Building a Sector Rotation Portfolio: S&P GICS Level 1 Equities

Miller Capital (Fictional Firm)

Ty Miller

Miller Capital is in the process of developing a sector rotation model based on a 100% allocation to 10 sectors of the S&P 500 Index, excluding Real Estate. Although many investors and firms have a diversified portfolio including U.S. Equities (the reason for utilizing the 10 S&P 500 indexes), Fixed Income, Real Estate and International Equities, most of the portfolio of Miller Capital is allocated to U.S. Equities which is the specialty of the firm. The portfolio is based on a long-only equity strategy, which aims to optimize Sharpe Ratio based on Sector Allocation within the S&P 500 indexes.

A sector rotation model was selected to anticipate and capitalize on market movements and subsequent business cycles. At this stage, the sector rotation model is merely being used to investigate whether such a thesis could be advantageous in the U.S. market, with further predictive tools to be incorporated in future developments.

When constructing the initial infrastructure for this portfolio, Miller Capital made several assumptions to simplify the construction.

Miller Capital measured the ending weekly price data of each of the S&P Sector Indexes. These sectors are as follows: Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Telecommunications and Utilities. Miller Capital measured the asset classes over the period of time from January 1, 2010, to December 31, 2019. The optimized portfolio was then measured against a Benchmark of a 60% Equity, 40% Bond allocation portfolio, comprised of the SPX Index for Equities and the U.S. Aggregate Bond Index for Bonds.

After retrieving the data from Bloomberg Terminals, the price data was cleaned to measure weekly changes in price, normalized to 0%. Miller Capital chose not to measure the Cumulative Returns Gross of Dividends primarily because of the measuring of sector index data, as opposed to the ETFs that track the underlying asset, or indexes, which itself do pay dividends.

A covariance matrix was then constructed for the 10 asset classes:

	HEALTHCARE	INFOTECH	UTILITIES	CONSDISCR	CONSSTAP	TELECOM	FINANCIALS	MATERIALS	INDUSTRIALS	ENERGY
HEALTHCARE	0.00037756	0.0003197	0.000159	0.00031084	0.0001994	0.00021	0.00034455	0.0003211	0.000324496	0.00032
INFOTECH	0.000319669	0.0005625	0.000153	0.00044116	0.0002302	0.000245	0.00044636	0.0004591	0.000444887	0.00044
UTILITIES	0.000158834	0.0001529	0.00033	0.00015563	0.000175	0.000173	0.00015017	0.0001531	0.000170403	0.00016
CONSDISCR	0.000310836	0.0004412	0.000156	0.00047101	0.0002265	0.00026	0.00044389	0.000433	0.000431381	0.00042
CONSSTAP	0.000199357	0.0002302	0.000175	0.00022652	0.0002425	0.000203	0.00023018	0.0002198	0.000234475	0.00022
TELECOM	0.000209765	0.0002449	0.000173	0.00026039	0.0002029	0.000428	0.00028788	0.0002608	0.000272834	0.00029
FINANCIALS	0.000344554	0.0004464	0.00015	0.00044389	0.0002302	0.000288	0.00066449	0.000525	0.000524243	0.00052
MATERIALS	0.000321149	0.0004591	0.000153	0.00043304	0.0002198	0.000261	0.00052501	0.0006575	0.000523855	0.00057
INDUSTRIALS	0.000324496	0.0004449	0.00017	0.00043138	0.0002345	0.000273	0.00052424	0.0005239	0.000545023	0.00051
ENERGY	0.000323562	0.0004375	0.00016	0.00042014	0.0002242	0.00029	0.00051644	0.0005654	0.000507527	0.00079

Following the construction of the matrix, the infrastructure for the optimization was built out, where weights were assigned to the individual sectors, and so the weights once optimized would sum to 100% (effectively, the fund utilizing the strategy is assumed to allocate 100% of its funds into the strategy). Miller Capital then calculated average returns for each sector, to be used as a proxy in the optimization calculation. Following this, the following metrics were calculated: Weekly Return, Weekly Variance, Weekly Standard Deviation, Total Return, and Total Standard Deviation.

When Calculating Sharpe Ratio, which the calculation for the optimization for the portfolio was based on, Miller Capital assumed a risk-free rate of 3%.

