Nasdaq's Equity Index for an Environment of Rising Interest Rates

Introduction

Nearly ten years after the financial crisis, an unprecedented period of ultra-low interest rates appears to be drawing to a close. A natural question for equity investors is how this change will impact equity valuations. Of additional interest is the extent to which the impact might differ across types of securities or sectors. Based on research around this topic, Nasdaq offers the Nasdaq US Large Cap Equities for Rising Rates Index (NQERR). NQERR comprises large-cap U.S. equity securities that have exhibited historically high positive correlation to changes in interest rates. The index aims to take advantage of rising rates within the confines of full equity exposure. Such a strategy involves holding securities expected to be positively impacted by higher rates while avoiding securities negatively impacted by higher rates.

This white paper provides background information on the motivation behind the construction of NQERR. NQERR may be considered an example of a 'smart beta' index in that it adheres to a rules-based methodology that results in focused exposure to a finite number of securities while eschewing traditional market-cap weighting. NQERR uses a selection and weighting scheme based on recent correlations with 10-year U.S. Treasury yields, with components and weights updated every quarter.

The components for NQERR are drawn from Nasdaq's large-cap U.S. equity benchmark: the Nasdaq US 500 Large Cap Index (NQUS500LC). The first step in index construction is to identify those sectors most positively correlated to 10-year yields.[1] Only securities in the five (out of 11) sectors with the highest correlation are considered for further evaluation. Within each of these five sectors, the 10 securities with highest historical correlation are selected for inclusion, resulting in 50 index components at each evaluation. The weights assigned to each component are tied to sector membership, with those 10 components in the highest correlated sector each receiving an initial weight of 3% each. The components in the second-highest sector receive a 2.5% weight. Weights for components in the 3rd-5th ranked sectors have weights of 2%, 1.5% and 1%, respectively.

Summary

- Nasdaq has introduced an equity index designed to perform well when interest rates increase.
- The index selects and weights components based on historical correlations to the 10-year U.S. Treasury yield.
- The methodology analyzes correlations at the sector and individual security level.
- Back-test research indicates that sector classification offers substantial explanatory power regarding correlations.
- Research has also shown that the observed correlation used to select and weight index components tends to persists in the near-term.
- The ProShares Equities for Rising Rates ETF (EQRR) tracks the Nasdaq US Large Cap Equity Rising Rates Total Return Index (NQERRT).

BY JEFFERY SMITH AND EUGENIO PIAZZA, NASDAQ ECONOMIC RESEARCH

Theoretical Framework

The role of interest rates in equity valuations is foundational. In theory, the value of a security is the market's perception of the present value of future earnings, with benchmark interest rates providing a key input as to the appropriate rate for present-value discounting.

Relevant for purposes of this white paper are the ways in which a change in rates has varying impacts on different types of securities. This question has been addressed in the academic finance literature. For example, Bernanke and Kuttner suggest that investors' reactions to monetary policy surprises tend to affect mostly securities belonging to the Technology and Telecommunications sectors, while securities belonging to the Energy and Utilities sectors seem to be the least affected by the Fed's decisions. Moreover, Jansen and Tsai show that returns of firms in Transportation and Communication are most strongly impacted by surprise changes in monetary policy.[2] Another strand of literature considers the differing impact of interest rates on value and growth securities.[3] Regardless of the approach taken, the academic literature shows a variable relationship between equities and interest rates, and sector classification persists as a frequent theme in explaining this heterogeneity.

Sector-Level Analysis

As noted above, the construction of NQERR follows a two-step approach, with the first step involving analysis of sector-level correlations. Implicit in this approach is the idea that certain fundamentals of a security relevant to interest-rate sensitivity can be accounted for by sector membership. For instance, Utilities tend to be characterized as providing relatively stable current distributable cash flow. Other sectors, such as Technology, tend to be valued more on future cash flows associated with forecasted growth in earnings. Such differences result in systematically different reactions to interest rate changes.

