

Introducing The Nasdaq US Large Cap Select Disruptors™ Index: A Concentrated, Pure Play Approach to Thematic Innovation Investing

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Launched on August 4, 2023, the Nasdaq US Large Cap Select Disruptors Index (NLCSD™) is designed to track 50 of the most disruptive, large-cap innovative companies in the US. Experienced growth investors are well aware that not all disruptors are created equal. As is often the case, earlier-stage companies with exciting innovations can experience rapid appreciation in their stock prices amid rosy, long-term growth projections, sometimes lasting for many years at a time. Eventually, however, the entry of new competitors into the same market can erode profits, the innovations themselves may become stale leading to revenue declines, or the companies' managers may simply fail to effectively capitalize on their opportunities for long-term, sustainable growth. For this reason, investors in highly disruptive, innovative companies should favor a more selective approach.

Unlike certain competitive products in the thematic innovation space, NLCSD's methodology follows more of a multifactor approach that reflects the S-curve theory of business model lifecycles. Namely, when a new business model is in its Early Stage, revenue growth is paramount, along with a heavy focus on investments driving innovation. In other words, profitability may take a back seat, while expenditures on research & development (R&D) – in order to secure the value of technological innovation, usually via patents – play a leading role. Ideally for investors, however, margins should at least be improving to signal long-term viability of the emerging business model. In the next stage of Expansion, wider adoption of the company's products or services takes place, hopefully with continuing improvement in margins and steadily growing profitability. Disruptive companies with a prudent approach to managing their operations and growth trajectories can finally enter the ultimate stage of Maturity, where high degrees of pricing power should prevail. While revenue growth and margin improvement will taper off, there should still be above-average profitability to signal a successful, full-length cycle of disruption has taken place, and a dominant market position has been achieved.

In order to properly account for the requisite fundamental strength across all three stages of the disruptor lifecycle, Nasdaq developed a multi-factor ranking process that scores each security in NLCSD's universe of eligibility across six unique metrics to derive an aggregate Disruptor Score:

- 1) Patent Value as a % of Full Market Cap – measured as the ratio of a firm's patent value to the security's full market capitalization.
- 2) R&D Expenses as a % of Annual Sales – measured as the ratio of annual R&D expenses (over the last 12 months) relative to annual sales over the same period.
- 3) Revenue Growth – measured as the % change of annual sales (over the last 12 months) between the most recently completed period and three years ago. Securities must have positive revenue three years ago (the base period) for inclusion.
- 4) Gross Margin Growth – measured as the % change of the average gross margin over the last 12 months (LTM) between the most recently completed quarter and three years ago. Securities must have positive LTM gross margin three years ago (the base period) for inclusion.

- 5) Average Gross Margin – measured as the average quarterly gross margin over the trailing 13 quarters leading up to the Index Reconstitution Reference Date.
- 6) Gross Margin Sharpe - measured as the ratio of a firm's average quarterly gross margin to the standard deviation of a firm's quarterly gross margin over the trailing 13 quarters leading up to the Index Reconstitution Reference Date.

Each security in the starting universe – the Nasdaq US 500 Large Cap™ Index (NQUS500LC™) – is ranked according to each individual metric in an ascending order. Security ranks are then normalized using a standard Z-score formula, after which a Disruptor Score is computed by summing the six normalized ranks across securities. The top 50 securities by Disruptor Score are then selected for inclusion in the index.

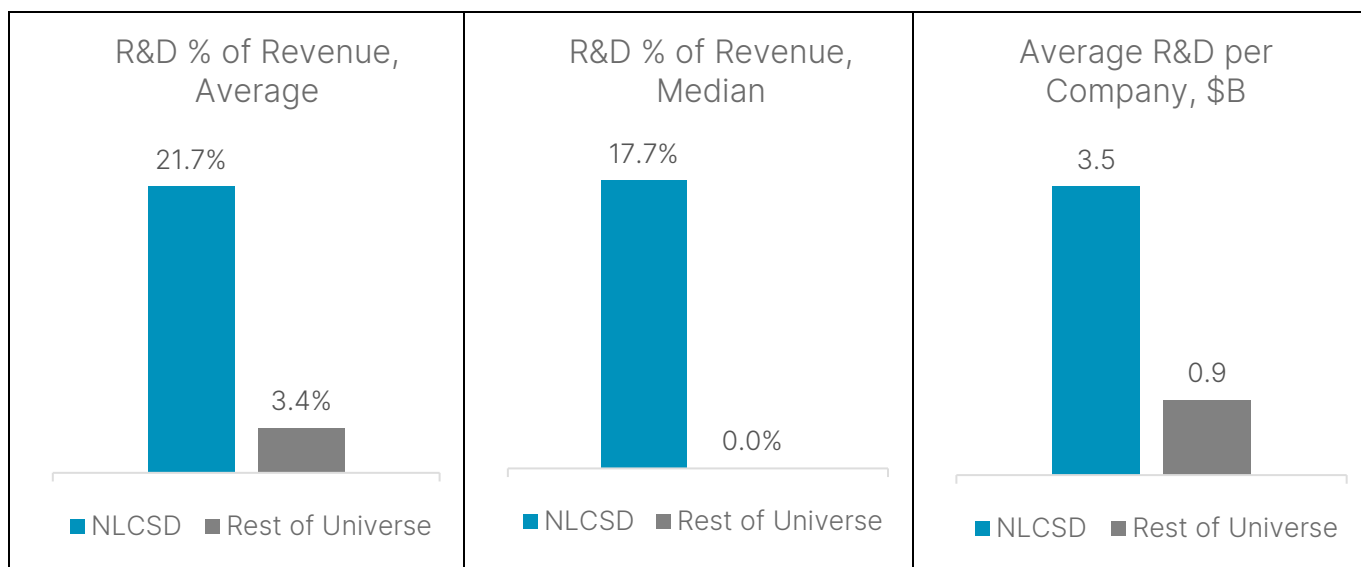
The NLCSD Index is rebalanced on a quarterly basis in March, June, September and December, and reconstituted semiannually in June and December. It follows a modified free-float market capitalization weighting scheme, subject to the following constraints:

