ClariFI® Factor Packs: Rapid Alpha Deployment
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Introduction
ClariFI® is a powerful analytical tool enabling the analyst to seamlessly perform powerful quantitative analysis. This quarter's newsletter introduces a collection of ClariFI alpha factors. Factor Packs are a set of concepts, which empower the reconstruction of trading signals that have been widely published in the literature. Each factor within the pack is available for download and upload into ClariFI. This paper provides users with a set of concept examples built within ClariFI. The Factor Pack may be used as a starting point for research and further to improve strategies using advanced techniques. One such technique reviewed herein, is the regime study.

Many of the signals within the Factor Pack are also available within a separate product called Alpha Factor Library (AFL). Users should be aware that these two products provide different factor implementations. This is discussed further within the **Factor Packs vs. Alpha Factor section**.

The Factor Pack offers two flavors of the factor constructions, one is based on S&P Capital IQ Point-in-Time Fundamentals and the other is based on Compustat Point-in-Time Snapshot. All concepts are built in ClariFI Version 5.2, and are available for download, unzip, and upload into any ClariFI installation. ClariFI Concepts (.msl) can be uploaded in bulk by navigating to the 'Import' dropdown menu:
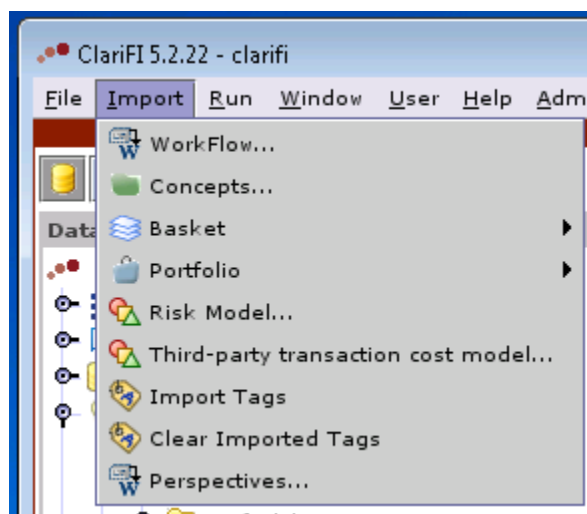

Figure 1: Import menu from ClariFI

Methodology
The following analysis utilizes the CIQ PIT concepts. The basic assumptions used in implementing these factors are:

- All statement data is Final, CIQ Reported Currency & Aperiodic frequency
- Because aperiodic data (daily frequency) is used, we use a Resample to monthly, with a lookback of 4 months
- For all factors with any item from the balance sheet (B/S), income statement (I/S), or cash flow statement (C/F) the factor is built with TTM (Trailing Twelve Month) treatment with a substitution logic to use annual data when TTM is not available. The entire factor would have to fail for the 'Replace Missing' to be implemented; no single data item is replaced by an annual item.

- The annual data are processed by an additional Custom Arithmetic transformation which replaces NULL with 0's
- If a factor uses data from the B/S and IS/CF statements then a simple moving average (SMA) of 4 for quarterly (2 for annual) periods will be used for the B/S data
- If a factor uses data from the B/S and IS/CF statements the factor applies a 'strict' sum of IS/CF quarterly data points to return an annual value
- If a factor uses only data from IS/CF statements the factor will be an 'available' sum of IS/CF quarterly data points
- All factors based on a per share or YoY change are a 'strict sum' of IS/CF quarterly data point when computing any B/S factor on a 'per share' basis, Equity Capital Structure Common Shares Outstanding data item is used (24152)
- When building factors using S&P Global Estimates data, all market data are converted from 'Business Day' to 'Monthly'
- Use CIQ Reported PRCCD for all pricing data factors
- Resample all daily pricing to monthly
- Does not use the Winsorize transform for any Price Momentum factor
- Uses 'n Period Maximum (Minimum) (A)' to compute high/low price for period
- When resampling Business Day (BD), resample lookback is set to 1
- Analyst Expectation data is Daily (D), when resampling to Monthly (M) and lookback is set to 1

For the CS PIT (also called Snapshot PIT) factors, the only differences to the above are that data items used are Final, Monthly views and pricing used is PRCCD – Compustat Traded Currency (CS Trd).

While building out the CIQ PIT concepts, a special Custom Arithmetic transformation is used for NULL handling. CIQ PIT represents a missing value as a NULL. In order to replaces the NULL with a zero, a Custom Arithmetic transformation (wherever appropriate) is used with the following logic:

> Custom Arithmetic Code: If(isNaN(pit1[1]),0,pit1[1])

The nine types of factor groupings provided are Capital Efficiency, Earnings Quality, Estimates, Generic Factors, Historical Growth, Price Momentum, Size, Valuation & Volatility.

