo

Redo

Cut

Copy

Paste

Paste as plain text

Delete

Spell-check

Select all

Paste randomized array from spreadsheet

Generate the permutations.

New ▾ Select Study ▾ Save As Delete → Generate Permutations → Previous Results

Studys ▶ Unclassified

Stitts Piotroski

kingSystem Permutations on
Stitts Piotroski
total
apse

Filter: Sector -- ALL --

Buckets 20

Stitts Piotroski	+ ▾	11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94
	▾	9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44 ✖
	▾	11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56 ✖
	▾	9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23 ✖
	▾	12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28 ✖
	▾	7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70 ✖
	▾	11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63 ✖
	▾	9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04 ✖
	▾	11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07 ✖

Click on Run and then click on Toggle Charts. Wait for the optimizer to process all of the permutations.

New Select Study Save As Delete Edit Permutations Run Toggle Charts Download

My Studys ▶ Unclassified

Stitts Piotroski ①

Run Optimization

Turn off Charts ②

Perm	Date Periods	Stitts Piotroski	Last	Delta	Slo
1	01/02/99 10/26/13	11.59, 12.19, 9.93, 7.83, 9.53, 11.17, 11.50, 11.94			
2	01/02/99 10/26/13	9.06, 11.84, 9.78, 11.95, 11.88, 9.22, 11.23, 9.44			
3	01/02/99 10/26/13	11.80, 9.58, 10.94, 8.85, 11.65, 12.44, 11.49, 8.56			
4	01/02/99 10/26/13	9.88, 8.75, 12.36, 9.66, 8.10, 8.45, 10.02, 8.23			
5	01/02/99 10/26/13	12.03, 7.96, 7.91, 11.51, 12.11, 11.52, 8.86, 12.28			
6	01/02/99 10/26/13	7.82, 9.57, 10.67, 9.54, 9.04, 12.09, 11.17, 7.70			
7	01/02/99 10/26/13	11.52, 8.90, 7.63, 7.52, 9.44, 9.01, 11.21, 7.63			
8	01/02/99 10/26/13	9.56, 11.50, 7.90, 9.06, 8.74, 9.78, 8.53, 8.04			
9	01/02/99 10/26/13	11.85, 12.13, 7.93, 11.93, 11.70, 8.05, 9.95, 9.07			
10	01/02/99 10/26/13	11.13, 9.51, 11.43, 10.50, 7.61, 9.94, 11.79, 8.16			

Choose what you consider to be the best permutation. In this example, I chose permutation #8.

Perm	Date Periods
1	01/02/99 10/26/13
2	01/02/99 10/26/13
3	01/02/99 10/26/13
4	01/02/99 10/26/13
5	01/02/99 10/26/13
6	01/02/99 10/26/13
7	01/02/99 10/26/13
8	01/02/99 10/26/13
9	01/02/99 10/26/13
10	01/02/99 10/26/13

Stitts Piotroski									
Min	Median	Mean	Max	First	Last	Delta	Slope	StdDev	
0.78	10.13	9.50	22.20	3.19	22.20	19.02	0.86	5.29	
1.39	9.40	9.43	20.89	2.95	20.89	17.94	0.83	5.06	
0.09	9.04	9.39	21.38	2.88	21.38	18.51	0.88	5.39	
0.56	9.04	9.38	21.04	2.35	21.04	18.69	0.88	5.36	
0.26	9.46	9.39	21.22	3.11	21.22	18.11	0.85	5.21	
1.77	9.96	9.41	21.69	2.71	21.69	18.98	0.88	5.35	
0.50	9.15	9.42	21.21	2.84	21.21	18.37	0.87	5.32	
0.93	9.68	9.47	22.30	3.04	22.30	19.26	0.88	5.37	
1.71	9.59	9.43	21.18	3.03	21.18	18.15	0.84	5.18	
0.80	9.99	9.40	22.21	2.61	22.21	19.60	0.88	5.39	

Now return to the spreadsheet, block select iteration #8 from the randomized data array, and copy it.