- 1) No single security may exceed 10% of the index weight
- 2) Aggregate weights of securities greater than 4.75% cannot exceed 50%

For the full index methodology, please go [here](#).

Nasdaq US Large Cap Select Disruptors: Champions of Innovation

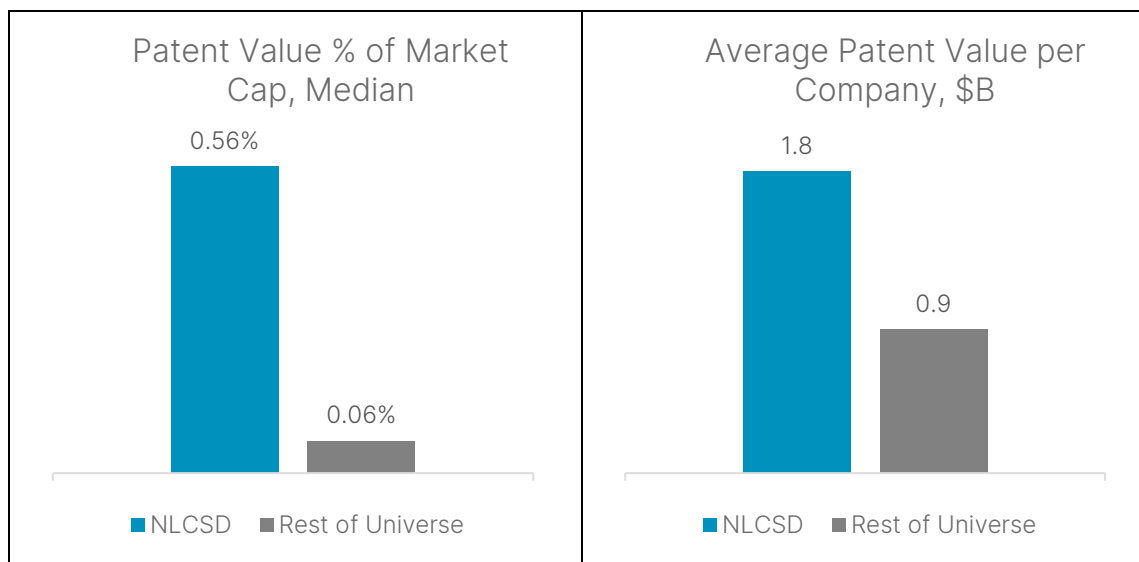
The most important factors associated with disruptive companies in the 21st century are undoubtedly an ongoing focus on R&D – which is easily observable on financial statements – and often a corollary that is more challenging to quantify, in the form of patent filings. Of the 441 companies in the eligible universe for which Disruptor Scores were calculated, more than half – 268 – reported zero R&D expenditure in the most recent 12-month period. Only one of these, Blackstone, ultimately made it into the NLCSD Index on the strength of its other scores. Overall, the 50 NLCSD companies reinvested, on average, 21.7% of their annual revenue back into R&D, vs. 3.4% for the remaining 391 companies in the eligible universe. The median NLCSD company spent 17.7%, vs. a median of 0% for the remaining 391 companies. In aggregate, the 50 NLCSD companies spent \$174B on R&D in the most recent 12 months, or \$3.5B on average, vs. a total of \$354B for the remaining 391 companies or \$0.9B, on average. Thus depending on how one chooses to measure the differential, NLCSD companies spend anywhere from four to seven times as much on R&D vs. the other companies in the eligible universe of US large-caps.



Patent valuations & other fundamental data as of December 31, 2022. Market capitalizations as of May 31, 2023.

In terms of patent filings, Nasdaq's unique partnership with IPR Strategies – an award-winning provider of patent valuation data with more than two decades of experience valuing patent portfolios – facilitates further quantitative analysis of the depth and breadth of a company's focus on innovation. Because of the specific accounting treatment of R&D as a single-period, non-capitalized expense on the income statement that does not result in an asset being created on the balance sheet (unlike, for example, traditional capital expenditures in Property, Plant & Equipment), patent valuation data can be used to estimate the "value" from historical R&D that has nonetheless accrued to a given company. This in effect broadens and completes the analysis of the level of disruptive potential across a portfolio of companies, beyond simply looking at standalone R&D Expense.

Looking more closely at our index, we find that only 88 companies in the eligible starting universe of 441 were reported to have patent valuations of zero; only two of these ultimately made it into NLCSD (Datadog & Snowflake). Overall, NLCSD's constituents reported aggregate patent values of \$91.4B, or \$1.8B on average. The other 391 companies in the universe reported patent values of \$340.7B, or only \$871MM on average. In terms of the normalized patent value as a percentage of market cap, the median NLCSD company registered a ratio of 0.56% - 9.5 times higher than the median for the remainder of the eligible universe at 0.06%. The average ratios of the two portfolios are quite similar here and are skewed by a number of non-NLCSD companies that do score very highly on patents – such as IBM, Intel, Qualcomm, and Dow Chemical – but score much worse on some of the other fundamental factors measuring the relative health of their margins and growth.