To compute factor efficacy quantitatively, a batch (BAT) workflow consisting of a Factor Backtest (FB) template workflow is run with the following inputs:

- Basket set - SP1500 Super Composite only
- Single Concept – Factor, Group Standardized
- Date Range set – 20yrs prior, through till 6/30/2017
- Expression set – CIQ PIT and CS PIT as 2 independent sets

The concept used in the batch workflow is a Group Relative Standardization of the raw factor, where the Group ID is a concept called "Industry-SubSector Grouping ID". This is the same standardization as performed in the Research Demonstration of the [first ClariFI newsletter](#).

Downloads
1. Workflow - "CFP - FB Template.wf" which is the template for a BAT workflow
2. ClariFI Factor Pack – 260 Concepts
3. CFP Supporting Concepts - 11 concepts, all required for the workflow

Note: All downloads are created in ClariFI Version 5.2, and are importable into either Version 5.2 & 5.3

Regime Analysis

As part of the study, we conduct a regime analysis in our test cases to highlight factor behaviors in different market environments. The different regimes are created by processing time-series data with the concept shown in Figure 2. This concept discretizes the continuous time-series, returning 3 discrete levels of -1, 0 and 1 whenever an environment variable is negative, no change or positive, respectively.
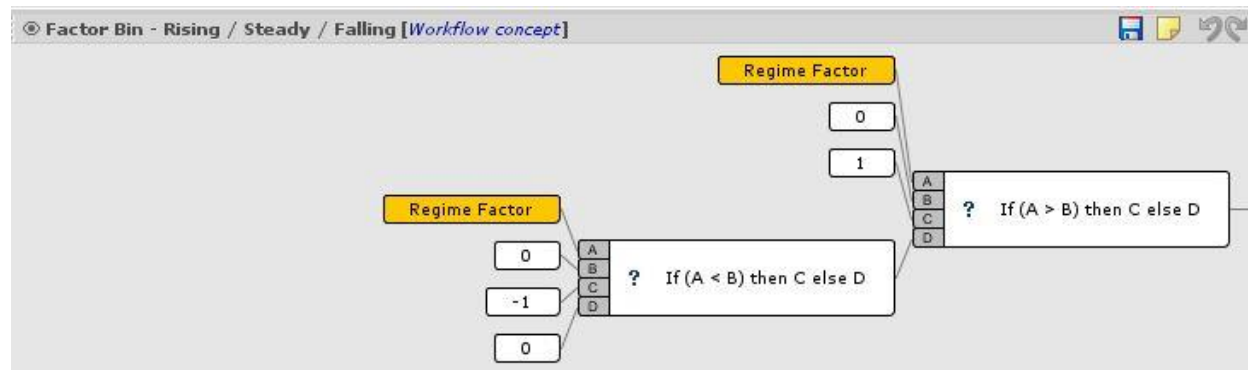

Figure 2: Boolean regime factor

We construct four regime studies: First, we evaluate the change in the federal funds rate by digitizing the 12-month percentage change. Second, we look at the bond market and calculate the 12 month slope of the yield curve. Next, calculate the 1 month % change of the S&P 500 Index – Total return which represents market beta. And lastly, evaluate the 1 month % change of the S&P 1500 Index – Total return which represents a broader market beta.

