



An Automated Trading Strategy using Corporate Reputation Indices Developed by Seldonix and Social Market Analytics

By: The Deltix Quantitative Research Team

Corporate Reputation Data

The Corporate Reputation Index (CRI), developed by Seldonix and distributed in partnership with Social Market Analytics, allows traders to identify and compare over- and under-priced stocks that are affected by a company's actions. Corporate Reputation is the controllable portion of a company's stock price, considered to be an intrinsic driver of company performance, and a major contributor to daily stock price fluctuation.

The Corporate Reputation Index is the first daily business metric for monitoring corporate reputation. Centered on "0", companies with negative values are deemed undervalued relative to market while those with positive values are overvalued.

The CRI is created after the close of markets and is currently available before markets open the next day at any time after 9:00 PM Eastern US Time the night before.

Each data record features a set of fields:

- The timestamp associated with each field is the market close date of the data used;
- Symbol;
- CRI.

An example of the data is shown below:

Instrument	Type	Time	CR
AAPL	EQUITY	1/4/2010 4:00:00 PM	-0.4860
ABBV	EQUITY	1/5/2010 4:00:00 PM	0.6860
ABC	EQUITY	1/6/2010 4:00:00 PM	0.5010
ABT	EQUITY	1/7/2010 4:00:00 PM	-0.6390
ACE	EQUITY	1/8/2010 4:00:00 PM	0.0570
ACN	EQUITY	1/11/2010 4:00:00 PM	-0.7630
ACT	EQUITY	1/12/2010 4:00:00 PM	0.0380
ADBE	EQUITY	1/13/2010 4:00:00 PM	-0.4300
ADI	EQUITY	1/14/2010 4:00:00 PM	-0.9390
ADM	EQUITY	1/15/2010 4:00:00 PM	-0.4600
ADP	EQUITY	1/19/2010 4:00:00 PM	0.6020
ADSK	EQUITY	1/20/2010 4:00:00 PM	0.1020
ADT	EQUITY	1/21/2010 4:00:00 PM	-0.1810
AEE	EQUITY	1/22/2010 4:00:00 PM	-1.1830
AEP	EQUITY	1/25/2010 4:00:00 PM	0.5190
AES	EQUITY	1/26/2010 4:00:00 PM	1.0500
AET	EQUITY	1/27/2010 4:00:00 PM	0.7090
AFL	EQUITY	1/28/2010 4:00:00 PM	-0.4420
AGN	EQUITY	1/29/2010 4:00:00 PM	-1.5400
AIG	EQUITY	2/1/2010 4:00:00 PM	-1.2070

Basis of Research using Seldonix data

The purpose of the research described in this paper is to determine if there are opportunities to generate alpha in US equities traded on the NYSE and NASDAQ using Seldonix data as a basis for daily market movement prediction (the holding period is about 6.5 hours).

We show how with the use of simple technical indicators and the popular conception of basket trading, we can exploit the CRI to generate excess returns. An evaluation of the CRI was conducted in the forecasting of stock price. The results of the testing showed a 1 – 8 day lag in the prediction of stock price, depending on the stock. Therefore our purpose is to determine the most appropriate time when the CRI generates the most suitable values for opening a position. As the CRI values change every day and are different for each ticker, we need to construct an approach which will successfully encompass both equally important collations. To identify these situations, we need to:

- Compare short-term values to long-term;
- Compare values within the considered universe of tickers.

Keltner indicator

For the first comparison we chose Keltner channels. The Keltner indicator attempts to locate the most important trends. The indicator is based on principles similar to those used in Envelope and Bollinger indicators. The upper band is calculated as the moving average plus the average true range, for N periods. The lower band is the moving average minus the average true range.

$$MiddleBand = SMA(CR, Period);$$

$$UpperBand = MiddleBand + Factor \ ATR(CR, Period);$$

$$LowerBand = MiddleBand - Factor \ ATR(CR, Period);$$

As a rule, the upper band detects that movement will most probably be directed downward. The lower band means that movement will most probably be directed upward.

The Keltner indicator, similar to Bollinger, is designed to gauge volatility. Nevertheless it was chosen over Bollinger since Keltner channels use an average true range rather than standard deviation and generally will be more sensitive to changes of the CRI values. Thus we construct the following measure, f , which is similar to Bollinger %b:

$$\%b = \frac{last - LowerBand}{UpperBand - LowerBand}$$

which tells you where you are in relation to the bands:

$$f = \frac{CR - MiddleBand}{UpperBand - LowerBand}$$

where CR is the latest value of the CRI.