Formula bar: $=ROUND(\$D7+\$U\$2*(RAND()-0.5)/10,\$U\$3)$

Sensitivity (%)
Roundoff Digits:

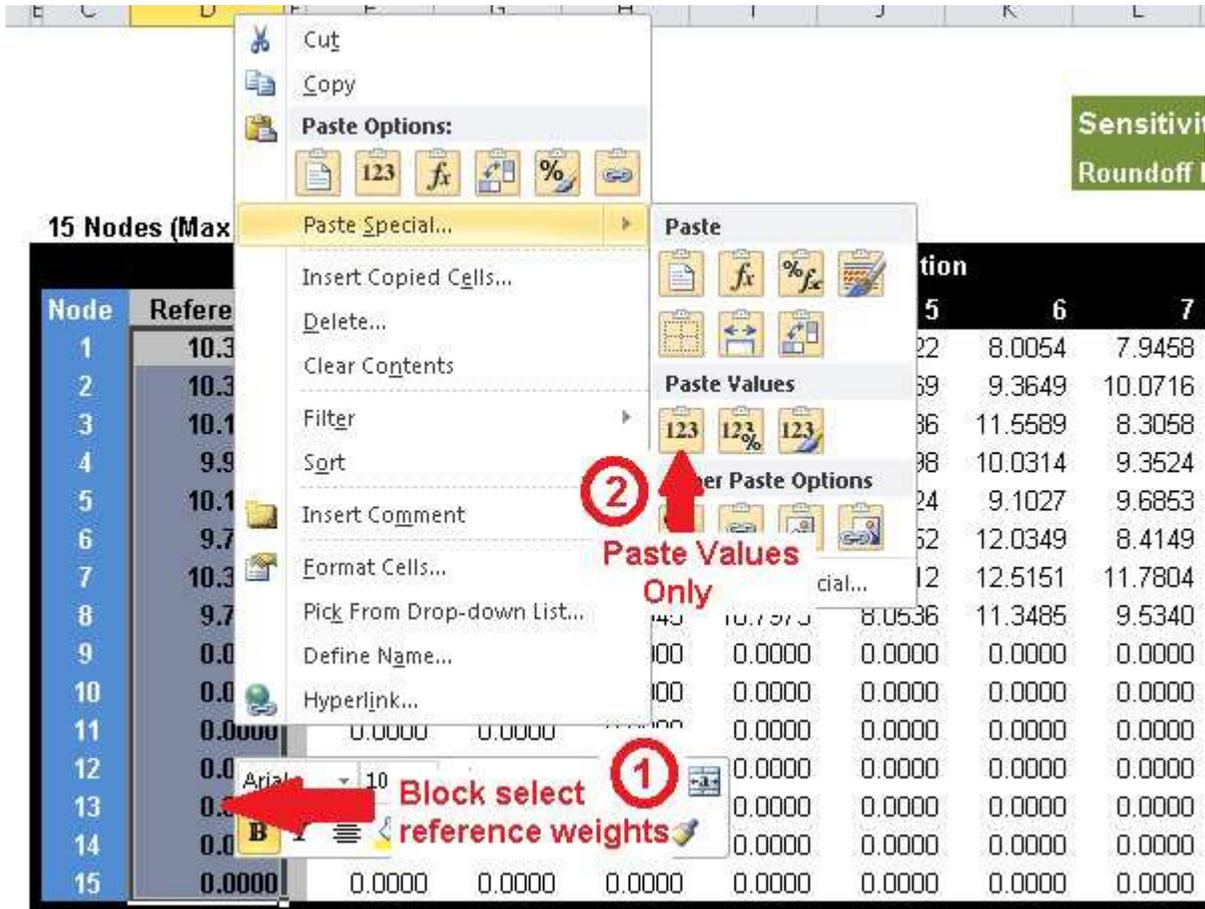
15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration							
		1	2	3	4	5	6	7	
1	10.3827	11.1121	9.9948	9.4408	10.2020	9.1322	8.0054	7.9458	11.32
2	10.3710	12.1532	9.0081	12.6383	11.9274	10.1069	9.3649	10.0716	12.20
3	10.1040	8.4295	11.1321	10.0216	8.3741	10.1586	11.5589	8.3058	8.91
4	9.9769	10.4302	9.7576	10.5786	10.2365	11.0498	10.0314	9.3524	8.63
5	10.1176	8.5824	11.7551	11.1810	9.5583	8.5624	9.1027	9.6853	8.09
6	9.7446	11.8742	8.6818	9.0931	7.3910	7.31	.0349	8.4149	10.89
7	10.3009	11.8921	12.2855	11.5298	11.9294	8.30	.5151	11.7804	9.60
8	9.7126	7.2700	7.9126	11.7945	10.7973	0.0000	0.0000	9.5340	7.63
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Block select 8th iteration