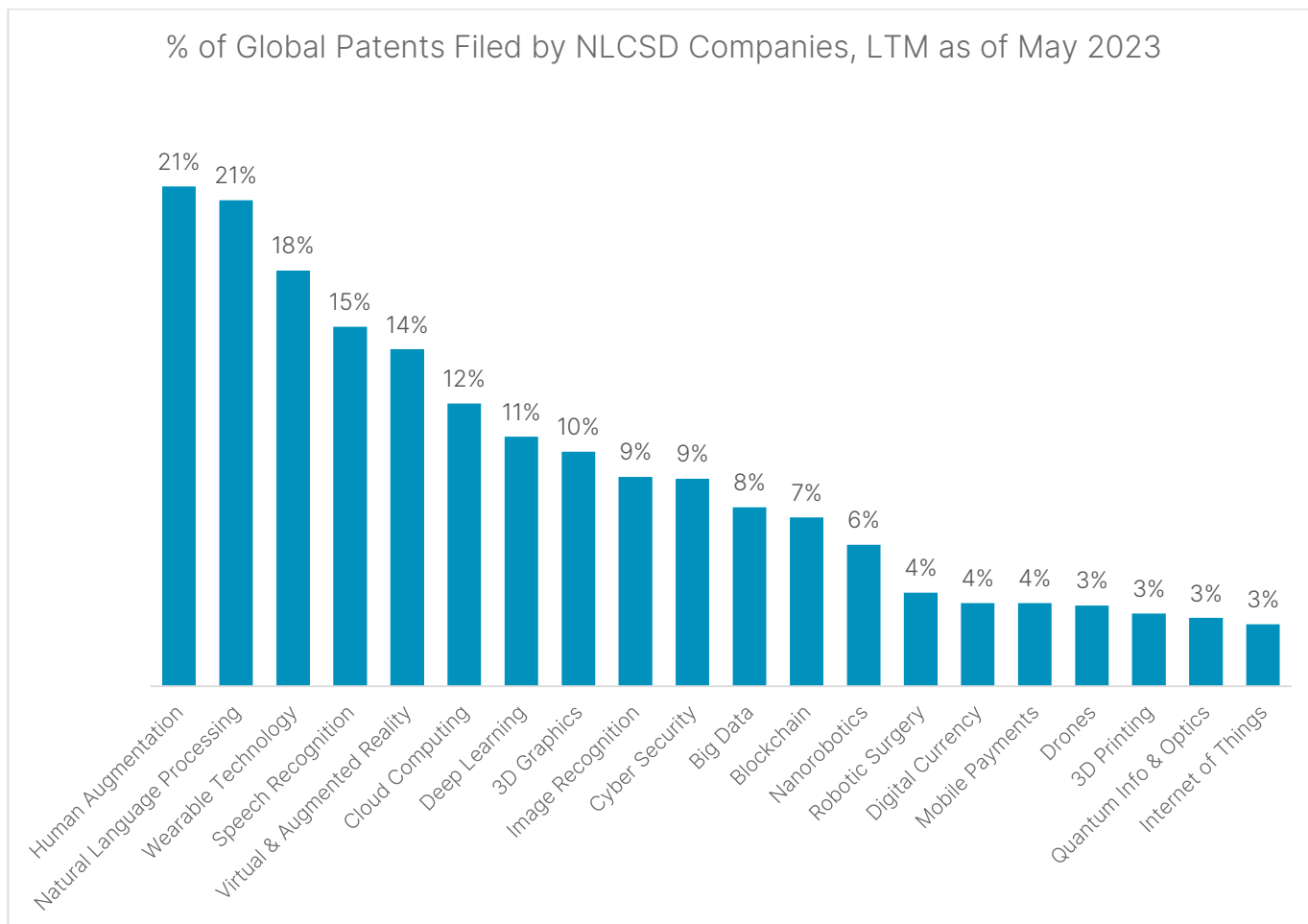


A final way to interpret the outsized emphasis on innovation across the NLCSD Index is by analyzing the types of patents associated with its constituents. Here we can look to a totally separate dataset, created by Nasdaq as part of maintaining the Nasdaq Global Disruptive Tech Benchmark™ Index (NYDTB™). This broad benchmark of ~1,800 companies is designed to track those with patents (filed in a rolling 12-month window) related to one or more of 35 disruptive technologies that are tied to some of the most exciting innovations taking place in today's modern economy. Out of a universe of nearly 20,000 publicly listed companies, it is extremely impressive to see that the 50 NLCSD companies contributed more than their fair share of patent filings across at least 20 of the 35 disruptive technologies tracked, including on average, 11% of patent filings across nine areas that relate directly or indirectly to advancements being made in artificial intelligence.¹

The growth of intangible assets like patents 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

¹ The list of AI-related technologies includes: Natural Language Processing, Quantum Information & Optics, 3D Graphics, Speech Recognition & Chatbots, Virtual & Augmented Reality, Cloud Computing, Deep Learning, Image Recognition, and Big Data.

