Economic Index Associates

General Description of Strategy and U.S. Equity Indexes

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Abstract

We examine the performance of several U.S. equity indexes, created based on our proprietary investment strategy, for the 39-year period from 1979 through 2017. Our strategy extends traditional smart beta and factor-based products to create dynamic indexes that adjust when economic conditions warrant. We use Fed policy signals as our reallocation indicator and rely on twelve firm financial metrics to determine the optimal equities in which to shift the underlying portfolio. The twelve metrics are used to identify firms that prosper under each alternative monetary environment. When the Fed indicator signals a shift in policy, the portfolio is reallocated to equities with features that are conducive to the new policy. Over the 39 years, our All-Cap Index earns an annual return of 19.18% versus 12.52% for the Wilshire 5000; further, both indexes experience similar volatility. Consistent with the penchant for small firms to have greater sensitivity to monetary conditions, our Small-Cap Index performs considerably better. Specifically, over the same period, our Small-Cap Index returns 20.25% versus 13.07% for the Russell 2000, and further, our Small-Cap Index subjects investors to less risk. Our investment strategy produces this superior performance with relatively low portfolio turnover, and the portfolio is always fully invested in a broad cross-section of equities.

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Astute investors know that changes in Federal Reserve monetary policy have a significant influence on the overall economy and the security markets. This influence is often attributed to the impact that Fed policy changes have on market participants' borrowing costs and the ability of consumers to spend money. While the crucial role the Fed plays in determining security returns is widely recognized, there is little agreement on how, or if, investors can capitalize on shifts in Fed policy.

Based on over 25 years of research evidence, we present compelling support for the view that, if measured properly, there is a large and consistent association between Fed policy shifts and the subsequent returns on equity securities. A signaled change in Fed policy can significantly impact security returns, especially if the change identifies a new direction in policy.

Translating past research findings into an executable investment strategy requires a methodology that accurately identifies "actual" shifts in Fed policy. Once policy shifts are identified, monetary policy environments can be established. To initiate the final step of the investment process, which is to implement the investment strategy, the investor needs to know the optimal set of securities to target in each identified monetary environment.

What if one could identify with reasonable certainty an actual shift in Fed policy? Better yet, what if one could use this information to guide the selection of a portfolio of stocks that maximized return while controlling for risk?

Based on a quarter century of peer-reviewed research, we, the team of Luis Garcia-Feijoo, Gerald Jensen, and Robert Johnson designed an investment strategy that accomplishes just that.[1] We have discovered powerful relationships that overwhelm most other observed market anomalies. For example, we find that the small cap and value effect, the over-reaction occurrence, and the cash effect, among others can be attributed more to shifts in Fed policy than anything else.

[1] The credentials of the four principals that comprise Economic Index Associates are presented at the end of this document.

We have designed and developed an investment approach and are using our patent pending methodology to build indexes upon which products such as mutual funds and ETFs are to be based. Our first set of indexes are built around U.S. equities and include a general equity index that includes actively traded stocks across the market cap spectrum (IFED-A), along with a large-cap index (IFED-L), a mid-cap index (IFED-M), a small-cap index (IFED-S) and a micro-cap index (IFED-MC).

In creating our strategy, we developed a monetary policy measure that relies on a combination of Fed indicators to identify three distinct monetary policy environments; expansive, restrictive and indeterminate. More importantly, our approach distinguishes between actual shifts in Fed policy versus transient changes in interest rates.

In developing our U.S. equity indexes, we applied exhaustive and extensive modeling and testing to identify the most critical financial metrics that influence company performance during the three environments. There is a total of twelve such metrics; however, the metrics are not common across the three environments. Essentially, the strategy relies on the observation that certain financial metrics have a magnified, or "leveraged" effect on companies' stock prices during particular monetary environments, but have little or no effect during other environments. Our process involves weighting those metrics appropriately to take the most advantage of the existing monetary environment.

The twelve metrics are selected based on economic validation and empirical analysis of return sensitivities to Fed policy changes. One example of such a metric is a firm's cash to total assets (Cash/TA) i.e. the firm's cash holdings. In an expansive environment, the cash holdings variable is assigned no weight as it is deemed relatively unimportant to stock performance during an expansive environment. The economic rationale supports zero weight because a firm's level of cash holdings is relatively inconsequential during periods when the Fed is signaling that funds will be readily available. In contrast, during a restrictive environment, the cash holdings variable is assigned maximum weight because the metric is expected to have a leveraged effect during such environments. That is, when the Fed signals that fund availability is going to be constrained in the future, having a higher level of cash holdings becomes more beneficial for a firm.

Several research analyses, performed by the authors and various other academic researchers, confirm that return sensitivities are consistent with the proposed economic rationales

for each of the twelve selected financial metrics. For each environment, the metrics are scored, the population of companies in the universe is ranked based on total metric score, and the 20% of firms with the highest monetary conditions score are selected for the index portfolio.