Evidence for a systematic 'sector' effect was analyzed statistically using a regression framework applied to historical correlations. Mirroring the index methodology, correlations between weekly changes in the 10-year U.S. Treasury yield and returns of Nasdaq US Large Cap Sector Indexes were computed from a set of five non-overlapping three-year periods. (The sample data ran from March 2001 through March 2016.) The correlations were regressed on Sector dummy variables (i.e., 0/1 indicator variables) as well as dummy variables indicating the specific 3-year period. As Table 1 shows, the regression indicated that 27% of the variation in security-level correlation was explained by sector, a result that easily met the standard for statistical significance.

Regression Analysis of Variance: Correlations with 10-Year U.S. Treasury Yield

FACTOR	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARED	F VALUE	PR(>F)
Sector	10	0.647	0.065	5.470	0.000
Date	4	1.246	0.311	26.339	0.000
Residuals	40	0.473	0.012		
Total	54	2.366			
Explained by Sector		27.34%			

Figure 1 below shows the average correlation of each sector index to the 10-year U.S. Treasury yield, illustrating the substantial variation that exists across sectors.

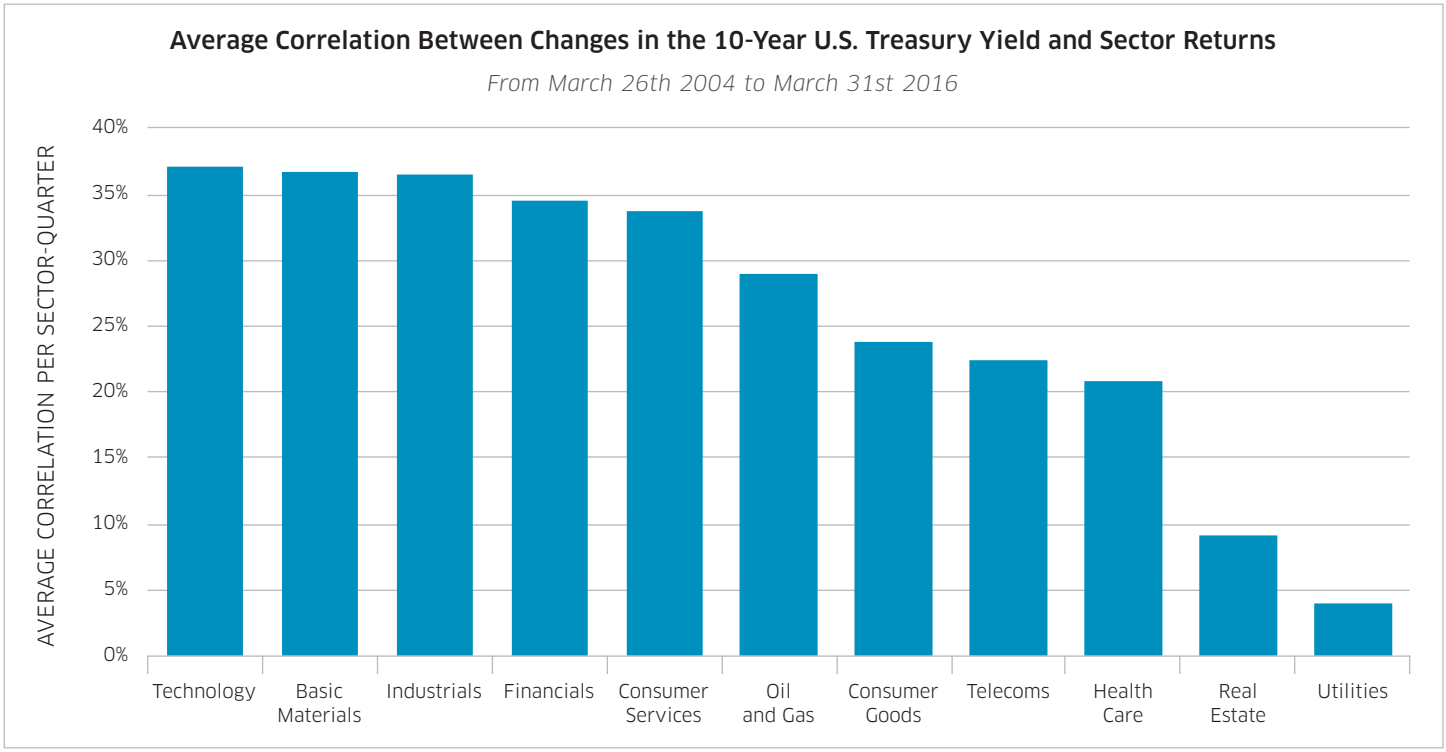
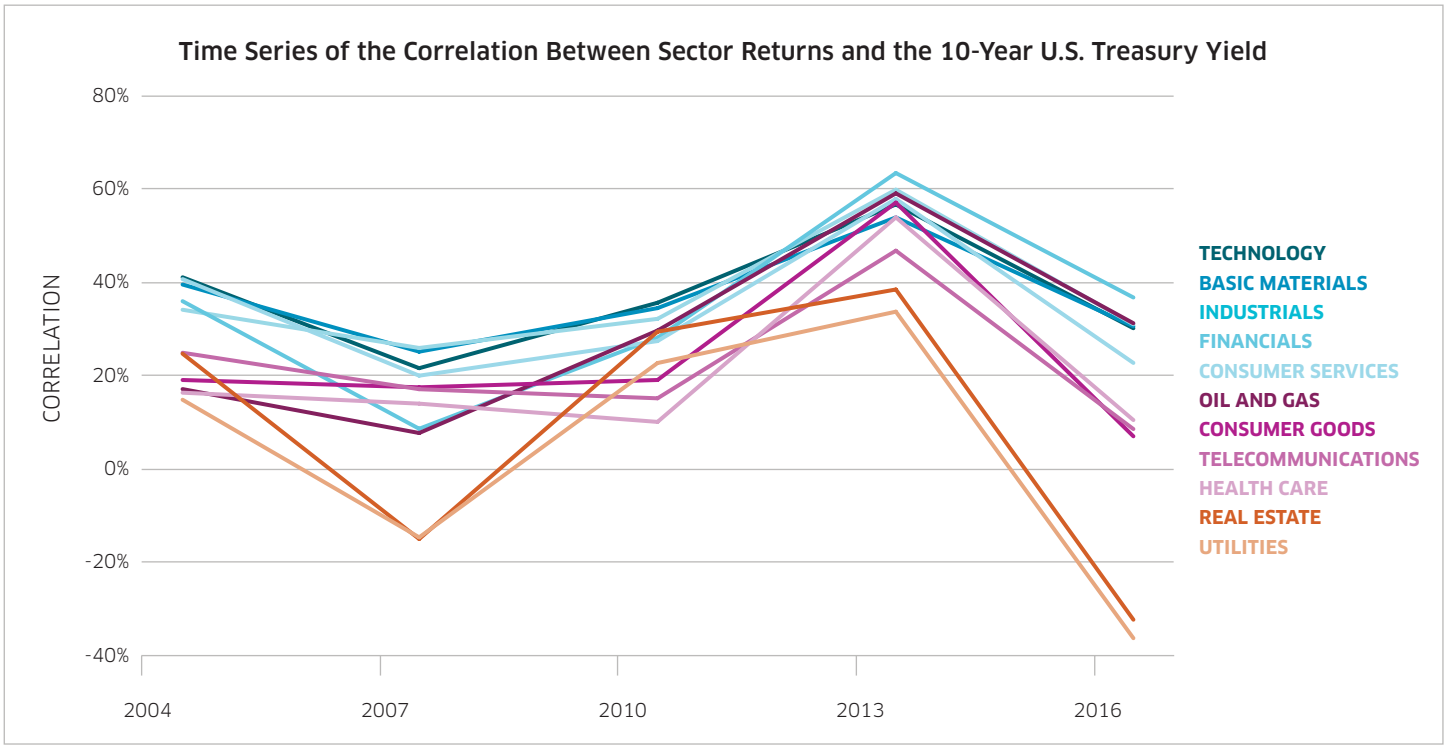


Figure 2 plots these same correlations over time. Correlations are plotted for each of five three-year non-overlapping periods, with the first such period ending in March 2004.



