

Introducing The Nasdaq Innovators Completion Cap Index™: Small Caps For the Innovation-Driven Economy of Tomorrow

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The Nasdaq Stock Exchange was established in 1971 as the world's first fully electronic exchange, and immediately began attracting IPOs from some of the most innovative companies in the world. In 1985, the Nasdaq-100® Index (NDX®) was launched, tracking 100 of the largest domestic and international non-financial companies listed on Nasdaq. Over the course of several decades, many of the world's largest companies have gained entry to NDX, including Intel, Apple, Microsoft, Cisco Systems, Alphabet, Amazon, Meta Platforms, NVIDIA, and Tesla. Investors in products tracking NDX have been handsomely rewarded, with total return performance more than doubling that of the S&P 500 over the span of the past decade and a half (590% vs. 242% respectively, trailing 15 years total returns as of June 30, 2022). A major driver of this outperformance has been an outsized focus by Nasdaq-100 companies on innovation, specifically R&D and other investments into intangible assets. Whether measured by R&D expenditure as reported on company financial statements, by patent filings, or by other methods, the "innovation gap" between the Nasdaq-100 and the S&P 500 has been consistent and substantial, despite the growing overlap between the two indexes.

In August 2020, Nasdaq launched the Nasdaq Next Generation 100 Index™ (NGX™) to track the next 100 largest domestic and international non-financial companies listed on Nasdaq. NGX serves as a natural extension of NDX, from the realm of the biggest large cap Nasdaq innovators into a hybrid of smaller large caps and true midcaps. Its history of constituents is chock-full of storied companies such as Tesla, Netflix, DocuSign and CrowdStrike that have graduated from the ranks of NGX up to NDX. Beyond those two indexes, more than 3,500 other Nasdaq-listed companies exist within the broad-based Nasdaq Composite™. With the inexorable rise of intangible assets in the 21st century, the next logical benchmark to extend the "innovation suite" would have to focus on small-cap companies – but with an intuitive screening process to identify the most innovative subset among them.

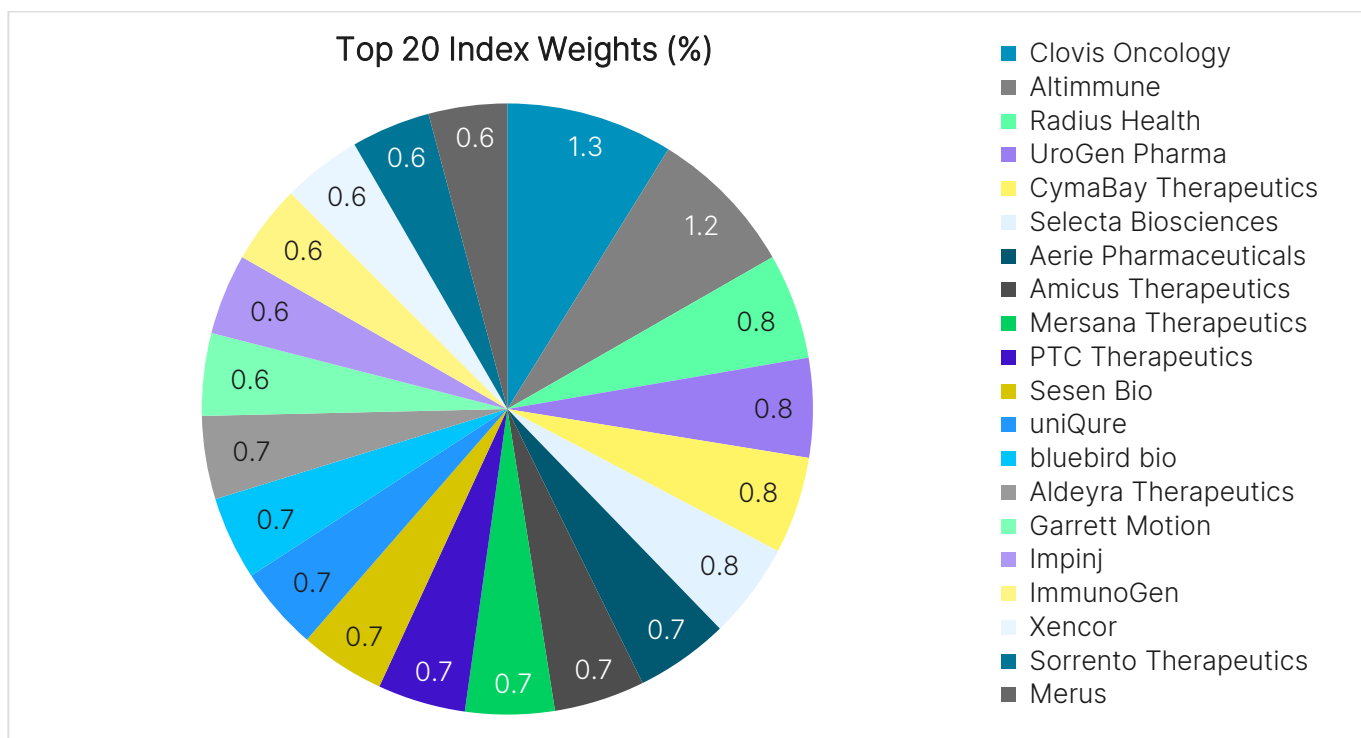
The Nasdaq Innovators Completion Cap Index (NCX™) was launched on June 7, 2022, to track the performance of 200 Nasdaq-listed companies outside of NDX/NGX. Specifically, NCX's methodology leverages a third-party dataset built by IPR Strategies¹ – a leader in the science of patent valuation – to identify the 200 non-NDX/NGX companies listed on Nasdaq that have the highest-valued patent portfolios in relation to their market capitalizations (excluding Financials). The index uses equal weighting, and is reconstituted semiannually in June and December with additional quarterly rebalances in March and September. Constituent securities must have minimum market caps of \$100 million, minimum three-month average daily traded volume of \$1 million, and three months of trading history (i.e. seasoning) to be eligible for inclusion. Beyond excluding Financials (based on ICB Industry), REITs and other Open End/Miscellaneous Investment Vehicles listed on Nasdaq are ineligible as well. In addition to common stocks and ordinary shares, American Depositary Receipts (ADRs) are eligible for inclusion. Let's first take a look at the composition and recent performance of the index, before analyzing its backtested