Starting from a broad benchmark of equities, our approach culls the set of equities included in the index to the 20% of firms that are best leveraged to benefit from the prevailing monetary environment. Equities with insufficient liquidity and firms with insufficient financial data to derive the twelve required metrics are eliminated from consideration. In selecting our final sample and conducting the performance evaluation, we apply rigorous academic research standards to eliminate prominent data issues such as survivorship bias, selection bias and look-ahead bias. We gauge the performance of our strategies over both the short-term (last 20 years) and the long-term (last 39 years) and find that they produce consistent superior risk-adjusted performance versus broad U.S. benchmarks such as the Wilshire 5000 for our all-cap equity index, the S&P 500 for our large-cap and mid-cap indexes, and the Russell 2000 for our small-cap and micro-cap indexes.

It is worth noting a couple of areas where our indexes differ materially from the benchmark we apply. First, in contrast to the Wilshire 5000, our all-cap index (IFED-A) excludes firms that have a market cap that is lower than the 20th percentile market cap value of the NYSE index. We exclude these relatively small firms to ensure that the equities included in the index have sufficient liquidity to avoid transactions issues. Thus, the Wilshire 5000 includes firms that are viewed to have potential liquidity issues and are excluded from IFED-A. Second, we compare both our large-cap and mid-cap indexes to the S&P 500. Whereas the S&P 500 is the appropriate benchmark for our large-cap index, the S&P MidCap 400 is the standard for our mid-cap index. Unfortunately, the S&P MidCap 400's history only dates back to 1991, and there is no other benchmark with a sufficient return history since the S&P 400 established the segment.

Style or factor-based indexes have limitations relative to our investment indexes because they rely on static, one-dimensional allocation rules. In contrast, our investment portfolios are created by applying a dynamic strategy that considers changes in economic conditions. Traditional smart beta and factor-based investment products rely on the assumption that security return patterns remain consistent over time; however, overwhelming evidence establishes that investment styles and strategies have periods where they are in-favor and other periods where

they are out-of-favor. Based on many years of academic research, we have identified a methodology that relies on Fed policy indicators to signal the opportune times to opt in and out of securities with particular features. Our research has identified twelve firm characteristics (or metrics) that effectively classify equities into categories that are best positioned to capitalize on an identified shift in Fed policy.

Our approach uses Fed policy signals to identify the opportune times to shift the portfolio allocation; however, our strategy should not be viewed as a market timing technique. Our approach relies on a combination of Fed signals as the indicator to reallocate the portfolio; however, the portfolio is always fully invested in equities. The portfolio merely shifts from the equities of firms with particular characteristics to the equities of firms with alternative features; that is, from firms that prospered under the old monetary environment to firms that will prosper under the new environment.

An attribution analysis confirms that our strategy is not a factor, or smart beta, investment philosophy. Rather, it is a strategic asset allocation process that relies on shifts in Fed policy to determine the appropriate weights that are allocated to the twelve metrics. The resulting U.S. equity portfolios are built using a transparent and rules-based methodology that is replicable for investors and product providers.

The performance for the five U.S. equity indexes created according to the methodology delineated above is reported in the next section. We start with the performance of the All-Cap Index (IFED-A) and then proceed to examine the performance of four alternative size portfolios: Large-Cap (IFED-L), Mid-Cap (IFED-M), Small-Cap (IFED-S) and Micro-Cap (IFED-MC).

Performance Results

All-Cap Equity Index (IFED-A)

Table 1, Panel A, reports performance results for the All-Cap Index (IFED-A) over the full 39-year sample period from 1979 through 2017. The portfolio of stocks included in the index is selected from the set of all actively traded stocks that have sufficient liquidity to be easily traded. In particular, we remove from consideration firms that have market caps that are less than the 20th percentile market cap value for NYSE stocks. The performance data is shown for the full period (column 1) and separately for each of the three monetary environments: expansive

(column 2), indeterminate (column 3) and restrictive (column 4). As you can see, the sample period is fairly evenly distributed across the three monetary environments. The performance measures were derived from monthly return series, and those measures in the top portion of the table were annualized, whereas those in the bottom portion are monthly values.

The full-period performance results from column 1 indicate that IFED-A generated an annual return of 19.18% over the 39-year period, whereas the return for the Wilshire 5000 was 12.52%. Thus, the mean annual active return (alpha) over the period was a pronounced 6.66%. In addition, the information ratio and Sharpe ratio confirm that the risk-return tradeoff for IFED-A over the 39 years greatly exceeded the benchmark. The superior returns were accompanied by slightly higher risk (15.84% vs. 15.17%), but this is expected given that IFED-A contains far fewer firms than the Wilshire 5000. Finally, the *t*-statistic on Jensen's alpha indicates that the abnormal return generated by the Portfolio is statistically significant.

The monetary environment data (columns 2 thru 4) indicates that strong performance contributions came from each environment. The mean active return (alpha) ranged from a low of 4.54% during indeterminate periods to a high of 10.37% during expansive periods. During expansive periods, incredibly the Sharpe ratio for IFED-A was more than double the Sharpe ratio for the Wilshire 5000. The *t*-statistics on Jensen's alpha confirm that the abnormal returns for the Portfolio are significant during each of the three monetary environments, which establishes the temporal robustness of IFED-A's outperformance.