history.^{2,3} 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%.⁴ In today's highly digitized economy, thematic investors looking to capitalize on innovation may stand to benefit by as much as 3-4% in annualized alpha by focusing on a universe of patent filers vs. non-filers, per O'Shaughnessy Asset Management,⁵ or high vs. low R&D-to-Sales firms, per Alpha Architect.⁶



Not All Disruptors Are Created Equal: The Importance of Fundamental Strength

An intensive focus on innovation can act as a great signal for investors to screen for the most disruptive companies, but alone, it cannot signify an attractive investment opportunity. For every Microsoft, Google, or Meta Platforms (all NLCSD constituents), there exist multiple examples of high-flying, innovative companies that delivered disappointing returns for years, and in some cases even ceased to exist despite valuable patent portfolios and strong research divisions (Blackberry, Yahoo!). That is why NLCSD's methodology places just as much of an emphasis on revenue growth and gross margin improvement as it does on R&D and patents. On average, NLCSD companies generated revenue growth of 27.8% in the most recent full year of data vs. three years ago, compared to only 13.6% for the rest of the eligible universe, on average. The median NLCSD company grew nearly three times faster than the median for the rest of the universe.

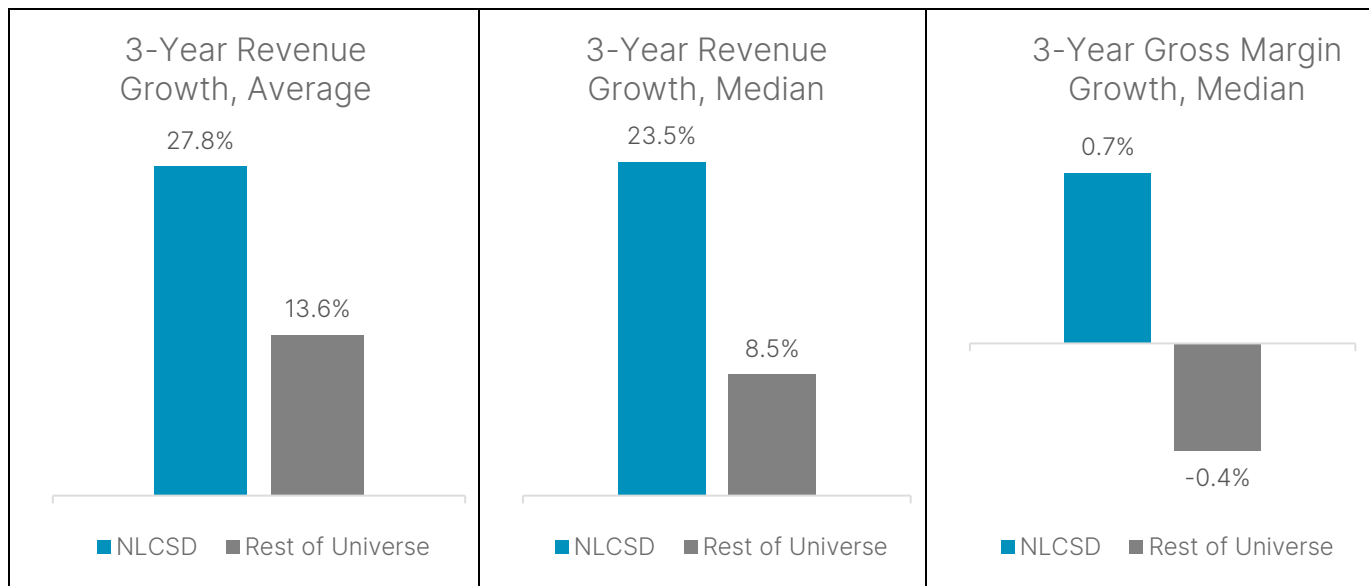
² https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3720983

³ <https://www.tandfonline.com/doi/full/10.1080/0015198X.2020.1842704>

⁴ <https://www.sparklinecapital.com/post/intangible-value>

⁵ <https://osam.com/pdfs/research/Mispriced-Innovation%E2%80%93Patents-as-a-Leading-Indicator-for-Earnings-Growth.pdf>

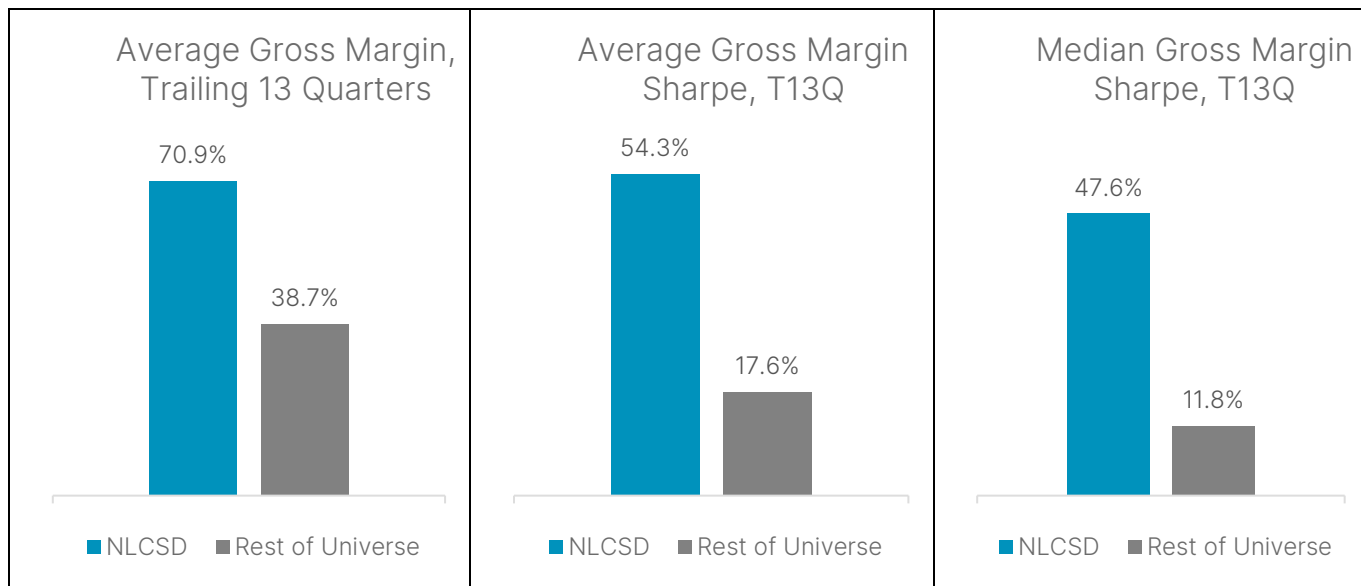
⁶ <https://alphaarchitect.com/2021/02/the-rd-premium-is-it-risk-or-mispricing/>