¹ <https://www.ipr-strategies.com/>

returns dating back to December 2011; its factor sensitivities; competitive positioning against similar products; and fundamental characteristics.

Index Composition and Recent Performance

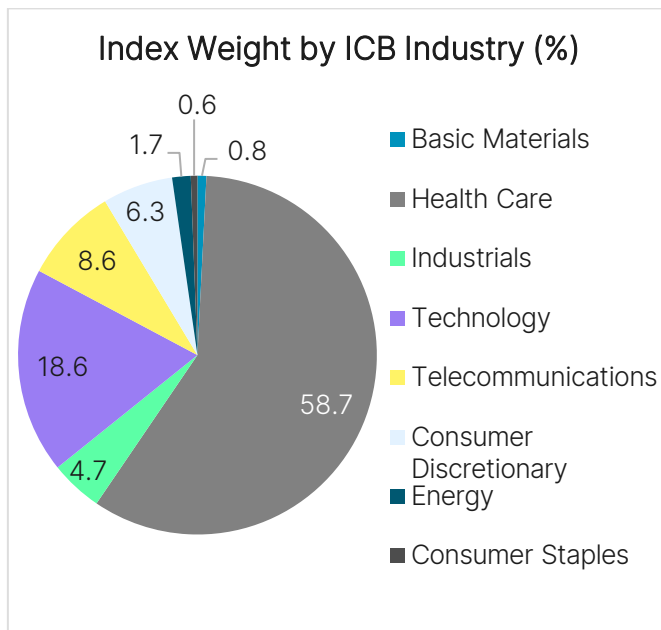
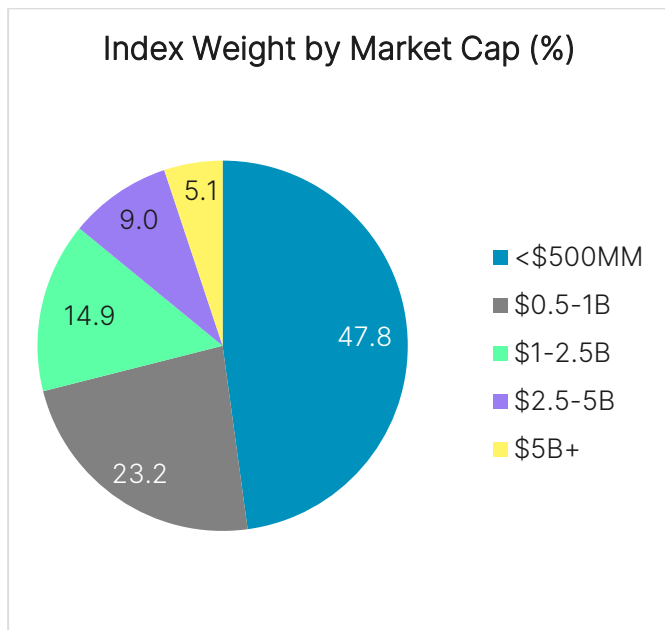
Following the most recent reconstitution in June 2022, NCX has maintained a pronounced sector tilt towards Health Care, representing nearly 59% of total index weight. Of the 109 Health Care names in the index, 70 fall within the Biotechnology subsector per ICB. And of the top 20 names in the index, 16 are Biotech companies, two are Pharmaceuticals, and the remaining two fall within Consumer Discretionary and Technology. Nasdaq has long been the undisputed home of biotech listings in the US, with a 97% share of the market over the past decade, and nearly 700 such listings in total. The past two years have been particularly active in terms of biotech IPO activity, as evidenced by the growing ranks of the Nasdaq Biotechnology Index™ which saw annual new additions of at least 100 constituents in both 2020 & 2021. Note that the top two names below – Clovis Oncology and Altimune – possess outsized weightings thanks to their incredible recent performance, up 159% and 131% for the month of June, respectively.



As of June 30, 2022

In terms of the remaining sector exposures, Technology ranks second-largest at nearly 19%, while Telecommunications, Consumer Discretionary, and Industrials round out the top five. As with NDX/NGX, NCX features minimal or zero exposure to companies operating in the Energy, Basic Materials, Utilities, Financials, and Real Estate sectors.