Copy Selection

Paste iteration #8 into the reference node array.



This completes one optimization cycle.

Hitting The Brick Wall

This seems to be pretty easy although a bit monotonous. But you will find that it doesn't take too long before you run into a brick wall. The performance of the top bucket will stop increasing no matter how many times you generate new permutations.

At this point in time you may need to shake things up a little bit. This is kind of like being in a maze, running into a dead end and having to backtrack before you can go forward again.

Try using a different tactic for deciding on the "best" permutation. I find that selecting the lowest first bucket while ignoring the top bucket for one or two iterations often works. You might also consider upping the sensitivity to 70% until you find a new "best" permutation.

As you can see from the example above, node 5 has a reference weight of 0.1763. It is time to eliminate this node. This is done by zeroing out the reference weight and the corresponding randomized data. Note that Nodes 2 and 3 are almost ready to be pruned as well, but not this time around.

15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	14.9543	16.3100	12.8632	17.0015	13.3853	14.6973	14.1632	12.6196	15.3276	13.3705	14.5377
2	2.9938	3.2861	4.0244	1.9659	3.5905	1.3295	4.1167	3.2741	0.6670	3.0871	3.1597
3	2.3156	4.0130	3.3490	1.9846	4.7300	3.9908	1.7646	3.6552	3.1950	0.1366	4.3330
4	5.6671	7.5038	7.9233	7.2758	7.4925	7.8271	4.5384	4.7778	5.0167	7.9613	5.1651
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	10.0611	10.7830	8.8583	12.4182	8.5601	7.7350	10.0188	8.3795	12.2871	11.9686	12.1345
7	12.3027	12.1263	11.7541	14.4810	12.0404	11.2399	13.0911	13.7579	13.6234	10.7123	12.5339
8	11.3757	8.9722	9.1500	10.3179	12.7062	13.0294	11.6828	9.6474	13.8647	12.7307	12.3536
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Once the node is zeroed out then continue on with the same steps as before. The optimizer can handle the zero weights.

Pruning nodes often results in a performance setback with the last bucket dropping in value. But it is usually made up fairly quickly with subsequent optimization iterations.

When you do achieve a new high for the last bucket it is a good idea to set aside the reference weights for future use. Simply copy and paste into an unused section of the spreadsheet. You can always come back to these numbers at a later time if need be.

15 Nodes (Max.), 10 Iterations (Max.)

Node	Reference	Weight / Iteration									
		1	2	3	4	5	6	7	8	9	10
1	10.2529	9.7203	7.7482	8.6547	13.3543	13.6212	7.1741	8.0610	11.3500	13.6614	9.6826
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	7.4351	8.6489	7.8951	5.2059	4.5953	4.7132	6.5669	4.7064	10.5503	4.8384	7.8087
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	7.4381	5.6647	4.6553	5.8003	4.5245	9.0254	5.0463	4.3438	10.7415	7.0335	6.7277
7	18.3135	18.6923	17.8851	21.7608	14.9232	17.7709	20.4440	16.0120	14.9232	17.7709	20.4440
8	6.5182	9.6078	6.5357	9.7544	9.6964	3.4435	3.7635	4.6309	7.947	5.8188	
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	10.25
	0
	0
	7.435
	0
	7.438
	18.31
	6.518
	0
	0
	0
	0
	0
	0
	0
	0

