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# Joined at the hip: ETF and index development

Vanguard research

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**Executive summary.** Exchange-traded funds (ETFs) have experienced tremendous growth over the past decade.<sup>1</sup> As of March 31, 2012, more than \$1.2 trillion was invested in about 1,400 U.S.-listed ETFs (Source: Strategic Insight's Simfund). The exponential growth of ETFs has coincided with the development of many new indexes representing a vast array of investment strategies.

Currently, U.S.-listed ETFs seek to track more than 1,000 different indexes (Source: Vanguard, based on Bloomberg data). Increasingly, ETFs have been launched using new indexes based on narrow market segments and alternative weighting methods that often lack "live" performance history. Among the indexes being created for use in ETFs, more than half include back-filled or "back-tested" data from before the date the indexes were first publicly available, and it is often difficult for investors to discern which data are hypothetical and which are live.

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<sup>1</sup> This paper uses the term *ETF* to refer to both exchange-traded funds and notes.

This paper examines the implications of the concurrent development of ETFs and the indexes they seek to track. We find that more than half of ETFs are launched with an index that has been in existence for less than six months. Using an event-study analysis to look at the performance of indexes before and after ETF creation, we find that ETFs are most likely to be created with indexes that have performed well relative to the broad U.S. stock market before the inception date, but that such performance, on average, does not persist. Even so, new ETFs that use indexes with back-filled data appear to have more success in attracting assets, suggesting that the availability of hypothetical performance data may contribute to the viability of a new ETF. Overall, our research suggests that investors need to be cautious in considering historical index performance, especially for indexes constructed for use in new ETFs. The adage that “past performance may not be an indicator of future results” is especially true when the past performance is hypothetical.

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**The exponential growth in ETFs over the past decade has been bolstered by a proliferation of ETFs and the indexes they seek to track (see Figure 1). As of November 30, 2011, about 1,400 U.S.-listed ETFs were tracking more than 1,000 indexes. There has also been tremendous growth in the number of ETF index providers, from just 6 in 2000 to 75 as of November 30, 2011. (Source: Vanguard, based on Bloomberg data.)**

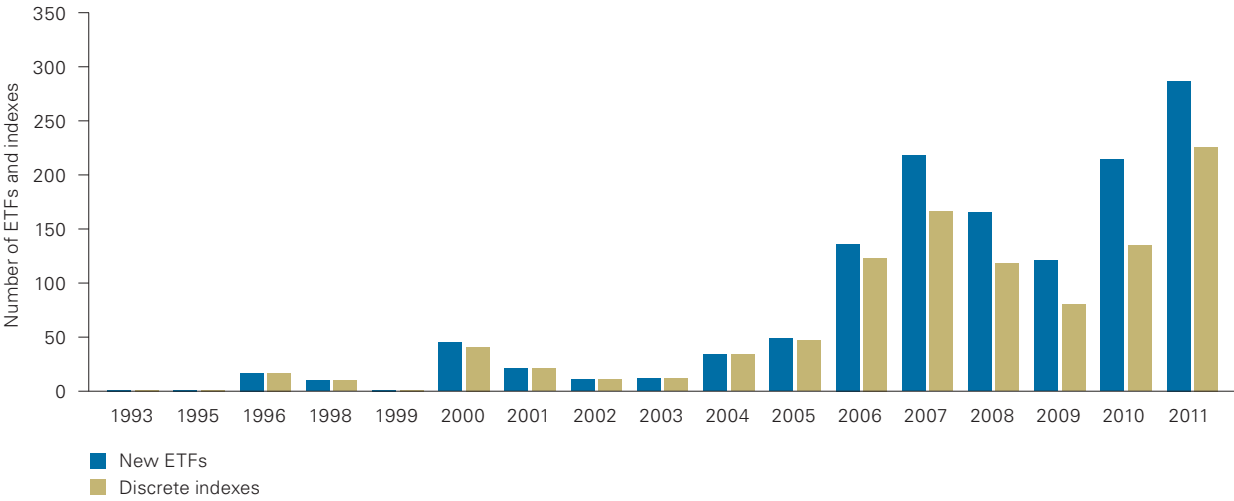
Investors in ETFs have a dizzying array of products and indexes to choose from. Along with the substantial increase in the number of indexes available for ETFs, there has also been significant