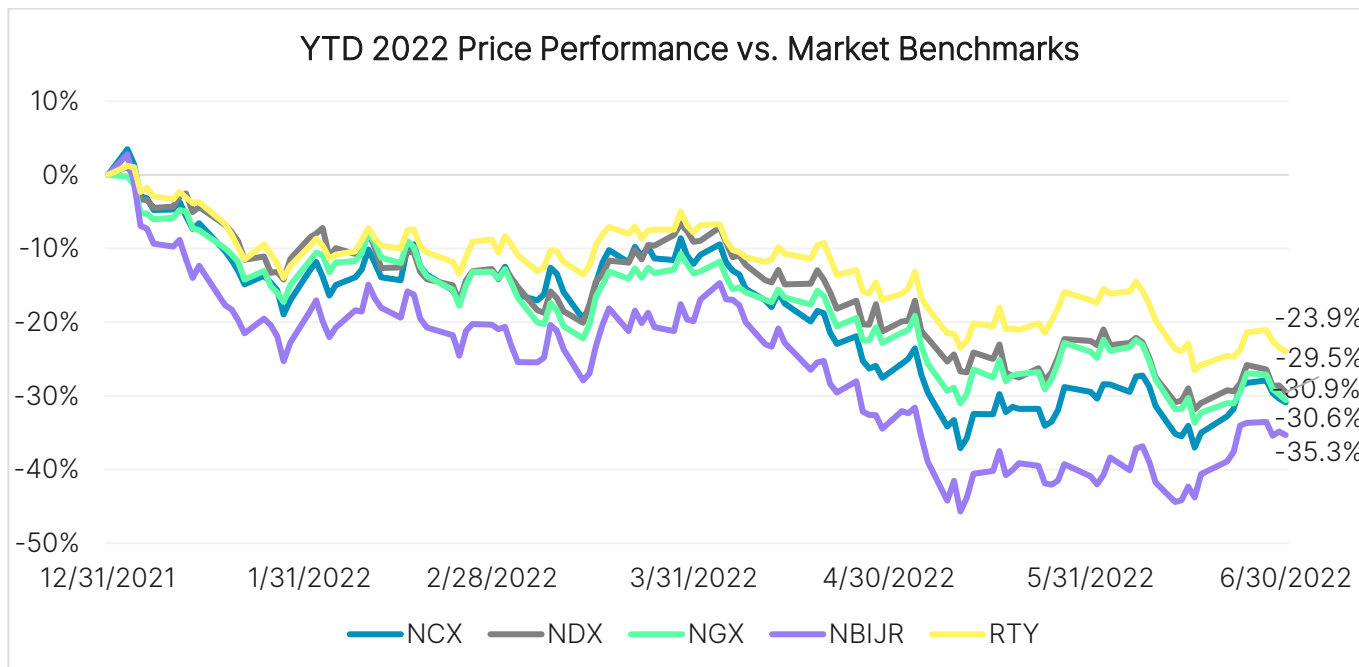
In terms of exposure to the size factor, the index derives nearly half of its weight from companies with market caps under \$500 million, and nearly a quarter from the next segment between \$500 million to \$1 billion. It is thus mostly a small/microcap index, but with some exposure to midcaps as well. Among its largest constituents, Dropbox is probably the best-known with a recent market cap of \$6.15 billion, while only two constituents possess market caps in excess of \$10 billion. The median market cap was \$555 million as of June 30, 2022, while the weighted average was \$1.27 billion and the simple average was \$1.34 billion.



As of June 30, 2022

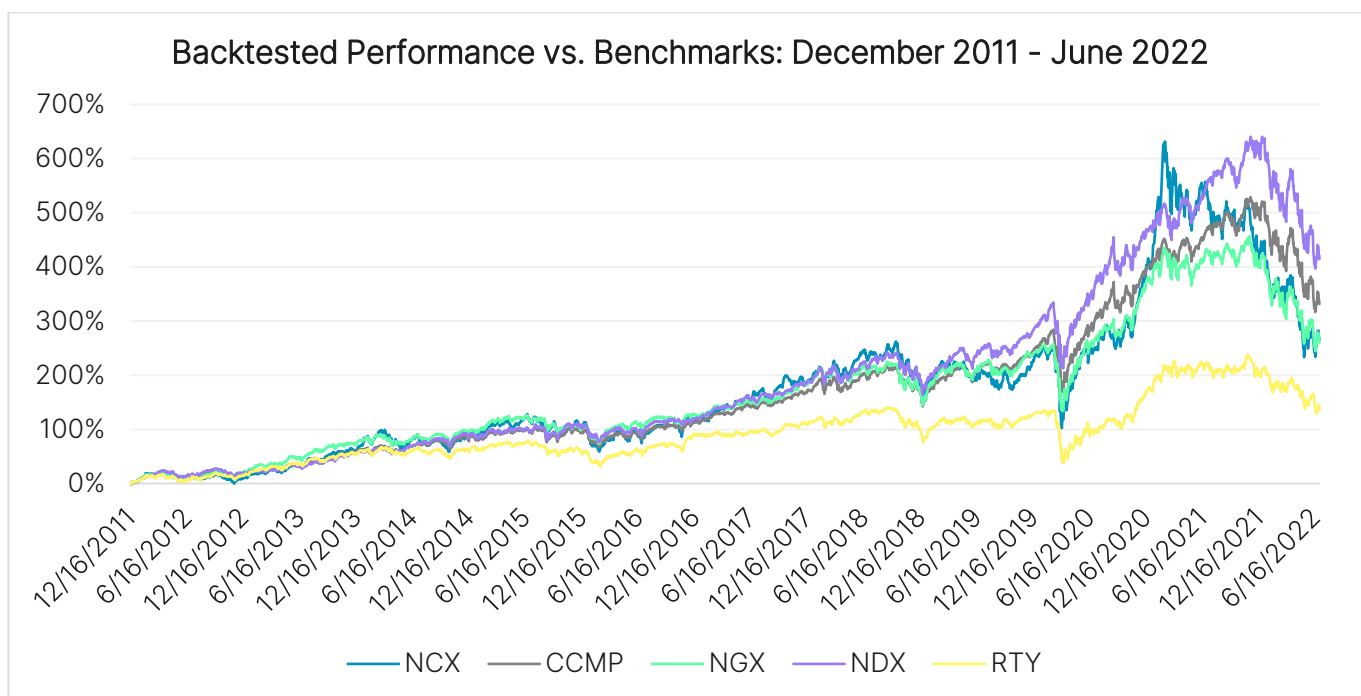
Finally, in terms of geographic exposure, the index has an international allocation of approximately 10% – in between those of NDX which typically tops out around 5%, and NGX which has sometimes approached 20%. 19 companies across mostly European countries, plus Taiwan and Israel, were part of the index as of June 30, 2022.