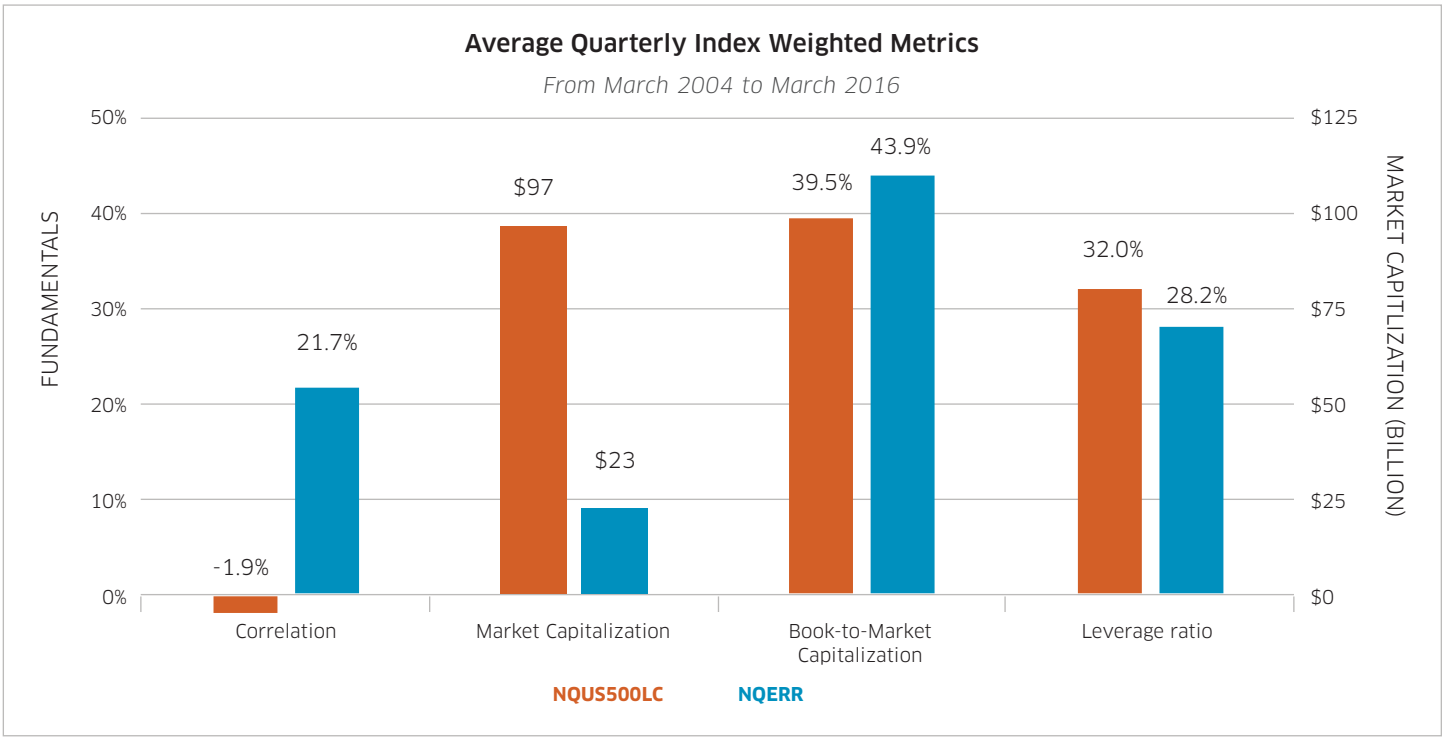
Note the color scheme of the eleven lines in the figure. The lines in orange, representing Utilities and Real Estate, have tended to be–though not always–the sectors with the lowest correlation to the 10-year yield. By contrast, the lines in blue, representing the sectors indicated in the legend, have tended to be–though again not always–the sectors with the highest correlation.

There are a number of conclusions derived from the figure. First, we see variation over time in the average level of correlation, presumably reflective of some type of macro-level effect. During this sample period, the 3-year period ending in 2013 exhibited the highest level of correlations. Secondly, we see that the relative ordering of sector-level correlations tends to be fairly consistent over time, even as correlations across the whole of the equity market moved higher or lower. This is indicative of fundamental sector-level effects. Finally, which the relative ranking of correlations tends to be consistent, it does in fact vary somewhat, indicating the need for periodic evaluation.

Overall Impact of NQERR weighting

The NQERR methodology result in a set of alternative weights applied to a select subset of the benchmark (i.e., NQUS500LC) components. A useful way to illustrate the impact of the alternative weights is to compute index-weighted averages of component characteristics, comparing the averages produced using the benchmark components and standard (i.e., market cap) weights with those produced using NQERR components and weights. Using index weights in computing averages is instructive since the index weight is reflective of a given index component's attribution to the fundamental characteristics and performance of the index.