Since we need the comparison between long and short term periods, we suggest using two Keltner indicators with periods 64 days and 2 days respectively. Therefore we consider two values: f_{64} and f_2 .

$$f_{64} = \frac{CR - MiddleBand_{64}}{UpperBand_{64} - LowerBand_{64}}$$

$$f_2 = \frac{CR - MiddleBand_2}{UpperBand_2 - LowerBand_2}$$

Over/under priced

Our purpose is to design a criterion which will provide sufficient predictive power for instrument price change and will identify which instruments in the particular universe are most likely to generate excess returns.

Since the expected return of the asset at time t is $E(R_t) = \frac{E(P_{t+1}) - P_t}{P_t}$, according to the Capital Asset Pricing Model (CAPM), if an asset is currently overpriced, at time $t + 1$ the asset returns to the CAPM suggested price, we can expect a positive return for underpriced and negative return for overpriced.

Therefore we propose the following hypothesis:

- 1) If an instrument is overpriced in the long term and underpriced in the short term it is most likely to be subject to positive day return.
- 2) If an instrument is underpriced in the long term and overpriced in the short term it is most likely to be subject to negative day return.

We can call this concept a reversal from overpriced to underpriced and vice versa. The values f_{64} and f_2 are designed to measure long and short term CRI dynamics and therefore will be used as indicators.

Baskets

To implement the estimate of CRI within a particular universe of tickers, we apply sorting into baskets according to the above criterion:

- 1) Basket 1: If an instrument's f_{64} is in the q percent of most overpriced instruments and instrument's f_2 is in the q percent of most underpriced, then it is most likely to be subject to positive day return.
- 2) Basket 2: If an instrument's f_{64} is in the q percent of most underpriced instruments and instrument's f_2 is in the q percent of most overpriced, then it is most likely to be subject to negative day return.

Trading Signals

To implement this hypothesis as an automated trading strategy we need to:

- 1) Receive the CRI before the day open;
- 2) Recalculate Keltner channels;
- 3) Calculate f_{64} and f_2 for each instrument:

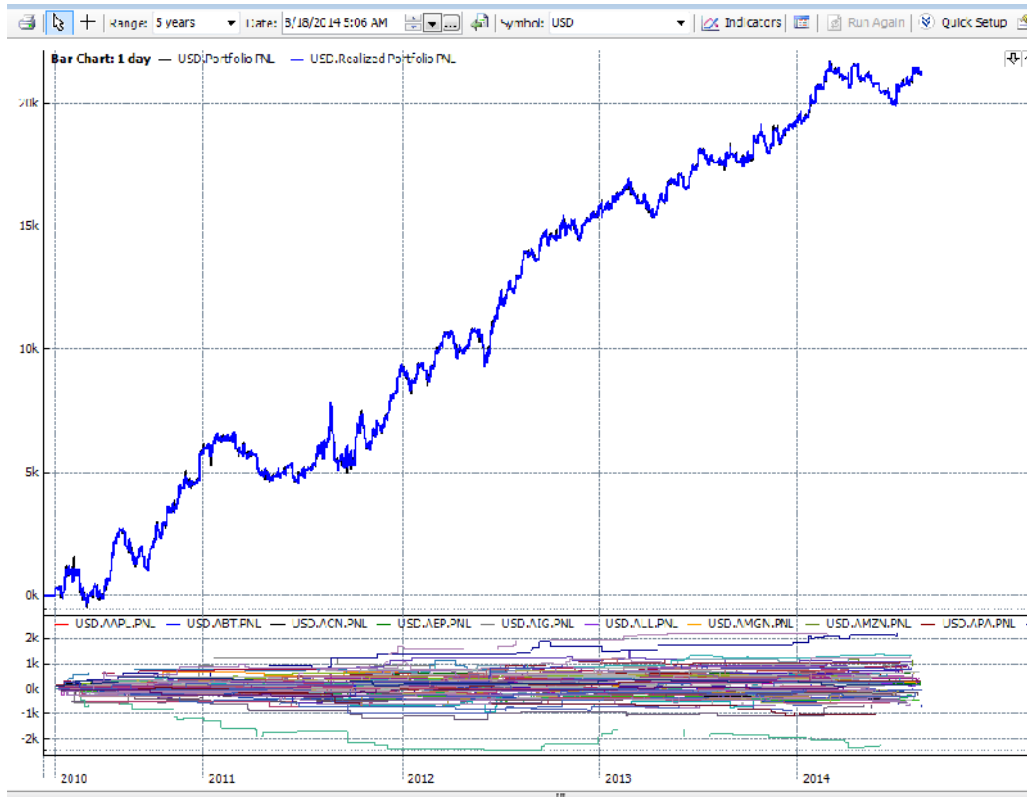
$$f_{64} = \frac{CR - MiddleBand_{64}}{UpperBand_{64} - LowerBand_{64}}$$