So far in 2022, index performance has been mostly in-line with NDX/NGX, down 30.9% on a price-return basis as of June 30. This underperformed the Russell 2000 Index (RTY) of small-cap companies by approximately 700 bps, but outperformed the Nasdaq Junior Biotechnology Index™ (NBIJR™) by approximately 440 bps. Biotech in particular has been hit hard by the recent regime change with respect to inflation, interest rates, and overall macroeconomic backdrop. Given its disproportionate emphasis on R&D in anticipation of future revenues and earnings, it is not a surprise that the biotech industry was one of the first to correct downward in 2021 along with other more speculative areas of growth equities.



Backtested Performance Analysis

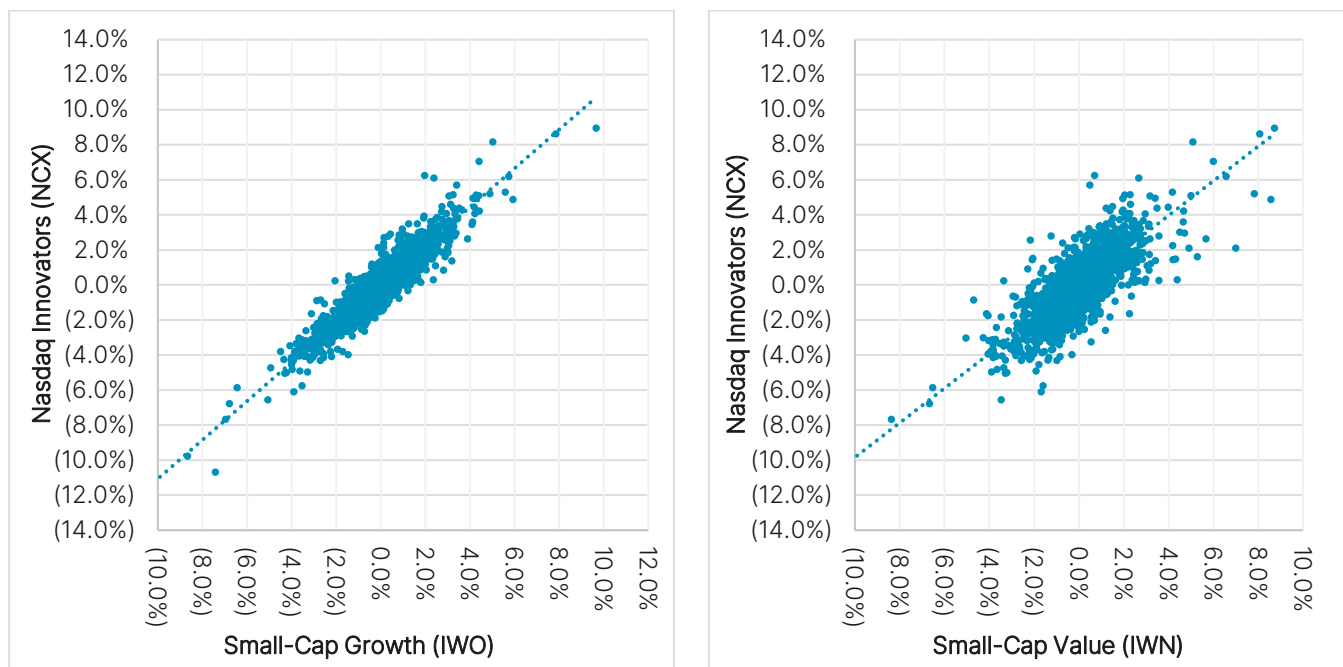
NCX's backtest extends in excess of 10 years to December 16, 2011. With that length of history, one can easily observe the performance differential vs. the Russell 2000. At the same time, the overall performance trajectory is much more in line with NDX, NGX, and the Nasdaq Composite (COMP™). While NDX remains the overall performance leader with a cumulative price return of 414% as of June 30, 2022, NCX briefly outpaced its large cap rival in late 2020 through its peak in February 2021. NCX has since corrected downward by about 50%, producing a cumulative price return of 266% (283% factoring in dividends) for the period, just above that of NGX at 260%. Given its sizable allocations to the largest Nasdaq-listed companies, COMP came in noticeably higher at 332%. The Russell 2000, however, increased by only 137% (172% factoring in dividends). Thus even with a much more severe correction over the past 16 months, NCX has still generated an annualized equivalent total return of 13.6% since the beginning of its backtest vs. only 10.0% for the Russell 2000.