Final support for the consistency of performance for IFED-A comes from the minimum and maximum returns reported at the bottom of the table. In only one case did IFED-A report a minimum return lower than the lowest monthly return for the Wilshire 5000 and all the maximum return values for IFED-A were higher than those for the Wilshire 5000. This evidence indicates that the Portfolio did not generate higher returns at the expense of subjecting investors to unusually large losses. Furthermore, it indicates that our strategy keeps losses constrained when security markets suffer, yet fully capitalizes from favorable market conditions when stocks prosper.

Table 1A. All-Cap Equity Index (IFED-A) and Wilshire 5000 Performance, 1979-2017

Full Sample Period: 1979-2017	Full Period (n=468)	Expansive (n=150)	Indeterminate (n=161)	Restrictive (n=157)
Annualized Performance Data				
IFED-A mean return (%) (IFED-A std. deviation in %)	19.18 (15.84)	21.53 (16.44)	16.22 (13.68)	19.97 (17.32)
Wilshire 5000 mean return (%) (Wilshire 5000 std. deviation in %)	12.52 (15.17)	11.15 (14.98)	11.68 (15.41)	14.68 (15.17)
Mean active return (alpha in %)	6.66	10.37	4.54	5.28
Tracking Risk (%)	7.73	9.00	7.00	7.03
Information Ratio	0.86	1.15	0.65	0.75
IFED-A Sharpe ratio	0.93	1.05	0.87	0.87
Wilshire 5000 Sharpe ratio	0.53	0.46	0.48	0.66
Monthly Performance Measures				
IFED-A Jensen's alpha (*t*-statistic)	0.0061 (5.30)***	0.0091 (3.58)***	0.0051 (3.47)***	0.0040 (2.47)**
IFED-A Minimum Return (%) Wilshire 5000 Minimum Return (%)	-22.32 -22.78	-13.37 -10.04	-16.61 -17.61	-22.32 -22.78
IFED-A Maximum Return (%) Wilshire 5000 Minimum Return (%)	16.85 12.80	13.00 11.93	13.32 12.80	16.85 11.53

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] IFED-A excludes stocks with a market cap below the 20th percentile for the NYSE. The NYSE size breakpoints are established by ranking all firms trading on the NYSE and identifying the 20th percentile value. That value is then applied to all actively traded stocks. Those firms above the 20th percentile NYSE market cap are eligible for the Portfolio. Thus, a NASDAQ stock with a market cap in the 21st percentile would be in the universe, whereas an NYSE listed stock at the 19th percentile of size would not.

[b] Active return is calculated as IFED-A return minus Wilshire 5000 return. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-A's monthly returns against the Wilshire 5000 monthly return.

To offer evidence regarding the time-period consistency of our strategy's performance, Table 1, Panel B, reports the performance of IFED-A over the last 20 years, 1998-2017. Overall, the evidence for this more recent period corresponds closely with the performance for the full 39-year period. The mean annual return for IFED-A over the 20 years is 15.68% versus 8.43% for the Wilshire 5000 a difference of 7.26% or 1.86 times. At 7.26%, the mean active return over this most recent 20-year period is 60 basis points higher than the mean active return over the full 39-year sample. This observation suggests the strategy's performance has certainly not diminished over time. In addition, relative to the 39-year period, there is more consistency in performance across the monetary environments as the lowest mean active return is 6.56% (during restrictive periods), whereas the highest active return is 8.38% (during expansive periods). Once again, the risk for IFED-A is slightly higher than the Wilshire 5000 (15.87% vs. 15.34%), but this risk difference pales in comparison to the return difference.

The monthly performance measures at the bottom of the table confirm the consistency of IFED-A's outperformance over the recent 20 years as the returns are significantly higher in each of the three environments. Furthermore, over the 20 years, the minimum and maximum return for IFED-A are superior to the comparable values for the Wilshire 5000.

Table 1B. All-Cap Index (IFED-A) Performance Relative to Wilshire 5000, 1998-2017

Sub-Period: 1998-2017	Full Period (n=240)	Expansive (n=64)	Indeterminate (n=83)	Restrictive (n=93)
Annualized Performance Data				
IFED-A mean return (%) (IFED-A standard deviation in %)	15.68 (15.87)	8.93 (17.29)	14.53 (13.68)	21.36 (15.62)
Wilshire 5000 mean return (%) (Wilshire 5000 std. deviation in %)	8.43 (15.34)	0.55 (16.56)	7.36 (16.99)	14.80 (12.61)
Mean active return (alpha in %)	7.26	8.38	7.17	6.56
Tracking Risk (%)	8.66	10.80	8.11	7.51
Information Ratio	0.84	0.78	0.88	0.87
IFED-A Sharpe ratio	0.87	0.38	0.87	1.24
Wilshire 5000 Sharpe ratio	0.42	-0.10	0.35	1.01
Monthly Performance Measures				
IFED-A Jensen's alpha (*t*-statistic)	0.0067 (3.98)***	0.0067 (1.67)*	0.0071 (3.03)***	0.0046 (1.90)*
IFED-A Minimum Return (%) Wilshire 5000 Minimum Return (%)	-16.60 -17.61	-13.37 -10.04	-16.60 -17.61	-9.66 -7.91
IFED-A Maximum Return (%) Wilshire 5000 Minimum Return (%)	16.85 11.53	11.31 8.77	11.52 10.64	16.85 11.53

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] IFED-A excludes stocks with a market cap below the 20th percentile for the NYSE. The NYSE size breakpoints are established by ranking all firms trading on the NYSE and identifying the 20th percentile value. That value is then applied to all actively traded stocks. Those firms above the 20th percentile NYSE market cap are eligible for the Portfolio. Thus, a NASDAQ stock with a market cap in the 21st percentile would be in the universe, whereas an NYSE listed stock at the 19th percentile of size would not.