In terms of gross margin improvement, here we again look to the medians to draw the comparison. The median NLCSD company saw gross margins improve by 67 bps annualized in the most recent quarter of data used to determine the index launch basket, vs. a deterioration of 42 bps annualized for the median company in the rest of the universe. The averages between the two portfolios are quite similar and are skewed higher by a number of outliers in the Energy sector, as companies like Chevron, Hess and Devon Energy registered historic improvements of 40-50% annualized (i.e., 4,000-5,000 bps) in their recently reported quarters vs. three years ago, when oil was in the penultimate stage of its historic, multiyear bear market and margins were often in the single digits, if not outright negative (as seen during the Covid pandemic when oil briefly traded below \$0).

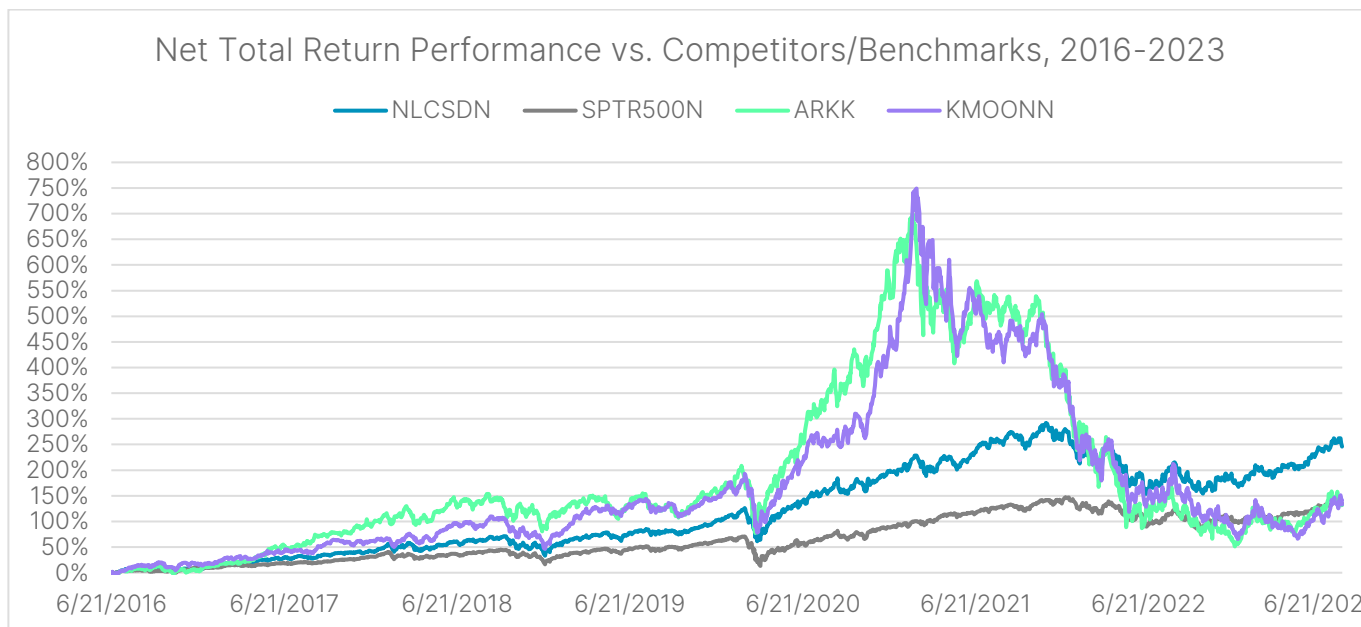
In terms of where overall gross margins have evolved and how volatile they've been over the past three years (13 quarters to be precise), we observe more of the same in terms of NLCSD's superior fundamental strength within its large-cap starting universe. The average NLCSD constituent had a gross margin of 70.9% over the last 13 quarters – nearly double the average margin of 38.7% for the rest of the eligible universe. (The median values were nearly identical – 71.9% vs. 34.7%, respectively.) Gross Margin Sharpe – measuring the “volatility” of a firm's quarterly gross margin with respect to its average over the trailing 13 quarters – illustrates the wide gulf in stability across firms in the large cap space. As with the standard Sharpe ratio measuring returns volatility, a higher value here indicates a more stable gross margin over time – a better outcome, especially when constructing a portfolio of disruptive companies. NLCSD's companies are nearly three times more stable, in terms of their gross margins, than the rest of the universe, on average. Looking at the median, the difference is even more pronounced with the median NLCSD firm nearly four times more stable than the rest of the universe. These readings validate the hypothesis that a portfolio of disruptors need not be highly volatile, and that a path towards investing in long-term, sustainable disruption does indeed exist.