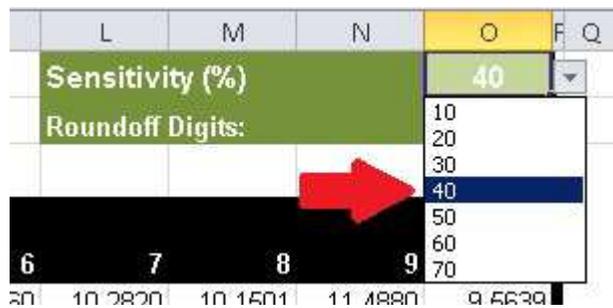
So that is the optimization process. Next post I'll outline how to finish it off, create the final ranking system, and as a bonus, create ten (or more) noisy ranking systems for robustness testing of future models.

The Final Ranking System

November 2, 2013

Reduce The Sensitivity Setting

In the last post it was determined that enough optimization had been performed and it was time to wrap up this project. At this point in time I suggest performing a few more optimization cycles while reducing the sensitivity from 50 down to 40, 30, 20 and finally 10. Doing so will find a local maximum. The optimization steps are the same as described in the last post. You only need to change the sensitivity setting in the spreadsheet.



Generate Noisy Test Ranking Systems

Once this has been done and the reference weights have been updated and considered to be final then the next step is to generate a set on noisy ranking systems for future test purposes. This is accomplished by doing a manual recalculate on the spreadsheet, then copying the randomized data into the ranking system optimizer permutations, and finally running the ranking system optimizer.

The ten permutations should be saved as individual ranking systems. This is done by selecting the permutation as shown below.

Stitts Piotroski																				
Perm	Date Periods	Stitts Piotroski										Min	Median	Mean	Max	First	Last	Delta	Slope	StdDev
<u>1</u>	01/02/99 10/26/13	10.35	0.00	0.00	7.71	0.00	7.07	17.70	6.58	0.46	9.21	9.58	23.30	1.54	23.30	21.76	0.85	5.43		
<u>2</u>	01/02/99 10/26/13	10.62	0.00	0.00	7.89	0.00	7.35	18.14	5.99	0.44	9.52	9.59	22.98	1.66	22.98	21.32	0.84	5.36		
<u>3</u>	01/02/99 10/26/13	10.21	0.00	0.00	7.85	0.00	7.42	17.89	6.16	0.76	9.29	9.60	23.08	1.58	23.08	21.50	0.84	5.35		
<u>4</u>	01/02/99 10/26/13	10.70	0.00	0.00	7.66	0.00	6.99	17.79	6.81	0.72	9.19	9.57	23.39	1.34	23.39	22.05	0.86	5.48		
<u>5</u>	01/02/99 10/26/13	10.44	0.00	0.00	7.76	0.00	7.16	18.43	6.23	0.33	9.47	9.59	23.40	1.67	23.40	21.73	0.84	5.41		
<u>6</u>	01/02/99 10/26/13	10.42	0.00	0.00	7.82	0.00	7.57	18.28	5.99	0.53	9.42	9.60	23.05	1.80	23.05	21.25	0.84	5.34		
<u>7</u>	01/02/99 10/26/13	10.89	0.00	0.00	7.62	0.00	7.35	18.36	6.48	0.33	9.28	9.59	23.48	1.59	23.48	21.89	0.85	5.44		
<u>8</u>	01/02/99 10/26/13	10.74	0.00	0.00	7.52	0.00	7.31	17.72	6.41	0.38	9.27	9.59	23.40	1.47	23.40	21.93	0.86	5.46		
<u>9</u>	01/02/99 10/26/13	10.54	0.00	0.00	7.49	0.00	7.73	18.47	6.19	0.31	9.50	9.61	23.68	1.65	23.68	22.03	0.85	5.44		
<u>10</u>	01/02/99 10/26/13	10.52	0.00	0.00	7.63	0.00	7.10	17.64	6.59	0.39	9.44	9.58	23.43	1.56	23.43	21.87	0.86	5.46		

A window will pop-up where you enter the name of the ranking system. Once this has been done then click on Save. You can then close the window.