$$f_2 = \frac{CR - MiddleBand_2}{UpperBand_2 - LowerBand_2}$$

- 4) Sort instruments into baskets using the described criterion with $q = 20\%$;
- 5) Open long position for Basket 1 and short position for Basket 2;
- 6) Close position on day close.

Results

This approach gives the following results for S&P 100 tested on the period from 1/5/2010 to 8/18/2014:



Parameter	All Trades	Long Trades	Short Trades
Net Profit/Loss	21,182.82	13,984.97	7,197.85
Total Profit	113,708.71	59,129.80	54,578.91
Total Loss	-92,525.89	-45,144.83	-47,381.06
Cumulated Profit %	21.18 %	13.98 %	7.20 %
Max Drawdown	-2,590.71	-2,774.62	-2,265.55
Max Drawdown %	-2.41 %	-2.66 %	-2.18 %
Max Drawdown Date	9/2/2011	9/30/2011	9/15/2011
Return/Drawdown Ratio	8.18	5.04	3.18
Drawdown Days %	80.96 %	80.36 %	88.29 %
Max Drawdown Duration	119	198	188
CAGR	4.40 %	2.97 %	1.57 %
Sharpe Ratio	1.73	1.37	0.73
Annualized Volatility	2.54	2.16	2.15
Sortino Ratio	2.86	2.15	1.13
UPI	0.39	0.27	0.13
Information Ratio	1.71	1.37	0.72

Optimal f	68.32	63.51	33.96
All Trades #	2308	1166	1142
Profitable Trades Ratio	0.53	0.54	0.52
Winning Trades #	1229	634	595
Losing Trades #	1079	532	547
Average Trade	9.18	11.99	6.30
Average Winning Trade	92.52	93.26	91.73
Average Losing Trade	-85.75	-84.86	-86.62
Avg. Win/ Avg. Loss Ratio	1.08	1.10	1.06
Average Profit per Share	0.04	0.05	0.03
Max Consequent Winners	9	11	9
Max Consequent Losers	10	10	9

Rules for closing

The other idea is to exploit the CR trend not only for opening but for closing position. On the figure below you can see the example of position on AAPL chart, blue line on second pad indicates CRI values:



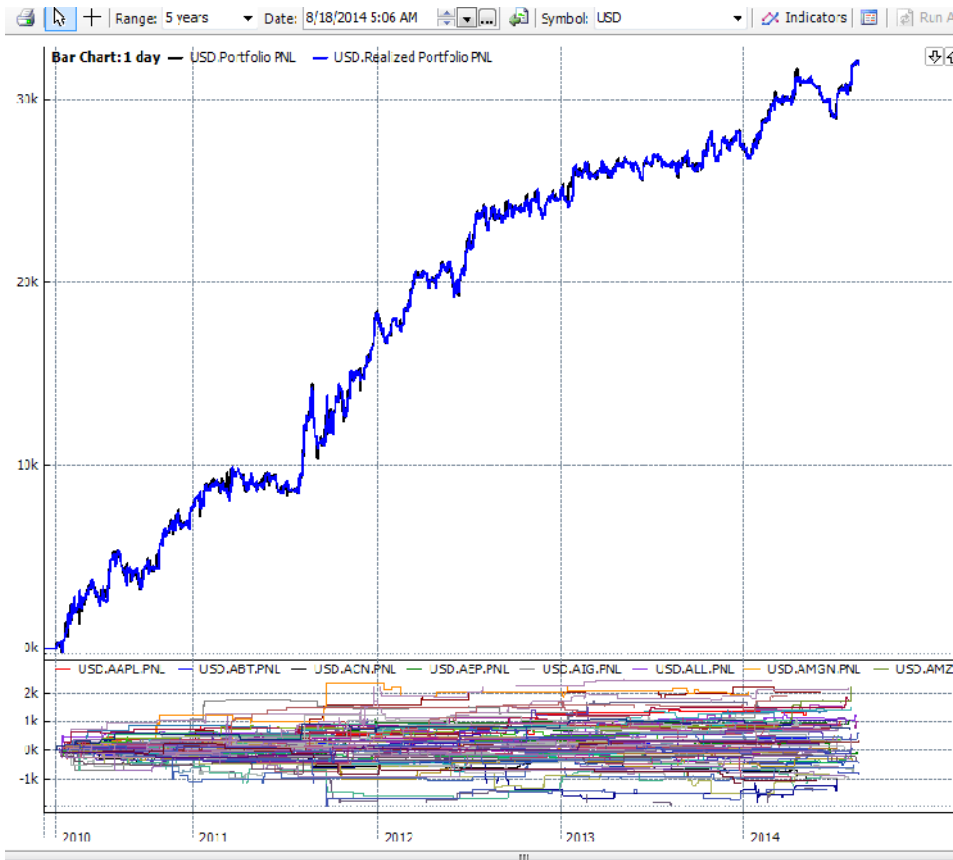
We use the Simple Moving Average (SMA) of the last CRI values (red line on the second pad) to determine whether the instrument gets over or underpriced. Using the model from the paragraph Over/Under Priced, we will close the position for the instrument according to following rule:

- 1) If $CR > SMA(5, CR)$ (instrument is overpriced at time t , price is likely to return to suggested price at $t+1$) close Short position on day close;
- 2) If $CR < SMA(5, CR)$ (instrument is underpriced at time t , price is likely to return to suggested price at $t+1$) close Long position on day close.

The same chart with this rule shows better results:



This approach gives the following results for S&P100 tested on the period from 1/5/2010 to 8/18/2014:



Parameter	All Trades	Long Trades	Short Trades
Net Profit/Loss	32,118.49	18,265.41	13,853.08
Total Profit	143,984.75	71,784.79	72,199.96
Total Loss	-111,866.26	-53,519.38	-58,346.88
Cumulated Profit %	32.12 %	18.27 %	13.85 %
Max Drawdown	-3,526.80	-4,508.75	-3,368.95
Max Drawdown %	-3.08 %	-4.22 %	-3.07 %
Max Drawdown Date	9/2/2011	9/30/2011	9/15/2011
Return/Drawdown Ratio	9.11	4.05	4.11
Drawdown Days %	80.45 %	81.83 %	88.63 %
Max Drawdown Duration	95	194	279
CAGR	6.44 %	3.83 %	2.95 %
Sharpe Ratio	1.97	1.31	0.94
Annualized Volatility	3.27	2.93	3.14
Sortino Ratio	3.40	2.06	1.55
UPI	0.58	0.26	0.19
Information Ratio	1.90	1.31	0.91
Optimal f	60.05	44.63	29.93
All Trades #	2190	1103	1087