As interest rates have risen, almost none of the growth segment of the equity market has remained immune to the downward pressure on valuations. Since NCX peaked, the Russell 2000 Growth Index has underperformed the Russell 2000 Value Index by almost 27 percentage points on a price return basis. The higher interest rates go, and the more a company's earnings are concentrated far into the future, the greater the damage to present values. Yet there is an interesting twist to the methodology of NCX, which perhaps can explain why – despite its similarly high allocation to unprofitable companies – it has been outperforming products such as the ARK Innovation ETF (ARKK), the Blackrock Future Tech ETF (BTEK), the Goldman Sachs Future Tech Leaders ETF (GTEK), and the Direxion Moonshot Innovators ETF (MOON). Its average outperformance with respect to these four is in excess of 16%. (The most recently launched product in the group was GTEK, on September 16, 2021, and it does not track an index with backtest history.)

Index/ETF Ticker	NCX	ARKK	BTEK	GTEK	MOON
Total Return from September 16, 2021 – June 30, 2022	-38%	-66%	-50%	-43%	-59%

NCX's methodology selects the highest-ranking companies within its universe based on the ratio of total patent value to market capitalization. With an average equity beta of 1.13 for the portfolio's constituents, the sensitivity of the denominator to large market movements is significant – while a ratio using accounting-based values such as total assets or total shareholder equity is much more stable quarter after quarter. Thus there is a built-in correction mechanism at each reconstitution, away from the companies whose market values have climbed the most on a relative basis to their patent values, and towards those for which the inverse has occurred. This is not to say that NCX is a value strategy; it most certainly is not. One quick way to determine its style drift is by looking at the spread of daily returns vs. the small-cap Russell 2000 Growth and Value products. The tightness with respect to the former is much more apparent than to the latter:



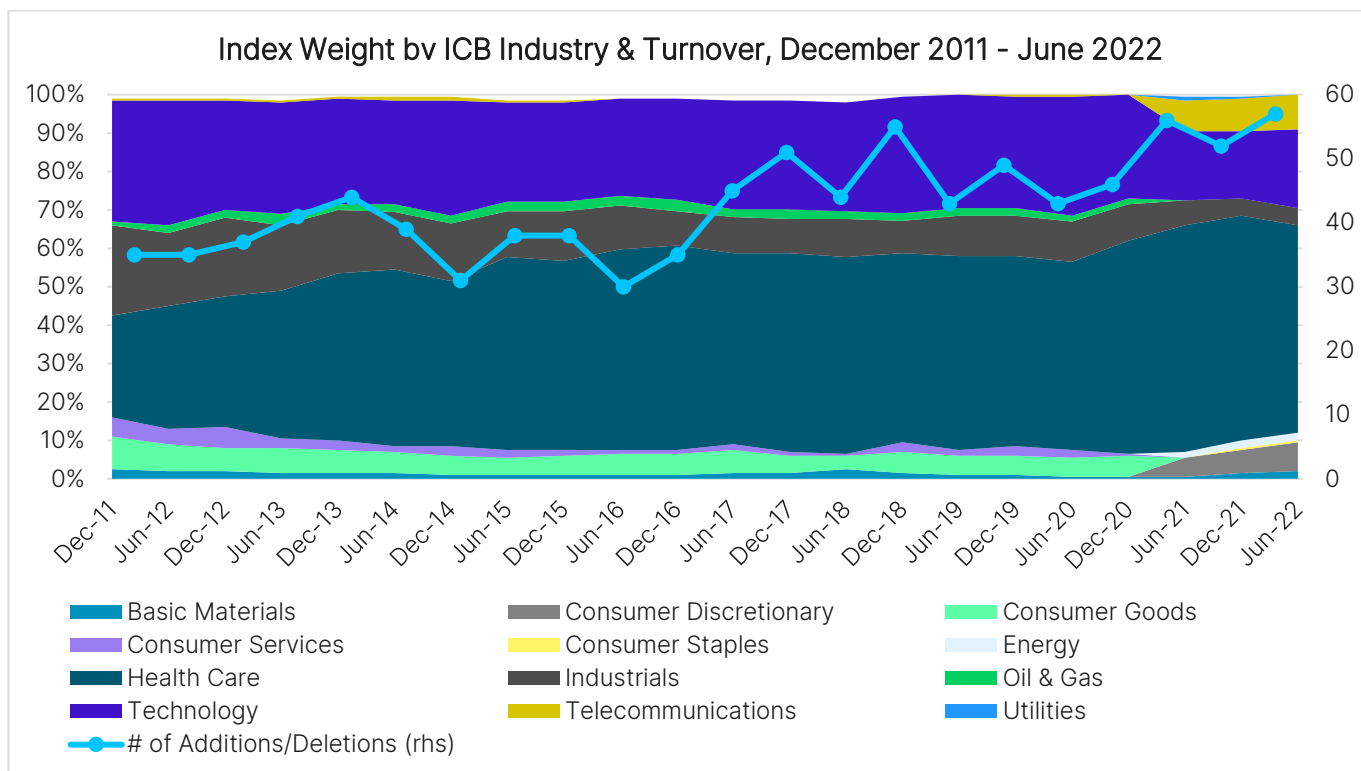
Daily returns from December 19, 2011 – June 7, 2022