New Stock Ranking System

Using modified settings from 'Optimize System'

Name	<input type="text" value="Stitts Piotroski 5% Noise Run #1"/>
Ranking Method	<input type="text" value="Percentile NAs Negative"/>
Visibility	<input type="text" value="Private"/>
Category	<input type="text" value="Unclassified"/>



Generate the Final Ranking System

After all ten ranking systems are saved then the final ranking system will be created. Start by block selecting the reference weights, then copying them.

15 Nodes (Max.), 10 Iterations (Max.)

		Weight / Iteration							
Node	Reference	4	5	6	7	8	9	10	
1	10.4	0.7047	10.4374	10.4158	10.8890	10.7445	10.5417	10.5202	
2	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
3	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
4	7.4	461	7.6572	7.7581	7.8218	7.6201	7.5204	7.4855	7.6292
5	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
6	7.3	216	6.9853	7.1561	7.5651	7.3473	7.3127	7.7309	7.0952
7	18.0	915	17.7875	18.4259	18.2821	18.3601	17.7153	18.4683	17.6395
8	3	645	6.8052	6.2256	5.9894	6.4777	6.4080	6.1863	6.5860
11	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
12	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
13	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
14	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

1

Block select the 8 reference weight nodes

2

Copy

Now block select the previous permutations in the Edit Permutations screen in the ranking system optimizer.

Add Permutation for Stitts Piotroski

CLOSE X

New Weight Permutations

Pr2BookQ	10.35	10.62	10.21	10.70	10.44	10.42	10.89	10.74	10.54	10.52
GMgn%TTM - G...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFCPSTTM-EPS...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DbtTot2AstQ - ...	7.71	7.89	7.85	7.66	7.76	7.82	7.62	7.52	7.49	7.63
CurRatioQ- Cur...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AstTurnTTM-As...	7.07	7.35	7.42	6.99	7.16	7.57	7.35	7.31	7.73	7.10
ROA%TTM - RO...	17.70	18.14	17.89	17.79	18.43	18.28				
ShsOutAvgTTM...	6.58	5.99	6.16	6.81	6.99	6.48	6.41	6.19	6.59	

Block Select all permutations

Undo
Redo

Cut
Copy
Paste
Paste as plain text
Delete

Paste Reference Weights

Update Done

Click on the Update button to save the permutations.

Add Permutation for Stitts Plotroski

New Weight Permutations

{🌐} ↓	Pr2BookQ	10.4423
{🌐} ↑	GMgn%TTM - G...	0.0000
{🌐} ↑	OCFPSTTM-EPS...	0.0000
{🌐} ↓	DbtTot2AstQ - ...	7.4642
{🌐} ↑	CurRatioQ- Cur...	0.0000
{🌐} ↑	AstTurnTTM-As...	7.3575
{🌐} ↑	ROA%TTM - RO...	18.0426
{🌐} ↓	ShsOutAvgTTM...	6.3142

Update Done



Click on the Generate Permutations menu item.