Nasdaq's own independent research set out to show the benefits of designing indexes with revenue growth, gross margin, and gross margin stability in mind. When constructing portfolios of outperforming large and midcap companies (isolating revenue growth and gross margin growth factors only) vs. the Russell 1000, the unconstrained market cap-weighted portfolio outperformed by approximately 60 bps annualized from June 2016-March 2023; selecting the top performers within each industry to create more balanced portfolios generated outperformance of more than 200 bps annualized. Similarly, isolating the pricing power factors (gross margin stability i.e. “Sharpe”, plus average gross margins) across the large and midcap universe and selecting the top one-third ranked companies within each industry generated approximately 200 bps annualized outperformance vs. a blend of the S&P 500 / S&P 400 Midcap benchmarks.



Historical (Backtested) Performance & Characteristics

NLCS D’S systematic, rules-based approach to index construction lends itself well to analysis of historical, backtested portfolios. Only 14 semiannual index reconstitutions took place over the course of the backtest dating from June 21, 2016 through index launch on August 7, 2023. Over this time period, the net total return of NLCS D was 245.6%, almost doubling that of the S&P 500 at 134.6%. Two of the most prominent competitor products in the thematic innovation space – the ARK Innovation ETF (actively managed, ticker: ARKK) and the Direxion Moonshot Innovators ETF (passively managed, tracking the S&P Kensho Moonshots Index, ticker: KMOONN) – produced incredible outperformance during the height of the Covid pandemic bubble, approaching peak cumulative returns of 750%. They have both given back most of those returns with drawdowns exceeding 70% each, producing cumulative returns of only 149.3% and 132.9%, respectively, as of August 4, 2023.



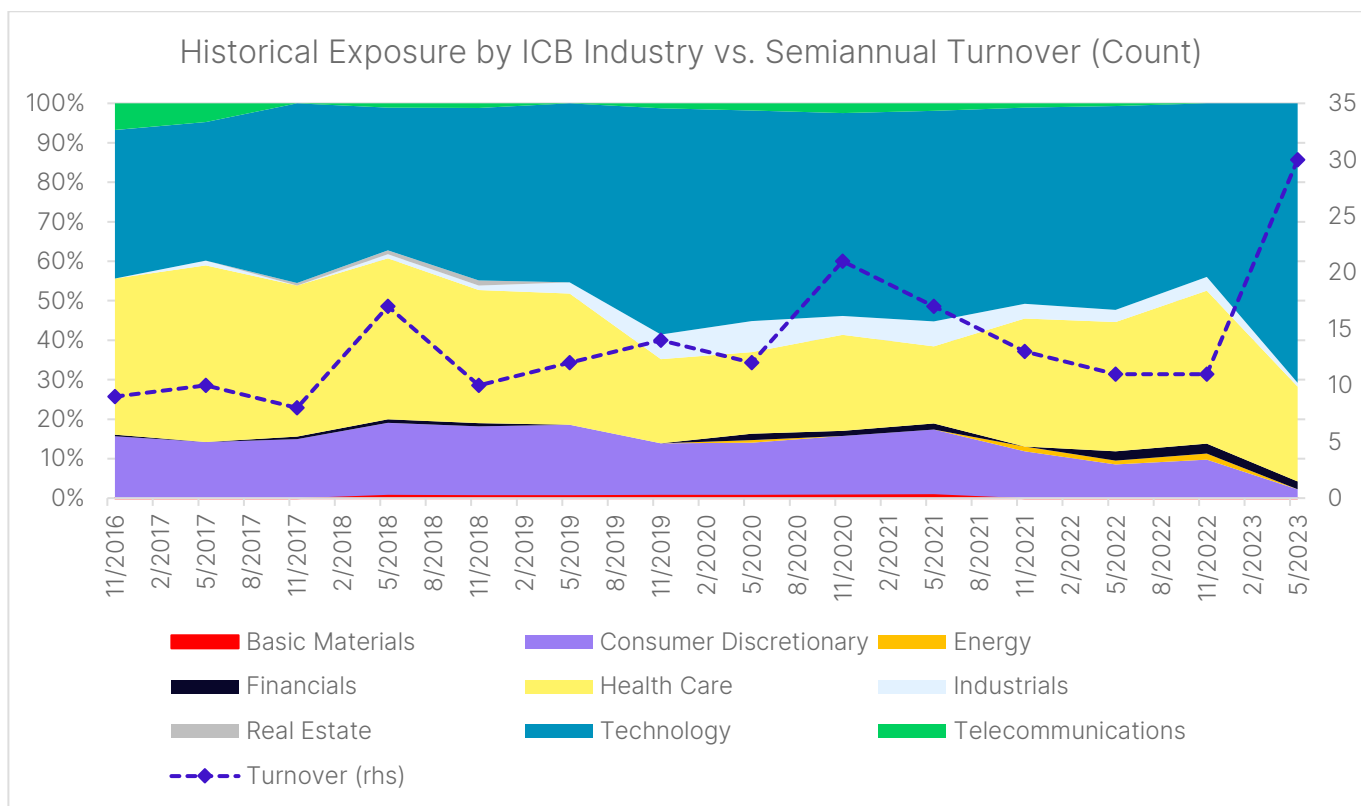
As of August 4, 2023

ARKK and KMOONN, despite a major difference in implementation via active vs. passive management, have both suffered from the drawbacks of focusing on disruption in a vacuum. Their returns were phenomenal for a few years, but ultimately unsustainable. Both products display minimal overlap with NLCS D, and overall negative P/E