Overall, the correlation with small-cap growth (IWO ETF) measures at 0.94 vs. 0.81 with small-cap value (IWN ETF). And in terms of tracking error, NCX measures at approximately 60 bps vs. growth, 38% lower than the 97 bps observed vs. value. All that being said, the impact of normalizing patent value by market cap serves the important purpose of identifying companies which the market may be undervaluing – at least with respect to patents – both on the way up, and on the way down. In other words, companies with highly-valued patent portfolios that have been rewarded by investors through soaring market caps will naturally cycle out of the index, replaced by those yet to be similarly rewarded. On the way down, companies that have overcorrected – i.e., where the market may have overshot on the downside, without an accompanying decrease in patent value – may find their way back into the index, providing additional upside potential. Of course, it is all relative. If the number of companies with rising ratios driven by increasing patent valuations exceeds the group whose ratios are rising as a function of falling market caps, then there will be less “reversion” with the index’s constituents and more of a rebalancing towards the newest patent leaders. The exception to this general rule is when there is a pronounced downtrend in the market impacting the index’s smallest constituents. Once they breach the minimum market cap threshold of \$100 million, they are automatically removed from the index at the next reconstitution, no matter how much higher their patent value ratios have shot up.

In the most recent reconstitution in June 2022, there were 53 deletions, of which 49 were due to failed eligibility criteria, with 35 specifically due to market cap. Only four deletions were due to a patent/market cap ratio falling out of the top 200 ranks – and this small group turned in a much different level of performance in the preceding six months, up 15% vs. an average loss of 49% for the other deletions.

Index/ETF Ticker	Count	Average Price Return, L6M	% Change in Patent Values YoY
Additions	57	-44%	+14%
Deletions (Failed Eligibility Criteria)	49	-49%	+18%
Deletions (Weaker Ratio Rank)	4	+15%	+16%

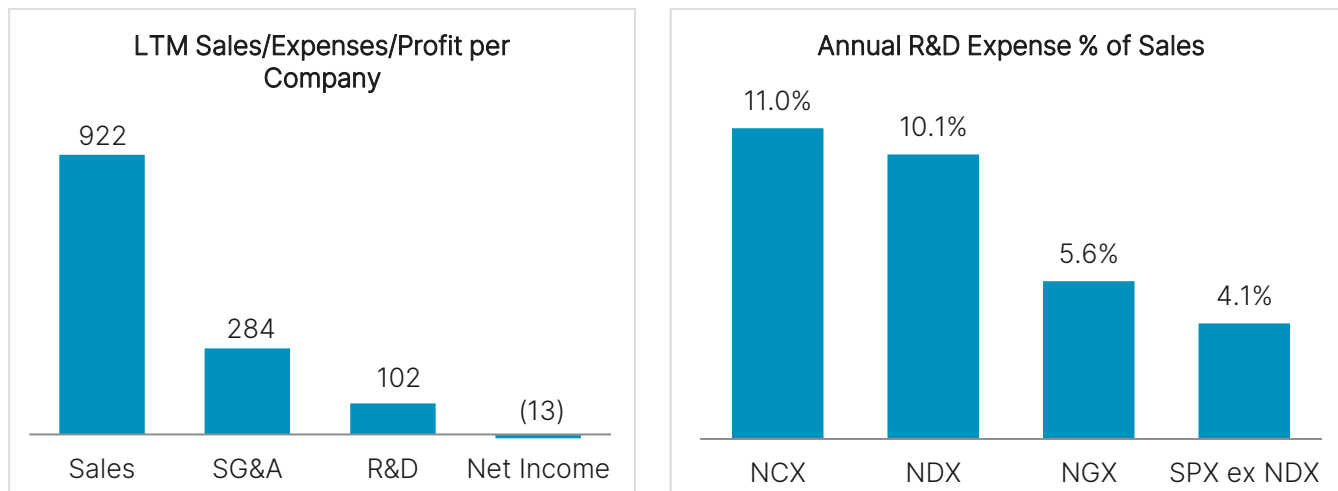
This level of index turnover is rather elevated vs. the historical average of approximately 43 new additions / deletions per semiannual reconstitution during the entire backtested period. (To be even more precise, there were 57 new additions in June 2022, accounting for four additional deletions that occurred intra-reconstitution due to corporate actions such as M&A activity – 35% more than the average for all prior periods.) The below chart shows the elevated rate of index turnover over the past three semiannual reconstitutions, reflecting widespread, sharp price corrections within much of the small-cap growth universe. Also visible in the chart is the steady growth of the Health Care sector as a percentage of index weight, which peaked at 59% in June 2021 – more than twice as high as its share in December 2011.



The Importance of R&D in Today’s Intangibles-Driven Economy

We can further think about the index’s factor exposures in terms of its constituents’ underlying financials and key fundamental ratios. Overall, the index’s constituents are not yet profitable, and spend considerably on R&D. The average NCX constituent generated a net loss of \$13 million on trailing 12-month revenues of \$922 million (as of June 30, 2022). On average, \$102 million was reinvested back into R&D, equivalent to 11% of total sales. This was close to matching the R&D reinvestment rate for the Nasdaq-100 – a perennial leader in innovation – which measured at 10.1% in 2021. It was also double the rate of R&D investment across the Nasdaq Next Generation 100 Index, and nearly triple the rate among the portion of the S&P 500 Index that does not overlap with the Nasdaq-100. The high level of R&D spend is consistent with a growth strategy, wherein the majority of companies are focused on present-day investment that hurts short-term profitability, but lays the groundwork for long-term competitive advantages, growth, and eventual profits. This theory does not play out 100% of the time, but does

have some excellent examples in the form of Tesla (NCX constituent at inception in December 2011), Meta Platforms (June 2012), and Advanced Micro Devices (June 2015) – all of which are now megacap members of the Nasdaq-100.