Select Study ▾ Save As Delete → Generate Permutations → Previous Results

Unclassified

Stitts Piotroski 

System Permutations on

Periods	<input type="button" value="+"/>	01/02/99 10/26/13
Ranking Method		Percentile NAs Negative
Ranking Frequency		Four Weeks
Ranking Universe		All Fundamentals
Minimum Price		3.0
Industry		-- ALL --
Ranking Size		20
Stitts Piotroski	<input type="button" value="+"/>	10.44, 0.00, 0.00, 7.46, 0.00, 7.36, 18.04, 6.31
↓		Pr2BookQ
↑		GMgn%TTM - GMgn%PTM
↑		OCFPSTTM-EPSPExclXorTTM
↓		DbtTot2AstQ - DbtTot2AstPYQ
↑		CurRatioQ - CurRatioPYQ
↑		AstTurnTTM-AstTurnPTM
↑		ROA%TTM - ROA%PTM
↓		ShsOutAvgTTM - ShsOutAvgPTM

Run the ranking system optimizer.

New Select Study Save As Delete Edit Permutations Run Toggle Charts

My Studys ▶ Unclassified

Stitts Piotroski

Perm Date Periods Min Median Mean Max First Last Delta Slope StdDev

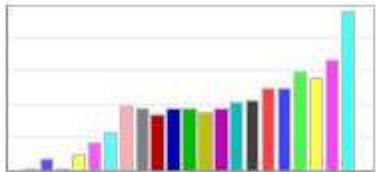
1	01/02/99 10/26/13										
---	-------------------	--	--	--	--	--	--	--	--	--	--

*HINT: use **SHIFT** ke*

Once the optimizer has finished then click on permutation #1 as shown below. Note: there should only be one permutation.

Stitts Piotroski

Perm Date Periods Annualized Returns Min Median Mean Max First Last Delta Slope StdDev

1	01/02/99 10/26/13		0.13	9.35	9.60	23.72	1.68	23.72	22.03	0.85	5.46
---	-------------------	---	------	------	------	-------	------	-------	-------	------	------

Select **Save As** to rename the final ranking system.

SYSTEMS SEARCH

Factors
Performance
Ranks
Correlation
Reverse Engineer
About
Notes

New Select Ranking System Save Save As Revert Delete Optimize

My Ranking Systems > Unclassified

Optimize System
ranking method: Percentile NAs Negative

branches | reordering | f(x) | text editor | raw editor (no ajax)

100% ↑ **Stitts Piotroski**

- 21.04% ↓ Pr2BookQ
- 0% ↑ GMgn%TTM - GMgn
- 0% ↑ OCFPSTTM-EPSP
- 15.04% ↓ DbtTot2AstQ - DbtTot2AstQ
- 0% ↑ CurRatioQ- CurRatioQ
- 14.83% ↑ AstTurnTTM-AstTurnTTM
- 36.36% ↑ ROA%TTM - ROA%TTM
- 12.72% ↓ ShsOutAvgTTM - ShsOutAvgTTM

Node Properties Add Node Weights Ranking Method

Update Copy & Paste

Label Stitts Piotroski

Ranking
 Lower values
 Higher values
 Summation only

HOME READY-2-GO PORTFOLIO BOOK RANK SCREEN STOCK E

SYSTEMS SEARCH

New Stock Ranking System

Using modified settings from 'Optimize System'

Name **1**

Ranking Method

Visibility

Category

2

Check to make sure you have all eleven (11) ranking systems as shown below.

Stitts Piotroski 5% Noise Run #1
Stitts Piotroski 5% Noise Run #10
Stitts Piotroski 5% Noise Run #2
Stitts Piotroski 5% Noise Run #3
Stitts Piotroski 5% Noise Run #4
Stitts Piotroski 5% Noise Run #5
Stitts Piotroski 5% Noise Run #6
Stitts Piotroski 5% Noise Run #7
Stitts Piotroski 5% Noise Run #8
Stitts Piotroski 5% Noise Run #9
Stitts Piotroski Final

Performance Check

3 of the 8 stock factors have been deleted from the original All Stars: Piotroski. The performance in the last bucket on the right has increased from 22% to 23.7% for 4 week rebalance. This doesn't sound like much but consider that the last bucket holds approximately 150 stocks and that the original ranking system was already quite an optimal configuration. The performance for weekly rebalance also improved.