When optimized, Miller Capital found a Sharpe Ratio of 3.27.

	weight	return
HEALTHCARE	0.246171183	0.0024747
INFOTECH	0.185234203	0.0031053
UTILITIES	0.167615008	0.0015589
CONSDISCR	0.36301698	0.0029984
CONSSTAP	0.037962627	0.0017757
TELECOM	0	0.0011117
FINANCIALS	0	0.0021955
MATERIALS	0	0.0015852
INDUSTRIALS	0	0.0022787
ENERGY	0	0.0005041
10	1.000000000	
Weekly Ret	0.00260158	
wkly variance	0.000314893	
weekly stdev	0.017745222	
total return	1.352821859	
total st dev	0.404653322	
rfr	0.03	
sharpe ratio	**3.269025083**	

Within this calculation, the optimal asset allocation was as follows:

25% Allocation to Health Care

19% Allocation to Information Technology

17% Allocation to Utilities

36% Allocation to Consumer Discretionary

4% Allocation to Consumer Staples

0% allocation was determined for the following sectors:

Telecommunications, Financials, Materials, Industrials, and Energy.

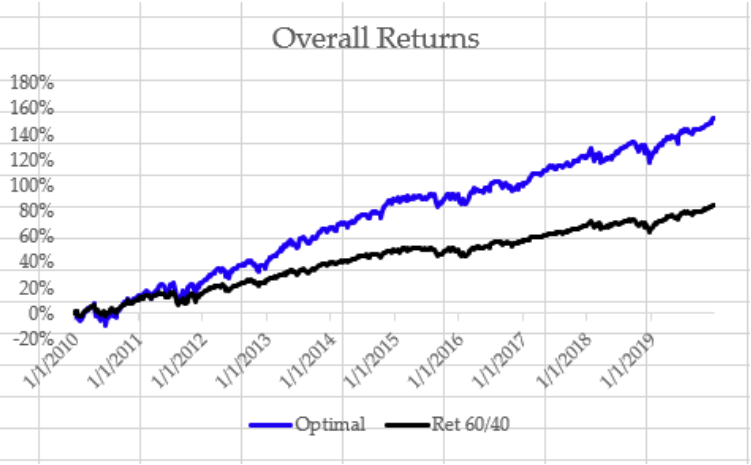
What follows is the tuition behind these results:

When maximizing Sharpe Ratio, the optimizer would seek to expand additional returns per unit of risk. Information Technology and Consumer Discretionary are highly levered to overall economic performance, with Information Technology being more so, and Consumer Discretionary performance towing the market line a bit closer. Healthcare, Utilities and Consumer Staples are more defensive sectors, and typically outperform in a bear market. They are less volatile and mitigate some risks in the event of an economic slowdown or contraction.

The following are the performance metrics calculated for both the benchmark and the optimized portfolio, compared to the benchmark.

The metrics of the Optimized Portfolio are as follows, compared to the Benchmark:

	Optimal	benchmark	
Beta to SPX	0.569007		
Beta to BM	1.901041		
Alpha	51%		
MaxDraw	17%	12%	
Total Ret	135%	85%	
Sharpe Ratio	3.27	~0.95	*
Vola	40%	61%	*



Pitfalls of the Current Model:

While the initial tests conducted for the U.S. Equities sector rotation strategy are promising, there are many factors that Miller Capital is looking to address in the future:

1. Time Period: Miller Capital ran tests on a time (2010-2019) where U.S. equities markets did not experience significant downturn, or recession.
2. This strategy was a buy and hold, which is consistent with long equity strategies, but Miller Capital's partner, JFC, sells out of equity positions on a regular basis, dependent on analysis.
3. In addition to the point above, there is no hedging activity associated with the strategy at this stage, and no short selling is being performed to capitalize on sectors that may be expected to underperform.
4. Perhaps most important: There is no rebalancing, nor adjustment based on an external factor, like the Consumer Price Index, or CPI, which measures inflation. (This is a placeholder for an economic indicator to be incorporated later.) This is a "Hindsight 20/20" portfolio, only looking back with no predictive factors built in, yet.
5. If this were to be applied to a real-life firm's trading strategies, there would likely be regulatory requirements that require a certain level of liquidity for investor security. The trading strategy discussed here has no additional cash and operates on the assumption of 100% allocation of funds.
6. Additional factors that relate to capital markets and quantitative models at large.

Further Analysis: How the Model can be Improved and Optimized Going Forward

Miller Capital is going to research the effects of incorporating SPX and LBUSTRUU in the covariance matrix next time, to measure direction of the correlation between SPX and individual sectors. Of course, LBUSTRUU and SPX would be weighted at zero during the optimization process and subsequent sector allocation.

Additional research will be conducted over longer time periods, and optimization will likely change after factoring in the effects of recessionary periods.

Another section of research and development will be the incorporation of a signal factor, for instance CPI, or another leading market indicator for rebalancing and change in allocation of the overall portfolio.

Although unlikely, especially when considering Miller Capital's current long-equity strategy, a short-selling strategy could be implemented to capitalize on additional trends, in this case potential downsides in the market.

The firm may also consider sectioning off a specific amount of funds into cash or money market securities to cover any liquidity concerns.