[b] Active return is calculated as IFED-A return minus Wilshire 5000 return. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-A's monthly returns against the Wilshire 5000 monthly return.

Large-Cap Index (IFED-L)

The Large-Cap Portfolio (IFED-L) is formed based on our Fed-policy-based investment strategy as outlined above, but limits the eligible set of stocks to those that exceed the 75th percentile of value based on NYSE breakpoints. In other words, only those stocks that exceed the 75th percentile NYSE rank value for market cap are candidates for inclusion in the portfolio. On average, the Large-Cap Portfolio has a composition of approximately 50 stocks over the sample period, 1979-2017.

The performance data indicates that for the full period from 1979 through 2017 IFED-L returned 17.36% on an annual basis versus 12.49% for the S&P 500. Thus, the mean active annual return for the period was 4.88%. IFED-L displayed slightly more volatility than the S&P 500, 15.47% to 14.77%, but the difference was minor in comparison to the return difference. The higher risk level for IFED-L is consistent with the fact that the S&P 500 includes approximately ten times the number of equities as IFED-L. Overall, for the full period, the information ratio and Sharpe ratio indicate that IFED-L performed exceptionally well relative to the S&P 500. The significant Jensen's alpha confirms the statistical significance of IFED-L's abnormal return.

The consistency of out-performance by IFED-L is highlighted by the mean active returns, which range from a low of 3.40% per year during indeterminate periods to a high of 6.45% during restrictive monetary periods. The *t*-statistics on Jensen's alpha confirm that there was significant out-performance by the Portfolio during each of the three monetary environments. That is, the abnormal returns reported for IFED-L were statistically significant at the 5% level, or better, during each of the three environments.

Table 2. Large-Cap Portfolio (IFED-L) Performance Relative to S&P 500

Period: 1979-2017	Full Period (n=468)	Expansive (n=150)	Indeterminate (n=161)	Restrictive (n=157)
Annualized Performance Data				
IFED-L mean return (%) (IFED-L standard deviation in %)	17.36 (15.47)	16.01 (15.42)	15.28 (13.60)	20.79 (17.25)
S&P 500 mean return (%) (S&P 500 standard deviation in %)	12.49 (14.77)	11.21 (15.02)	11.88 (14.79)	14.33 (14.59)
Mean active return (alpha in %)	4.88	4.81	3.40	6.45
Tracking Risk (%)	7.92	8.02	7.61	8.15
Information Ratio	0.62	0.60	0.45	0.79
IFED-L Sharpe ratio	0.84	0.76	0.81	0.93
S&P 500 Sharpe ratio	0.55	0.46	0.51	0.66
Monthly Performance Measure				
IFED-L Jensen's alpha (*t*-statistic)	0.0047*** (4.07)	0.0047** (2.28)	0.0041*** (2.86)	0.0050** (2.23)

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] Large-cap stocks are defined as the largest 25% of firms based on NYSE breakpoints. The breakpoints are established by ranking all firms trading on the NYSE and identifying the 75th percentile value. That value is then applied to all firms in the sample, which includes all actively traded stocks. Those firms that are at or above the 75th percentile value are eligible for IFED-L.

[b] Active return is calculated as IFED-L return minus the return on the S&P 500. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-L monthly returns against the S&P 500 monthly return.

Mid-Cap Index (IFED-M)

The performance results presented in Table 3 for the Mid-Cap Portfolio are generally superior to those reported for the Large-Cap Portfolio in Table 2. We anticipated such a finding based on prior empirical research. Specifically, academic research, including much of our own, has long established that small firms are relatively sensitive to shifts in monetary policy because their access to alternative sources of capital is more limited. Therefore, we expected our performance results to get progressively stronger as we move from the Large-Cap Portfolio to portfolios that are composed of firms with smaller market caps.

Amazingly, the mean return for IFED-M exceeds 19% for the full period and is greater than 18% during each of the three monetary environments. Furthermore, the Portfolio's mean active return for the full period is 6.88%, and the mean active return ranges from a low of 4.89% during restrictive conditions to a high of 9.35% during expansive conditions. Incredibly, the Sharpe ratio for the portfolio during expansive conditions (0.96) is more than double the comparable S&P 500 Sharpe ratio (0.46). Once again, Jensen's alphas at the bottom of the table support the statistical significance of the abnormal returns generated by the Mid-Cap Portfolio as they confirm that all four abnormal returns are statistically significant.