Figure 3 below demonstrates how each of the four different environments are created within ClariFI.
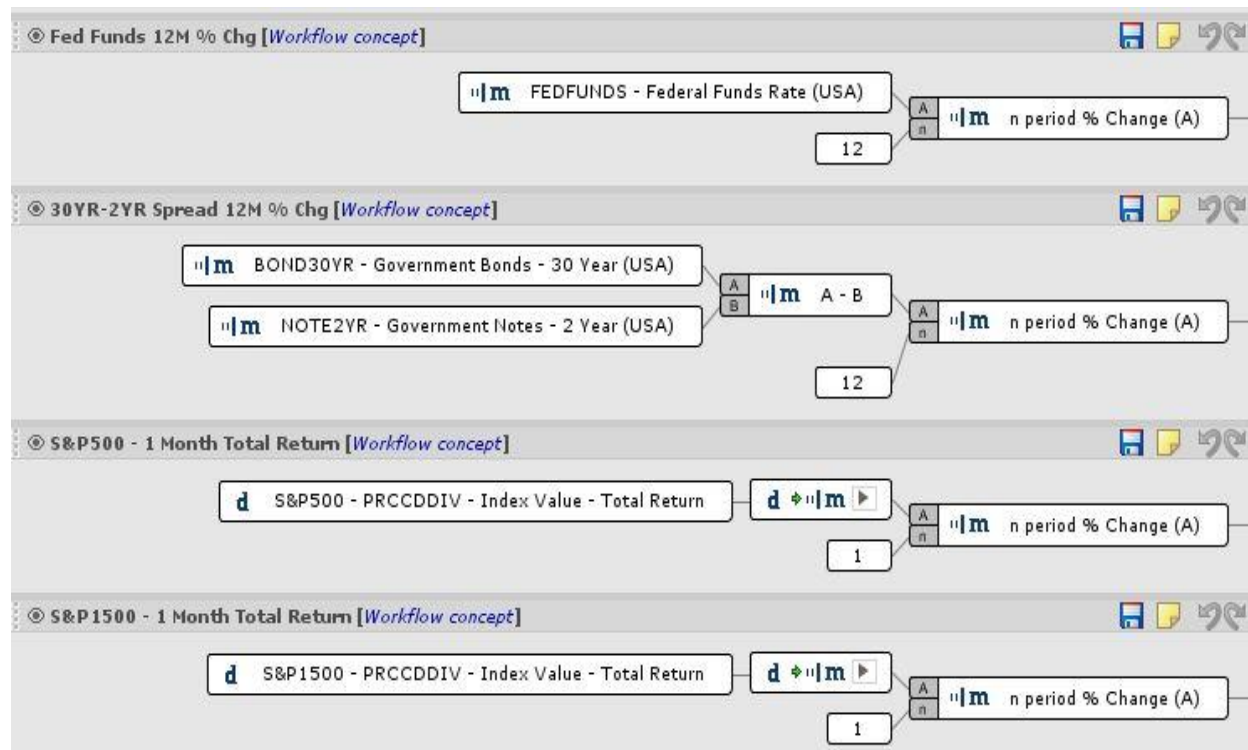

Figure 3: Four environments built as concepts

Results Discussion

In Exhibit 1, Capital Efficiency factor backtest results are shown. All factors are sorted in *descending* mode except for factors marked with a * which are ranked in ascending mode. The orders correspond to the expected alpha direction of the factors.

The "All Periods" column shows statistics for the entire 20-year backtest period in the analysis. The columns display results for the four regime studies. The highlighted backtest statistics shown are Information Coefficient (IC) in the 1st row and Annualized Top-Bottom Quintile spread (TBS) in the 2nd row. TBS is annualized from average monthly data. The factors are sorted by absolute value of the T-stat of the All Periods column. Information coefficients are color coded by statistical significance, where dark-green indicates significance at the 99%+ level (>=2.61), medium-green at the 95% level (>=1.98), light-green at the 90% level (>=1.66) and white below the 90% level. As shown, some factors perform better in a particular market regime versus over the entire backtest period (20yr window). For example all factors, with the exception of the Capital Acquisition ratio display greater efficacy in down markets.

Exhibit 1: Factor Backtest Results for Capital Efficiency Factors on SP1500 Super Composite Basket (06/30/1997 - 06/30/2017)