LTM financial data for NCX constituents as of June 30, 2022, including R&D % of Sales. NDX/NGX/SPX data as of FY'21.

Health Care's share of the index has been steadily growing over the past decade. Thus it may not be surprising that NCX is an outperformer in terms of R&D, as the equivalent revenue-based ratio for the Nasdaq Biotechnology Index can exceed 30%. If we exclude the 85 biotech and pharmaceutical companies from aggregate index financials, the remaining group of 115 NCX constituents generated an average net income of \$33 million on \$853 million of revenue, good enough for a 3.9% profit margin. The R&D reinvestment rate drops to 5.8%, still in-line with the innovation-tilted NGX average of 5.6%. This is an intuitive result, knowing that 73 of the 85 biotech/pharma names in the index generated a net loss in the most recent 12 month period, while spending more than \$9.5 billion on R&D as a group. (52 of them spent more on R&D than they brought in with topline revenue.)

The biotech business model is well known for focusing intensely on R&D for many years until a breakthrough product receives approval from the FDA following extensive periods of clinical trials, safety testing, and the like. It is thus important to understand that NCX effectively functions as two-indexes-in-one: a small-cap biotech, plus a tech-heavy small-cap benchmark with other innovation-driven sectors layered on. Given biotech's outsized emphasis on patent development as part of individual company business strategy and overall sector value, it is expected for an index built around patent intensity to allocate a substantial portion of its weight to the space. In an academic study seeking to rank industries by their "intangible intensity", Pharmaceuticals, Biotechnology & Life Sciences" ranked highest among 21 sectors, while Health Care Equipment & Services ranked fifth-highest; Software & Services, Media & Entertainment, and Telecommunication Services ranked second/third/fourth, respectively.²

The growth of intangible assets has been studied in recent years as a newer factor driving investment returns, especially in terms of explaining the longest and sharpest underperformance of the Value factor in its history.^{3,4} By one measure, intangible assets – broadly categorized as consisting of Intellectual Property (e.g. patents), Brand Equity, Human Capital, and Network Effects – have grown to comprise roughly half of the value of corporate balance sheets in the US; similarly, the percentage of total US equity market capitalization represented by high-intangible industries (e.g. Hardware, Software, Health Care, Consumer Services, Business Services) has also grown to nearly 50%.⁵ For the five largest companies in today's economy, intangibles drive upwards of 75% of

²https://www.morganstanley.com/im/publication/insights/articles/article_marketexpectedreturnoninvestment_en.pdf?1618411268606

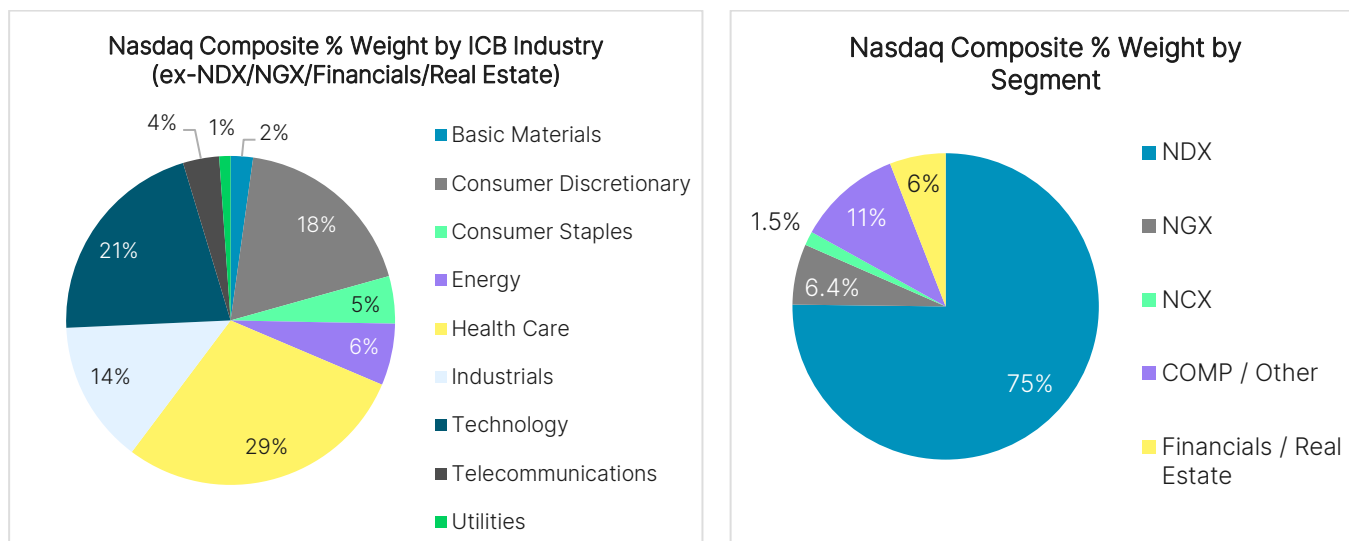
³ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3720983

⁴ <https://www.tandfonline.com/doi/full/10.1080/0015198X.2020.1842704>

⁵ <https://www.sparklinecapital.com/post/intangible-value>

total firm value.⁶ According to IPR Strategies’ dataset, the aggregate patent valuation of NCX’s constituents totalled \$32.3 billion (as of May 2022), vs. an aggregate total of \$47.4 billion for net Property, Plant & Equipment (PP&E) – a reasonable ratio given the existence of other intangible assets besides patents.