Table 3. Mid-Cap Portfolio (IFED-M) Performance Relative to S&P 500

Period: 1979-2017	Full Period (n=468)	Expansive (n=150)	Indeterminate (n=161)	Restrictive (n=157)
Annualized Performance Data				
IFED-M mean return (%) (IFED-M standard deviation in %)	19.36 (17.07)	20.56 (16.93)	18.39 (17.11)	19.21 (17.24)
S&P 500 mean return (%) (S&P 500 standard deviation in %)	12.49 (14.77)	11.21 (15.02)	11.88 (14.79)	14.33 (14.59)
Mean active return (alpha in %)	6.88	9.35	6.52	4.89
Tracking Risk (%)	9.33	10.55	9.06	8.35
Information Ratio	0.74	0.89	0.72	0.58
IFED-M Sharpe ratio	0.84	0.96	0.82	0.84
S&P 500 Sharpe ratio	0.55	0.46	0.51	0.66
Monthly Performance Measure				
IFED-M Jensen's alpha (*t*-statistic)	0.0059*** (4.07)	0.0084*** (3.04)	0.0055** (2.33)	0.0038* (1.96)

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] Mid-cap stocks are defined as firms falling between the 50th and 75th percentile based on NYSE breakpoints. The breakpoints are established by ranking all firms trading on the NYSE and identifying the 50th and 75th percentile values. Those values are then applied to all firms in the sample, which includes all actively traded stocks. Those firms that are above the 50th percentile, but below the 75th percentile value are eligible for IFED-M.

[b] Active return is calculated as IFED-M return minus the return on the S&P 500. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-M monthly returns against the S&P 500 monthly return.

Small-Cap Index (IFED-S)

The results for IFED-S are reported in Table 4 and support our contention that the effectiveness of our strategy compounds as the size of firm considered decreases. Over the full period, IFED-S generated a return of 20.25% versus a return of 13.07% for the Russell 2000, which results in a mean active return of 7.18%. Surprisingly, this substantial out-performance by IFED-S was accomplished with the assumption of less risk (18.50% versus 19.30%).

The mean active returns are very large and exceptionally consistent across the three environments with a low value of 6.57% (during indeterminate periods) and a high value of 7.99% (during expansive periods). The superiority in performance of IFED-S is confirmed by the observation that its Sharpe ratio nearly doubles the Russell 2000 Sharpe ratio for the overall period, and for each of the three monetary environments. Finally, the alpha values at the bottom of the table indicate that the abnormal returns are highly significant over the full period and for each monetary environment.

Table 4. Small-Cap Portfolio (IFED-S) Performance Relative to Russell 2000

Period: 1979-2017	Full Period (n=468)	Expansive (n=150)	Indeterminate (n=161)	Restrictive (n=157)
Annualized Performance Data				
IFED-S mean return (%) (IFED-S standard deviation in %)	20.25 (18.50)	21.03 (18.97)	18.55 (17.73)	21.25 (18.93)
Russell 2000 mean return (%) (Russell 2000 std. deviation in %)	13.07 (19.30)	13.04 (17.67)	11.98 (19.01)	14.21 (21.07)
Mean active return (alpha in %)	7.18	7.99	6.57	7.04
Tracking Risk (%)	8.89	9.59	8.56	8.57
Information Ratio	0.81	0.83	0.77	0.82
IFED-S Sharpe ratio	0.86	0.88	0.80	0.87
Russell 2000 Sharpe ratio	0.45	0.49	0.40	0.45
Monthly Performance Measure				
IFED-S Jensen's alpha (*t*-statistic)	0.0071*** (6.70)	0.0072*** (3.79)	0.0066*** (3.75)	0.0073*** (4.12)

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] Small-cap stocks are defined as firms falling between the 20th and 50th percentile based on NYSE breakpoints. The breakpoints are established by ranking all firms trading on the NYSE and identifying the 20th and 50th percentile values. Those values are then applied to all firms in the sample, which includes all actively traded stocks. Those firms that are above the 20th percentile, but below the 50th percentile value are eligible for IFED-S.

[b] Active return is calculated as IFED-S return minus the return on the Russell 2000. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-S monthly returns against the Russell 2000 monthly return.

Micro-Cap Index (IFED-MC)

The degree of out-performance reported in Table 5 for the Micro-Cap Portfolio is greater than what was reported in Table 4 for the Small-Cap Portfolio; however, there is not as much consistency in the superior performance. For the full 39-year period, the mean annual return of 22.81% for IFED-MC and the Portfolio's mean active return of 9.74% are truly impressive values. They are especially impressive given that IFED-MC's risk is only marginally greater than the Russell 2000 (19.75% versus 19.30%). There is considerable divergence in the out-performance across the three environments; however, as the lowest mean active return is 6.98% (during indeterminate periods) and the highest mean active return is 16.43% (during expansive periods).

The extreme divergence in the Sharpe ratios in favor of IFED-MC and the highly significant alpha values offer strong support for the superiority of the Micro-Cap Portfolio relative to the Russell 2000. The illiquidity and transactions costs associated with micro-cap stocks make them challenging to use as the basis of an investment strategy; however, the evidence in Table 5 suggests that there are large benefits associated with applying our investment strategy to this classification of equities.