ratios with the vast majority of their constituents remaining unprofitable. In stark contrast, 86% of NLCSD's portfolio was allocated to companies with positive earnings when the index was launched.

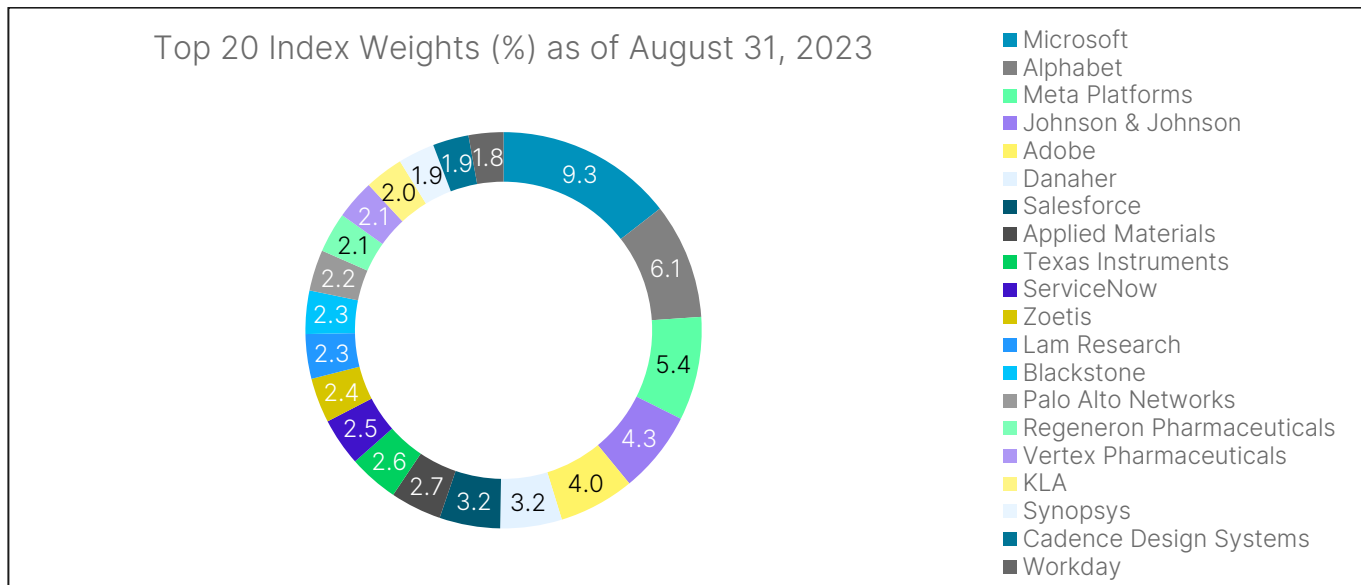
Index/ETF Ticker	NLCSDN	ARKK	KMOONN/MOON	SPTR500N
Net Total Return from February 16, 2021 (peak) – August 4, 2023	5.3%	-70.5%	-72.6%	17.0%
Overlap as of August 4, 2023 (# Positions / % Portfolio Weight)	50 / 100%	2 / 1.6%	1 / 2.0%	35 / 17.0%
P/E as of August 4, 2023 (Index-Level / # of Positive P/E / % Portfolio Weight Positive P/E)	39.8 / 38 / 85.8%	<0 / 4 / 19.3%	<0 / 2 / 4.2%	22.4 / 487 / 98.1%

Looking back historically through the semiannual reconstitutions of the backtest, we find that NLCSD has consistently been heavily weighted towards Technology and Healthcare, at 48% and 32% of index weight on average, respectively. Consumer Discretionary has averaged at 13%, but recently dropped down to 2%. Tech recently jumped up to its highest-ever reading, at 71% of index weight during the June 2023 reconstitution, while Healthcare dropped down to only 24%, among the lower readings in its history. On average, approximately 14 constituents turn over at each semiannual reconstitution (i.e. 14 additions replacing 14 deletions), and 165 unique constituents have entered and/or exited the index over the course of the backtest since June 2016. On average, these constituents spent approximately nine quarters as members of the index, not necessarily consecutively. Given the outsized movements across much of the Tech sector in the first half of this year – with many names recovering from the unfavorable fundamentals that dominated 2022, only to be replaced by broad optimism around the promises of Artificial Intelligence and its impact on the overall demand for both software and hardware – it is perhaps not surprising that the index's turnover was above average with 30 additions and 30 deletions in June 2023.