Factor Name	Stats	All Periods	S&P 500 Up and Down		S&P 1500 Up and Down		Bond Yield		Fed Funds		
			Up	Down	Up	Down	Up	Down	Up	Unchg	Down
Capital Acquisition Ratio	IC	0.019	0.012	0.029	0.012	0.03	0.014	0.023	0.013	0.028	0.022
	Ann Ret	5.47%	0.77%	14.12%	0.52%	14.62%	2.82%	8.52%	5.18%	4.48%	5.80%
Cash Flow Return on Invested Capital	IC	0.017	0.005	0.037	0.004	0.039	0.019	0.019	0.01	0.037	0.02
	Ann Ret	3.59%	-2.19%	14.38%	-2.62%	15.25%	2.16%	5.89%	2.42%	7.59%	4.11%
1Y Chg in Stock Buybacks	IC	0.01	0.007	0.014	0.007	0.014	0.005	0.01	0.013	0.008	0.007
	Ann Ret	1.13%	-0.09%	3.27%	-0.20%	3.49%	-0.22%	1.45%	1.62%	-0.21%	0.89%
Change in Shares (B/S Numbers)*	IC	0.011	0.008	0.017	0.007	0.018	0.01	0.014	0.007	0.037	0.011
	Ann Ret	3.17%	1.12%	6.65%	0.80%	7.18%	1.71%	4.43%	1.61%	7.71%	3.91%
ROIC	IC	0.01	-0.001	0.03	-0.002	0.031	0.018	0.008	0.009	0.05	0.007
	Ann Ret	1.31%	-4.48%	12.13%	-4.95%	13.09%	0.36%	2.45%	1.73%	12.23%	-0.07%
ROE	IC	0.009	-0.004	0.032	-0.004	0.033	0.013	0.012	0.008	0.055	0.006
	Ann Ret	0.48%	-6.01%	12.77%	-6.39%	13.55%	-0.74%	2.10%	0.92%	11.25%	-0.89%
ROA	IC	0.007	-0.01	0.038	-0.011	0.039	0.013	0.011	0.001	0.057	0.008
	Ann Ret	0.10%	-7.56%	14.81%	-8.06%	15.88%	-1.69%	3.10%	-0.17%	15.54%	-1.16%
Interest Coverage Ratio	IC	0.004	-0.007	0.023	-0.007	0.024	0.001	0.007	0.009	-0.013	0.002
	Ann Ret	0.69%	-4.59%	10.52%	-4.80%	10.94%	-1.16%	3.04%	1.14%	-1.70%	0.59%
LT Debt to Equity*	IC	0.002	-0.006	0.015	-0.006	0.015	0.001	0.006	0	0.019	0.001
	Ann Ret	1.58%	-1.92%	7.40%	-2.08%	7.66%	1.37%	2.69%	0.75%	5.24%	1.85%

Source: S&P Global Market Intelligence's ClariFI. All returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as of 06/30/2017.

Capital Acquisition Ratio in the Capital Efficiency grouping consistently (across all regimes) provides a positive annualized TBS. Change in Shares* in the same grouping demonstrates similar behavior.

Comparing ICs for all the regimes, ROA, ROIC and ROE show the highest ICs in the down market scenario as well as when Fed Funds are unchanged, while they have moderate premiums over the full 20 year period. This supports the assertion that these factors are defensive and add alpha in market pullbacks or in a steady rate environment.

Advanced users have the ability to change the following inputs to the batch workflow:

1. Investible universe
2. Date range

And the following to "CFP - FB Template.wf":

1. Frequency of rebalancing the portfolio
2. Interaction factors (either Security Master based or custom expressions)
3. Benchmark price
4. Return weighting expression
5. Varying holding period

Factor Packs vs. Alpha Factor Library

Of interest to many readers may be the feasibility of replicating AFL values in ClariFI. Because ClariFI is the tool used by AFL to generate factor values, and because AFL methodology is completely transparent, the replication of the AFL datafeed may seem straightforward. This could not be farther from the truth, for two primary reasons.

First and foremost, AFL contains both backfill and production data. This means that the on-going values for the feed are generated programmatically on the basis of the data available in the Xpressfeed™ database. The concepts are constructed by using S&P Capital IQ latest fundamental data, and not point-in-time data, in production. Note that the data generated by this process *is point-in-time*, despite the fact that it is sourced from a non-point-in-time dataset. The reason is that the production values are generated using the latest fundamental data available at each point in time the calculation is run. For backfill history, point-in-time data is then used.

To a lesser extent, but still worth noting, the AFL factors use proprietary substitution and currency translation logic. The process remains completely transparent, in the sense that the AFL team will provide clients with the equation and input values for a reasonable number of data points, if requested. However, the AFL data itself is provided as a feed, and the extraction logic from Xpressfeed (so called, SQL stored procedures) and switching logic handled in ClariFI, are both proprietary. Also, AFL uses Compustat® data for North American securities and S&P Capital IQ data for international securities which could cause further difference when the underlying data source differs.

As a result, though many of these concepts share a name and high-level construction ideology with factors from the alpha factor library (AFL), the concepts presented in this treatment are not expected to replicate AFL values. Our position is that AFL and ClariFI are complementary tools, each providing a means to generate alpha in the investment management space.

Conclusion

Factor Pack provides a comprehensive tool for clients to jump start their factor research, based on either CIQ PIT or Compustat Snapshot database. By way of example, this document demonstrates the flexibility of ClariFI by using these concepts to conduct rapid alpha discovery and regime analysis. ClariFI users are provided with readily importable factors to reproduce these results and expand upon the complexity of factor testing.

The authors would like to thank Daniel Sandberg for his assistance with this project. Users are encouraged to reach out to [ClariFI Support](#) for assistance with setting up the template Factor Backtest (FB) workflow or concepts.

All screenshots and figures in this document are for illustrative purposes.