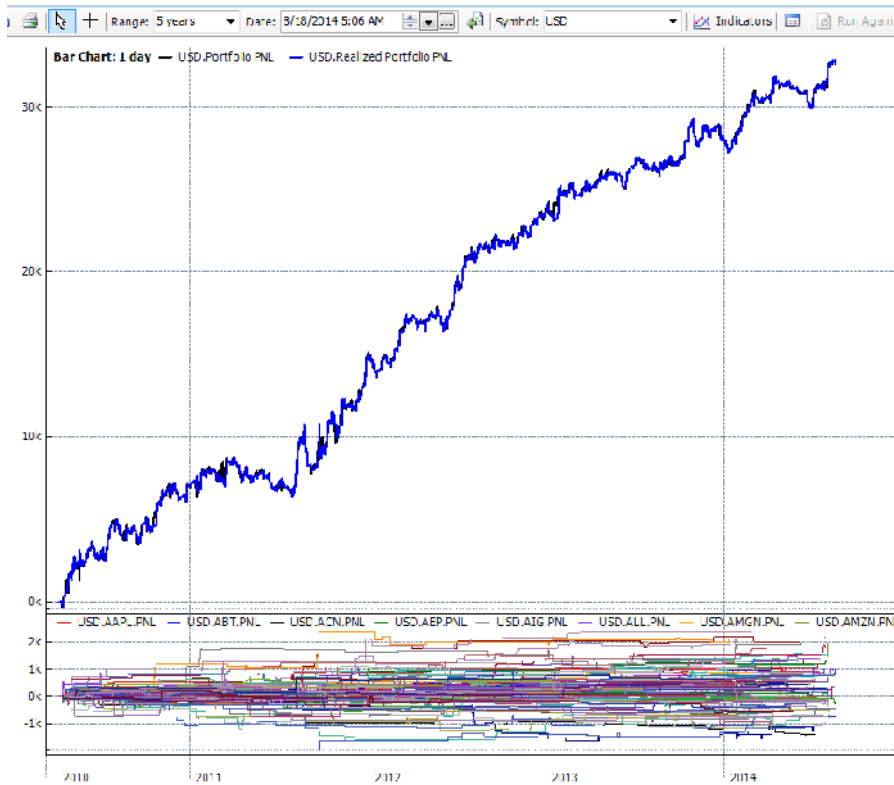
Profitable Trades Ratio	0.53	0.55	0.51
Winning Trades #	1158	603	555
Losing Trades #	1032	500	532
Average Trade	14.67	16.56	12.74
Average Winning Trade	124.34	119.05	130.09
Average Losing Trade	-108.40	-107.04	-109.67
Avg. Win/ Avg. Loss Ratio	1.15	1.11	1.19
Average Profit per Share	0.06	0.07	0.05
Max Consequent Winners	13	16	16
Max Consequent Losers	11	9	15

Filter for stronger signal

One more idea is to filter a stronger signal when CR retains its sign from the previous day, which is a stronger signal indicating overpriced/ underpriced asset. On the chart below you can see two trades on MSFT asset, the second one is unprofitable, when the CR line changes its value from -1 to 1:



Filtering out such unstable situations gets the following results for the S&P 100 tested in the period from 1/5/2010 to 8/18/2014:



Parameter	All Trades	Long Trades	Short Trades
Net Profit/Loss	32,810.12	19,145.45	13,664.67
Total Profit	126,322.99	64,003.72	62,319.27
Total Loss	-93,512.87	-44,858.26	-48,654.61
Cumulated Profit %	32.81 %	19.15 %	13.66 %
Max Drawdown	-2,617.49	-4,409.37	-2,465.16
Max Drawdown %	-2.37 %	-4.18 %	-2.29 %
Max Drawdown Date	9/2/2011	9/30/2011	9/15/2011
Return/Drawdown Ratio	12.53	4.34	5.54
Drawdown Days %	78.38 %	80.02 %	86.74 %
Max Drawdown Duration	89	194	176
CAGR	6.56 %	4.00 %	2.91 %
Sharpe Ratio	2.16	1.49	1.03
Annualized Volatility	3.04	2.68	2.84
Sortino Ratio	3.82	2.45	1.70
UPI	0.67	0.26	0.24
Information Ratio	2.11	1.50	1.01
Optimal f	70.80	55.51	36.20
All Trades #	1839	937	902
Profitable Trades Ratio	0.53	0.55	0.51
Winning Trades #	972	512	460

Losing Trades #	867	425	442
Average Trade	17.84	20.43	15.15
Average Winning Trade	129.96	125.01	135.48
Average Losing Trade	-107.86	-105.55	-110.08
Avg. Win/ Avg. Loss Ratio	1.20	1.18	1.23
Average Profit per Share	0.07	0.08	0.06
Max Consequent Winners	12	12	11
Max Consequent Losers	11	10	16

Conclusion

We presented an approach that uses CR indices as a strong predictive factor of price directionality. We developed a trading strategy that implements an algorithm based on this approach. We also constructed two other versions, both based on CRI predictive power, that raise the performance of the main approach.

The main contribution of the paper is back-testing and comparison of the different versions of the strategy. On stocks in the S&P 100, back-testing shows that the first strategy has an average Information Ratio of 1.71 over the period 2010-2014, the second and third versions achieved Information Ratios of 1.90 and 2.11 respectively, which indicates that the CRI is predictive in the forecasting of stock returns.