Figure 3 shows comparative index-weighted averages for four key metrics. The analysis is based on averages computed over the 2004-2016 sample period using the contemporaneous weights and components from the benchmark NQUS500LC index as well as NQERR.



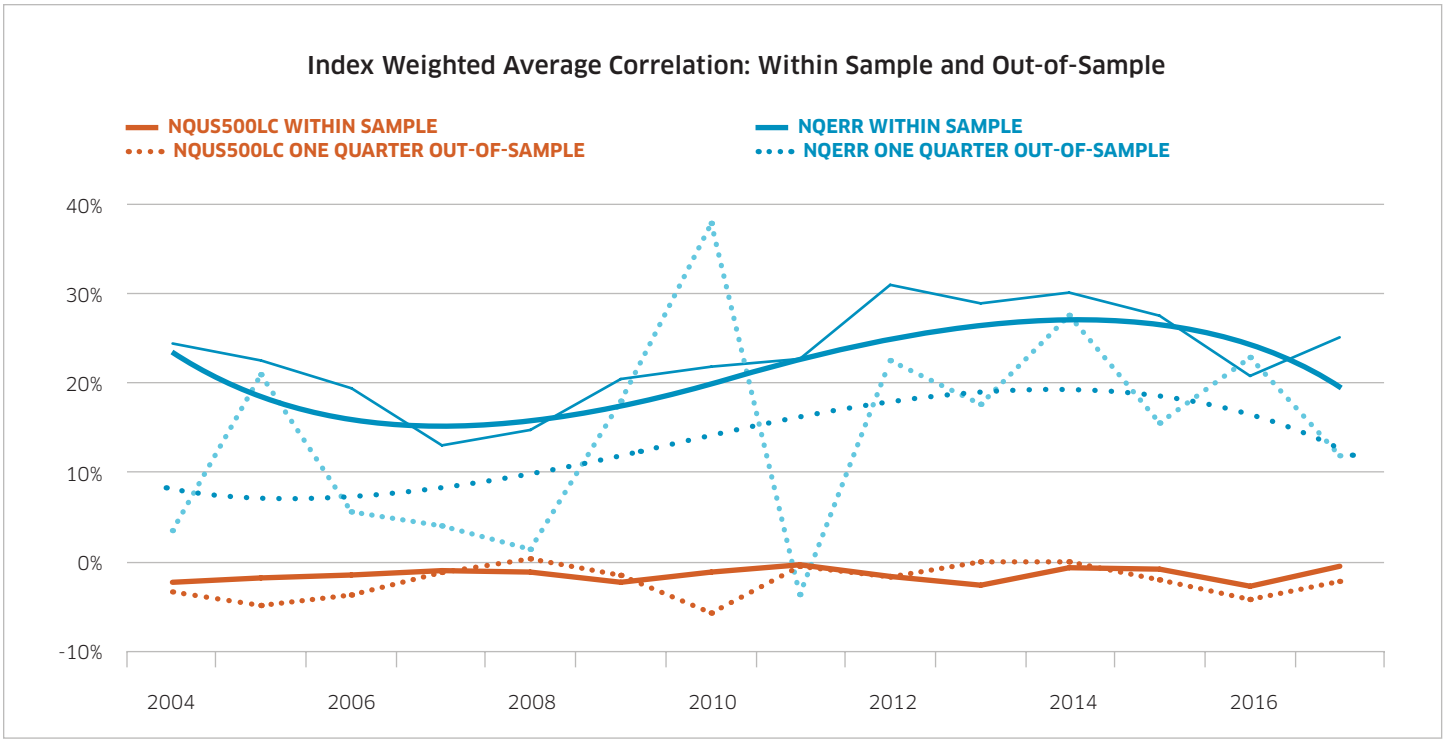
Note first the difference in average correlation. The NQERR-weighted average for its components was 21.7% compared with -1.9% for the benchmark generally. This difference represents the value offered by the NQERR methodology: while the benchmark has essentially no correlation with 10-year yields, by design NQERR does.