Table 5. Micro-Cap Portfolio (IFED-MC) Performance Relative to Russell 2000

Period: 1979-2017	Full Period (n=468)	Expansive (n=150)	Indeterminate (n=161)	Restrictive (n=157)
Annualized Performance Data				
IFED-MC mean return (%) (IFED-MC standard deviation in %)	22.81 (19.75)	29.48 (20.94)	18.97 (19.24)	20.39 (19.07)
Russell 2000 mean return (%) (Russell 2000 std. deviation in %)	13.07 (19.30)	13.04 (17.67)	11.98 (19.01)	14.21 (21.07)
Mean active return (alpha in %)	9.74	16.43	6.98	8.18
Tracking Risk (%)	10.19	11.50	10.51	7.56
Information Ratio	0.96	1.43	0.66	0.76
IFED-MC Sharpe ratio	0.86	1.20	0.76	0.82
Russell 2000 Sharpe ratio	0.45	0.49	0.40	0.45
Monthly Performance Measure				
IFED-MC Jensen's alpha (*t*-statistic)	0.0090*** (6.31)	0.0137*** (4.66)	0.0067*** (3.09)	0.0065*** (3.86)

***, **, * identify statistical significance at the 1%, 5% and 10% levels, respectively.

[a] Micro-cap stocks are defined as firms falling below the 20th percentile based on NYSE breakpoints. The breakpoints are established by ranking all firms trading on the NYSE and identifying the 20th percentile value. This value is then applied to all firms in the sample, which includes all actively traded stocks. Those firms that are below the 20th percentile value are eligible for IFED-MC.

[b] Active return is calculated as IFED-MC return minus the return on the Russell 2000. Tracking risk is derived as the standard deviation of active return, and the information ratio is calculated as mean active return divided by tracking risk. The values are annualized from monthly return data.

[c] Jensen's alpha is the constant term in a regression of IFED-MC monthly returns against the Russell 2000 monthly return.

Performance Results Summary

Table 6 reports general performance measures for the five indexes considered in our U.S. equity analysis. The mean annual returns highlight our contention that market cap is inversely related to the efficacy of our investment strategy as the returns increase monotonically as market cap decreases from IFED-L to IFED-MC; however, risk also increases. The coefficient of variation indicates that the best risk/return tradeoff is achieved by IFED-A and the worst by IFED-S; however, the four cap-category funds report very similar risk-to-return values. In all cases, the risk/return tradeoff for each of the funds is very appealing.

Based on the information ratio, which assesses performance relative to a benchmark, IFED-MC achieves superior performance relative to the other funds. IFED-MC's information ratio is the highest by far, whereas IFED-L reports the lowest information ratio. As noted previously, transactions costs are generally relatively high for decile 9 and 10 stocks; however, the substantial performance benefits of IFED-MC may make the strategy desirable for investors that target the small-cap segment.

The maximum drawdown values for the five indexes help to alleviate any concerns that the portfolios accrue their benefits by subjecting investors to substantial downside risk. The first three funds report drawdown values that are less extreme than their benchmark; and for the first two, the positive difference exceeds twelve basis points. Relative to their benchmarks, the drawdown values for the last two funds are similar with a maximum negative difference of only eight basis points.

The superiority of the five indexes is strongly supported by their upside and downside capture ratios. The upside capture for IFED-M at 1.16 is especially impressive; however, all five ratios exceed 1.00, which are favorable values. The downside capture ratios are all notably less than 1.00, which indicates that, on a relative basis, the indexes offer considerable downside protection. Overall, for each index, the combination of an upside ratio greater than 1.00 and a downside ratio far less than 1.00 confirm that the indexes offer strong benefits without the potential for extreme underperformance of the benchmark.

Table 6. IFED Indexes Performance Summary (1979-2017)

Measure	**All-Cap IFED-A**	**Large-Cap IFED-L**	**Mid-Cap IFED-M**	**Small-Cap IFED-S**	**Micro-Cap IFED-MC**
Mean Annual Return	19.18%	17.36%	19.36%	20.25%	22.81%
Standard Deviation	15.84%	15.47%	17.07%	18.50%	19.75%
Coefficient of Variation	0.83	0.89	0.88	0.91	0.87
Active Return (Alpha)	6.66%	4.88%	6.88%	7.18%	9.74%
Tracking Risk	7.73%	7.92%	9.33%	8.89%	10.19%
Information Ratio	0.86	0.62	0.74	0.81	0.96
Maximum Drawdown	-38.60%	-37.60%	-49.70%	-57.40%	-60.3%
Benchmark Max. Drawdown	-50.90%	-50.90%	-50.90%	-52.30%	-52.3%
Upside Capture Ratio	1.10	1.05	1.16	1.03	1.08
Downside Capture Ratio	0.75	0.76	0.84	0.69	0.65

Index Allocation Characteristics

Appendix A reports allocation characteristics for the All-Cap Index (IFED-A). The data for IFED-A indicates that the index is widely diversified across industries and has a broad representation of firms. The other four indexes have similar distributional features; however, the firm and industry representation are more limited given their more refined investment universe. The portfolio turnover statistics at the bottom of the table identify the number of shifts in the monetary environment and the average length of monetary environments. A few things to keep in mind regarding these statistics are as follows: 1) An environment shift identifies a shift in investment focus; however, that does not mean all firms in the index are replaced. In many cases, firms will go from having an overweight to having an underweight in the index. Further, in some cases, a firm's weight in the index will remain static. 2) Monetary policy around the time of the financial crisis of 2008, and after, has been quite uncertain. This period, and others like it, skew the statistics toward greater turnover as policy tends to vacillate into, and out of, indeterminate conditions. 3) A shift to indeterminate conditions results in a more diminished shift in underlying stocks relative to a shift to either expansive or restrictive conditions.