A major disconnect for fundamentally-oriented investors is the mistreatment of intangibles by outdated accounting standards, which recognize “investments” like R&D as single-period expenses that reduce profit when they are undertaken, but never appear on the balance sheet as capitalized assets with an amortization schedule like PP&E. This shortcoming is part of the reason that the book-to-market (i.e. price/book) ratio has been increasingly recognized as an ineffective valuation metric in today’s highly digitized economy. It also wreaks havoc with calculations of return-on-equity (ROE) and return-on-invested-capital (ROIC). There are now several academically-oriented approaches toward “fixing” book-to-market ratios by adjusting corporate balance sheets and income statements for intangible investments including R&D and other segments of Selling, General & Administrative (SG&A) expense. These are multi-step, intensive assignments when scanning a universe as large as the entirety of US small caps. A more streamlined, systematic approach is preferable when looking to build a well-diversified portfolio of innovative small-cap companies that have been overlooked in spite of, or even because of, their outsized levels of intangible investment. Given the disproportionate concentration of Nasdaq-listed companies that operate in sectors with high levels of intangible intensity, the patent value screening process of the NCX Index delivers something very close.



As of June 30, 2022

By focusing on the small-cap portion of the Nasdaq Composite Index (12.5% of all Nasdaq-listed market cap, ex-Financials/Real Estate), NCX’s methodology targets companies with a strong track record of intangible asset investment that are potentially being discounted by the broader investor community as a function of inadequate accounting standards and outdated financial metrics/valuation principles. At a minimum, given their aggregate trailing 12-month R&D spend of \$20.3 billion (as of June 30, 2022), the index constituents’ combined net loss of \$2.6 billion over the same period would be more than offset if R&D were capitalized and amortized – as with investments in Property, Plant & Equipment – instead of expensed, as they are legally required to be. Furthermore, their aggregate book values would increase by the entire history of unamortized investments in R&D; price-to-book ratios would shrink accordingly, making the index appear less expensive. In an environment of rising rates, a higher discount rate on NCX exists, thanks to investors’ narrowed focus on companies with current-day profits.

⁶ <https://www.aon.com/getmedia/60fbb49a-c7a5-4027-ba98-0553b29dc89f/Ponemon-Report-V24.aspx>

Summary

The Nasdaq Innovators Completion Cap Index tracks a very small slice of the US equity market, representing just 1.5% of Nasdaq's aggregate listed market cap. The index's methodology applies unique alternative data in the form of patent valuation estimates to determine the most innovative Nasdaq-listed companies that exist outside of the innovation-driven Nasdaq-100 and Nasdaq Next Generation 100. The index's constituents must score highly on an absolute basis – with high patent valuations – as well as on a relative basis, in proportion to their total market capitalizations. As a result, the portfolio is mostly comprised of sectors that place a premium on R&D investment to drive growth and create value. NCX is well-positioned to select companies that are potentially being undervalued by investors, either on a fundamental basis due to depressed financial metrics, or on a temporary basis due to depressed equity market conditions. With a long track record of backtested performance that competes with top-performing growth benchmarks like the Nasdaq-100 and Nasdaq Next Generation 100, Nasdaq Innovators Completion Cap is an index built for investors seeking to capture the new economy's growth potential in the small-cap equity space.

ETFs currently tracking NCX include the Invesco Nasdaq Future Gen 200 ETF (Nasdaq: QQQS).

Sources: Nasdaq Global Indexes, FactSet, Bloomberg, IPR Strategies. IPR Strategies' entire patent value dataset is available exclusively via [Nasdaq Data Link](#).

About IPR Strategies and their award-winning approach to patent valuation:

From its founding in 2000, IPR Strategies has consulted on assignments for patent portfolio valuations to support corporate M&A transactions for clients including Johnson & Johnson, Roche Pharmaceuticals, L'Oreal, BMW, and Royal Dutch Shell. In 2006, the group began developing an automated patent valuation methodology, leveraging a machine-learning algorithm trained on live patent transaction data. IPR's patent value estimates dataset now covers more than 20,000 publicly listed companies across 188 countries. The group continues to generate approximately 3-5 bespoke patent valuations per week, which serve to continuously refine the algorithm with fresh, live patent transaction data.

IPR's approach is a 6-step process which begins with raw patent data sourced from the US Patent Office, along with those in the EU & Japan. The model combines a qualitative indicator approach with the market value analogy method to produce patent valuations that rely on 27 distinct characteristics, spanning those that relate to: Assignee Value, Market Coverage, Market Attractiveness, Technical Quality, and Legal Attributes.

Along with Nasdaq Global Indexes and [Nasdaq Data Link](#) teams, IPR Strategies has demonstrated statistically significant uncorrelated alpha-generating potential with its dataset.

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