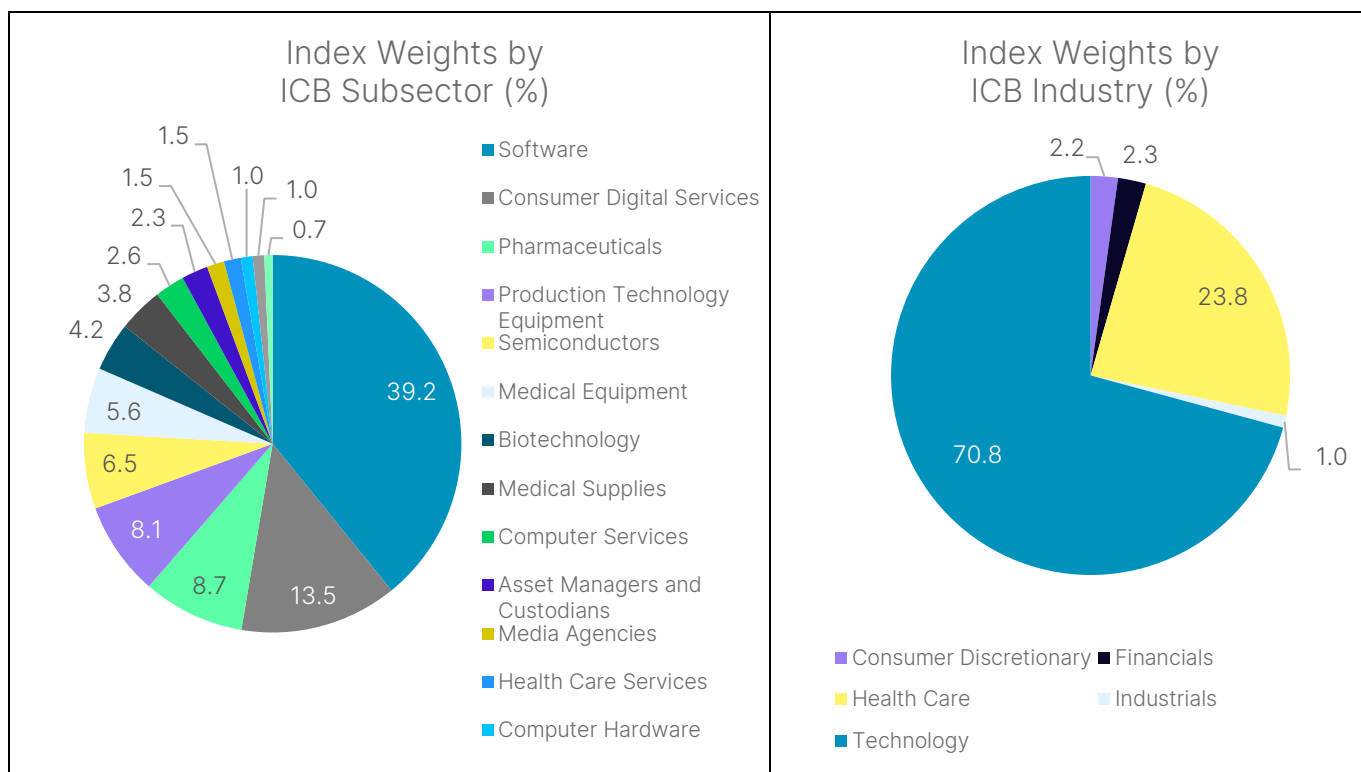


Current Index Composition

As of August 31, 2023, the top 20 constituents in NLCS D comprised 64.2% of index weight and included well-known mega-cap Tech innovators such as Microsoft, Alphabet, Meta Platforms, Adobe and Salesforce. Also included were a number of large-cap Healthcare names such as Johnson & Johnson, Danaher, Zoetis, Regeneron Pharmaceuticals, and Vertex Pharmaceuticals. Blackstone made the cut as the only company in the Financials sector, as did a number of smaller Tech names including Workday, Cadence Design Systems, and Synopsys.



Drilling down at the ICB subsector level, we can see Software companies made up the biggest contribution at 39.2% of index weight, with Consumer Digital Services the next-largest at 13.5%. They were followed by Pharmaceuticals at 8.7%, and Semiconductors (6.5%) along with its sibling subsector, Production Technology Equipment (8.1%), which includes well-known semis players such as Applied Materials, Lam Research, and KLA.



Summary

The Nasdaq US Large Cap Select Disruptors Index tracks only 50 companies, utilizing a concentrated approach to generate pureplay exposure to innovation as an investment theme. The index's methodology leverages unique alternative data in the form of patent valuation estimates, along with more traditional financial data around R&D expenditures, to determine the most innovative companies in the US large cap universe. The index's constituents must also score highly across four other fundamental factors that measure the strength and quality of their growth. In addition to scoring on topline growth, the index selects companies that outperform on margin improvement, as well as on the stability of their margins. This unique approach ensures that high-quality, disruptive companies can become index constituents while operating in any of the three stages of the business life cycle "S-Curve" – Early Stage, Expansion, or Maturity. The portfolio is mostly comprised of sectors that place a premium on innovation through patent filings and R&D investment to drive growth and create value, namely Technology, Healthcare and Consumer Discretionary. With a long track record of backtested performance that competes with top-performing growth benchmarks like the Nasdaq-100® and easily outperforms similar-sounding competitor products in the thematic innovation space, Nasdaq US Large Cap Select Disruptors is an index built for investors seeking to capture the new economy's champions of selective and self-sustaining disruption.

ETFs currently tracking NLCSD include the GraniteShares Nasdaq Select Disruptors ETF (Nasdaq: DRUP).

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 (part of InTraCoM GmbH) 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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