Summary and Conclusions

This document presents a general description of the process used by Economic Index Associates in creating a series of equity indexes that are designed to improve on existing fund structures. Traditional smart beta and factor-based investment funds are static, one-dimensional products, whereas our approach is dynamic and multi-dimensional. The underlying portfolio for our indexes is reallocated optimally over time to capitalize on changing economic conditions. Thus, investors are not stuck with a strategy that has gone out-of-favor due to a change in economic conditions.

The newly proposed indexes, rely on two fundamental components. Component 1 involves the creation of our indicator variable, which is used to identify economic conditions when portfolio reallocation is warranted. For our indicator variable, we rely on a proprietary approach to classify Fed policy into three alternative monetary environments: expansive, indeterminate and restrictive. Component 2 involves identifying the firm metrics that allow us to best capitalize on identified shifts in the indicator variable. Based on extensive empirical and theoretical research, we identify twelve firm financial characteristics that we use to select firms that perform best during each of the three monetary environments.

We examine the performance of five alternative equity indexes that are created following our proprietary investment strategy. The strategy reallocates the portfolio when economic conditions warrant (component 1) and selects the set of equities that best capitalizes on the existing monetary environment (component 2). In other words, Fed policy shifts are used as an indicator to identify when to replace equities that prospered under the previous economic conditions with alternative equities that are more likely to prosper under the new economic conditions.

An attractive feature of our strategy is that it relies on limited portfolio rebalancing, and thus, transactions costs associated with executing the strategy are relatively low. In addition, the approach is always fully invested in a broad range of equities, which reduces the tracking risk problems associated with traditional market-timing techniques.

We find that our five equity indexes substantially outperform their corresponding benchmarks over the 39-year sample period from 1979 through 2017. For example, over this period, our all-cap index (IFED-A) earns an annual return of 19.18% versus a return of 12.52%

for the Wilshire 5000. Furthermore, the volatility of IFED-A is only slightly higher than that of the Wilshire 5000 (15.84% versus 15.17%). Our small-cap index (IFED-S) showed even greater performance superiority relative to its benchmark as it earned 20.52% versus 13.07% for the Russell 2000. Remarkably, this prominent active return was earned even though IFED-S exhibited less risk than the Russell 2000, 18.50% versus 19.30%.

Credentials of Economic Index Associates Partners

The four principals of Economic Index Associates include the three creators of the investment strategy, who are the principals of the Fed Policy Investment Research Group (FPIR Group), LLC and include Luis Garcia-Feijoo, Gerald R. Jensen and Robert R. Johnson. In 2015, these three principals published the book, *Invest with the Fed*, McGraw-Hill Education. *Invest with the Fed* presents the basis from which the investment strategy was developed. Al Neubert, the other principal, is a long time professional in the financial services industry and recognized expert in the index business. He was instrumental in creating the business model, which S&P used as the first index provider to create an index licensing business.

Luis Garcia-Feijoo, PhD, CFA, CIPM

Luis Garcia is an Associate Professor of Finance and the Coordinator of the Finance Ph.D. Program at Florida Atlantic University. Prior to joining FAU, he was a Director of Examination Development at CFA Institute from 2007-2009. His responsibilities at CFA Institute included organizing and managing all processes necessary to develop the CFA Level II and III item set examinations. Prior to working at CFA Institute, he was an Associate Professor of Finance at Creighton University.

Luis has been an Associate Editor/Co-Editor at CFA Institute's *Financial Analysts Journal* since 2012, and was the Interim Managing Editor in August 2017-May 2018 and in June-December 2014, working in consultation with the Executive Editor to make the final publication decisions for the *FAJ*. Luis has handled over 1,000 submissions during his time with the *FAJ*.

Luis has been actively engaged with the CFA Institute as a consultant, serving as a member of the CFA Institute Exam Team and a CFA Exam grader. He began his engagement with CFA Institute in 2009 and continues to serve in both capacities. Additionally, he was a member of the Board of the CFA Society of South Florida from 2009-2014, holding an Officer position from 2011-2014.

Luis is an active researcher who has published close to 30 articles in practitioner and academic journals, such as *Financial Analysts Journal*, *Journal of Portfolio Management*, *Journal of Finance, Review of Asset Pricing Studies, Financial Management, Journal of Banking and Finance, and Journal of Financial Research.* He holds the CFA designation, the Certificate in Investment Performance Measurement, and a PhD from the University of Missouri-Columbia.

Gerald R. Jensen, PhD, CFA

Gerry Jensen held a Board of Trustees Professorship and the Jones Endowed Professorship in Banking at Northern Illinois University for several years before joining the faculty at Creighton University in August 2015. At Creighton, Gerry serves as a full professor and oversees the Creighton University Student Portfolio. Gerry earned his bachelor's degree from South Dakota State University, his MBA from Iowa State University and his PhD from the University of Nebraska-Lincoln. He earned his CFA charter in 2005.

Gerry has been actively engaged with the CFA Institute as a consultant, serving as a member of the CFA Institute Exam Team and a CFA Exam grader. He began his engagement with CFA Institute in 2006 and continues to serve in both capacities.