It is interesting to see the impact of the weighting differences on other metrics. Consider next the differences in weighted average market capitalization. Not surprisingly, the market-cap weighted benchmark results in a very high weighted average of market cap itself, about $97 billion. By contrast, NQERR, using its tiered equal-weighting structure, produces an average component market cap of only $23 billion. NQERR weights smaller securities much more heavily than the benchmark.

Two other metrics related security fundamentals are shown. The Book-to-Market Value ratio is often used as a measure of 'value,' with higher ratios indicative of more value. NQERR tends to exhibit enhanced levels of value compared with the benchmark, though the difference is not large. The Leverage of a security is defined here as Long-Term Debt relative to Market Value. NQERR tends to weigh less levered securities more heavily, but the difference is not large.

The correlation results shown in Figure 3 may be thought of as being 'within sample,' which is to say they reflect the time period considered at the quarterly evaluation of the index. From an investor perspective, however, what matters is not so much the within sample historical correlation, but the 'out-of-sample' correlation. The out-of-sample period represents the three months that the index actually holds the components selected at each evaluation, and thus the veracity of the index depends on the on whether the within sample correlation persists into the out-of-sample period. Put another way, do correlations estimated using historical data have a predictive relationship vis-à-vis future realized correlations?

Figure 4 provides evidence addressing this question. The construction of the figure proceeds as follows. For a given point in time, the historical index-weighted correlation was determined, based on the previous three years of data (mirroring the index methodology, and similar to what was done with Figure 3). The correlation for the future quarter was then calculated, using the same index weights—an out-of-sample result. The figure shows results for 12 points in time (end of March of each year) for both NQERR and the NQUS500LC benchmark. The figure presents both the actual computed values as well as a smoothed overlay of the computed values. (Smoothed values indicated with the heavier line.)



Consider first the NQERR-weighted averages, shown with the blue lines. As would be suggested by results from Figure 3, the within-sample average correlations (solid blue lines) vary over time but tend to average around 20%. The computed out-of-sample average correlations (thin dotted line) are relatively noisily, fluctuating both above and below the within-sample averages. The relatively higher variability in the out-of-sample results is largely due to differences in sample size, as the within sample observations are representative of 12 quarters of data while the out-of-sample observations represent a single of quarter data and thus are more susceptible to outliers. The smoothed out-of-sample trend line (heavy dotted-blue line) indicates, however, that the out-of-sample average correlations tend to be between 5% to 10% lower than the within-sample values. Still, these values are well above zero and significantly larger than those of the NQUS500LC benchmark. By contrast, consider the orange lines, which represent correlations using benchmark weights. Not surprisingly, the within-sample correlations out-of-sample averages are slightly negative, suggesting the benchmark exhibits no discernable relationship with movements in interest rates. On the basis of these results, it can said that the historical correlations used to select and weight NQERR components do in fact tend to produce an index with consistently superior future interest rate correlations.

Endnotes

1. Additional details on NQERR methodology as well as historical back-test values may be found at https://indexes.nasdaqomx.com/Index/Overview/NQERR. NQERR uses the Industry Classification Benchmark (ICB) system as published by FTSE Russell. The highest level of categorization used by ICB is termed "Industry." This white paper, however, uses the term "sector" to refer to ICB industry, following common practice. Real Estate is broken out of the Finance sector and treated as its own sector.
2. See Ben S. Bernanke and Kenneth N. Kuttner (2005) What explains the Stock Market's Reaction to Federal Reserve Policy?, The Journal of Finance, Vol. 60, No 3, pp.1221-1257; and Dennis W. Jansen and Chun-Li Tsai (2010) Monetary policy and stock returns: Financing Constraints and asymmetries in bull and bear markets, Journal of Empirical Finance, Vol. 17, pp. 981-990.
3. See Martin Lettau, and Jessica A. Wachter (2011) The term structures of equity and interest rates, Journal of Financial Economics 101, 90-113; and Abraham Lioui, and Paulo Maio (2014) Interest Rate Risk and Cross Section of Stock Returns, Journal of Financial and Quantitative Analysis Vol. 49, No 2, April 2014, pp. 483-511.

More Information

For more information on the Nasdaq US Large Cap Equities for Rising Rates Index (NQERR) please visit www.business.nasdaq.com/indexes.