Gerry has published over 60 academic articles in highly regarded journals including the *Journal of Financial Economics*, *Journal of Business*, *Journal of Financial and Quantitative Analysis*, *Financial Analysts Journal*, *Journal of Banking and Finance*, *Journal of Portfolio Management*, *Journal of Financial Research, Journal of Corporate Finance* and *Financial Management*. In addition, he served as an associate Editor for the *Journal of Financial Research* from 2011 to 2017.

Gerry is a co-author on the 14th edition of the investments textbook, Gerald Jensen and Charles Jones, *Investments: Analysis and Management,* Wiley Publishing, 2018.

Robert R. Johnson, PhD, CFA, CAIA, CLF

Bob Johnson was most recently the President and Chief Executive Officer of The American College of Financial Services, a non-profit, accredited, degree granting institution based in Bryn Mawr, PA. Prior to joining The College, he served as Professor of Finance in Creighton University's Heider College of Business. From 1996 to 2011, he held a number of senior executive positions at CFA Institute and was responsible for all aspects of the Chartered Financial Analyst (CFA) Program. Bob is the author of multiple books and over 80 scholarly articles on portfolio management, asset valuation, wealth management, and monetary policy. He is co-author of the books *Invest With the Fed*, *Strategic Value Investing*, *The Tools and Techniques of Investment Planning*, and *Investment Banking for Dummies*. Warren Buffett has selected *Strategic Value Investing* for the Berkshire Hathaway Annual Meeting Reading List for each of the past four years.

Bob served as editor of the *Quarterly Journal of Finance and Accounting*, served on the editorial board of the *Journal of Wealth Management*, and serves on the editorial board of the *Journal of Portfolio Management*.

Bob is a regular columnist for *The Huffington Post*, *The Hill*, and *El Mercurio* (Chile). He also periodically writes for *Fortune* and *Barron's*. He has been quoted in *The Wall Street Journal*, *US News & World Report*, *Forbes*, *CNN Money*, *CNBC*, *The Financial Times* and other prominent publications.

He is the recipient of the 2013 Alfred C. "Pete" Morley Distinguished Service Award from CFA Institute, the Robert F. Kennedy Memorial Student Award for Teaching Achievement (Creighton University), and Outstanding Faculty Member of the Year Award at Creighton for three years.

Bob holds the CFA charter, the CAIA charter, the CLF designation, a BSBA degree from University of Nebraska-Omaha, an MBA from Creighton University, and a Ph.D. from the University of Nebraska-Lincoln.

Albert S. Neubert, MBA

Mr. Neubert is considered an authority on index development and maintenance protocols. He currently serves as a consultant for the Cantor Fitzgerald ETF and Index Trading Group. He

works with Cantor to develop portfolio strategies for institutional users and to create managed ETF solutions for institutional clients. In past consulting relationships, he has developed new indexes, index-linked products, marketing and sales campaigns and business development programs. Past clients include the Sydney Futures Exchange, Calvert Group, Information Management Network, FTSE, KLD Research & Analytics, Nasdaq, Renaissance Capital Management, Dow Jones Indexes, IHS Global, INDXX and Vestek Systems.

Albert is also a senior partner in Cryptoworld LLC, a cryptocurrency and blockchain research firm and conference producer. Cryptoworld produced its inaugural Wall Street and the Internet of Money conference on March 22, 2018 in New York City.

From 2010 to 2013, Albert served as a financial advisor for Merrill Lynch's Kingston, New York branch office. He specialized in institutional and high net worth accounts and advised clients on risk management and asset allocation executed with index-linked solutions. Prior to that, he was Senior Vice President, Business Development for Information Management Network (IMN), a division of Euromoney Institutional Investor, from 2001 to 2010.

Albert served as Senior Director for Global Marketing & Business Development at Dow Jones Indexes and STOXX from 1999 to 2001. Before his assignment with Dow Jones, he was at Standard & Poor's Financial Information Services, from 1976 to 1997. At S&P, Mr. Neubert managed the S&P 500 and led the development of the S&P MidCap 400, S&P SmallCap 600 and SuperComposite 1500 Indexes. He was also involved in the creation of the S&P/BARRA Growth and Value Index series.

Mr. Neubert has authored several index-related articles for periodicals and books, including "Professional Perspectives on Indexing," "Index Design and Implications for Index Tracking," and "Indexing for Maximum Investment Results." He holds Series 7, 63 and 66 licenses and is a frequent speaker at industry conferences and seminars. Mr. Neubert has a BA in Finance from Pace University and an MBA from New York University.

Appendix A
Index Allocation Characteristics
All-Cap Index (IFED-A)

Index Feature [1979-2017]	Full Period	Expansive	Indeterminate	Restrictive
Industry & Firm Concentration				
Industry Concentration (2-digit SIC)				
Average weight in most represented industry	10.16%	9.39%	5.62%	6.54%
Minimum number of industries represented in index	30	35	30	32
Firm Representation in Index				
Average number of firms	202	200	201	203
Minimum number of firms	160	160	161	162
Portfolio Turnover				
Number of environment shifts	91	To Exp. = 25	To Ind. = 43	To Res. = 23
Average length of environment	5.3 months	5.81 months	3.8 months	6.5 months