growth in weighting methods and selection criteria on which these indexes are based (see Figure 2). Before the recent proliferation of indexes, most indexes weighted components based on market capitalization. Today, 20 different weighting approaches and 27 different selection criteria exist for indexes tracked by ETFs. The percentage of ETF products based on alternative weighting methods jumped from just 5% in 2000 to almost 50% in 2011 (Source: IndexUniverse). But these alternative weighting approaches have not consistently produced excess returns after accounting for size and style exposures (Philips et al., 2011; Thomas and Bennyhoff, 2012).

*Notes on risk: Past performance is not a guarantee of future results. All investments in mutual funds are subject to risk. Investments in bond funds are subject to interest rate, credit, and inflation risk. Prices of mid- and small-cap stocks often fluctuate more than those of large-company stocks. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. You must buy and sell Vanguard ETF® Shares through a broker, which may incur commissions. Vanguard ETF Shares are not redeemable directly with the issuing fund other than in Creation Unit aggregations. Like stocks, ETFs are subject to market volatility. When buying or selling an ETF, you will pay or receive the current market price, which may be more or less than net asset value.*

**Figure 1.** Growth in number of new ETFs and their indexes: 1993–November 30, 2011

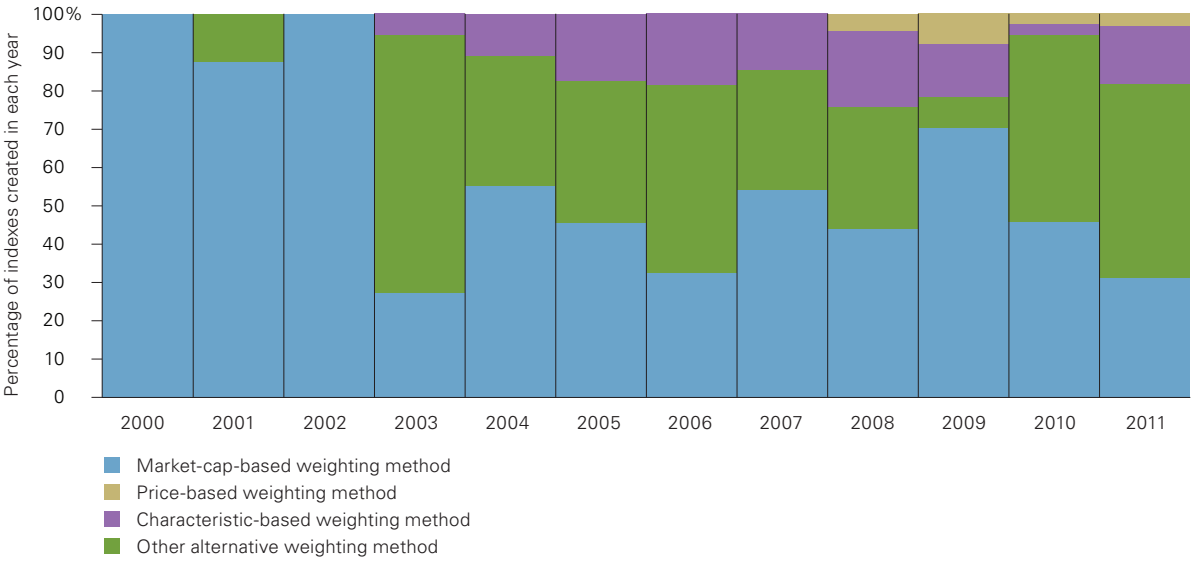
The growth of ETFs has been accompanied by a huge increase in the number of different indexes that ETFs seek to track.



Notes: Blue bars indicate number of new ETFs launched in each year. Gold bars indicate number of indexes that had an ETF attempting to track them for the first time.  
Sources: Vanguard, based on data from Strategic Insight’s Simfund.

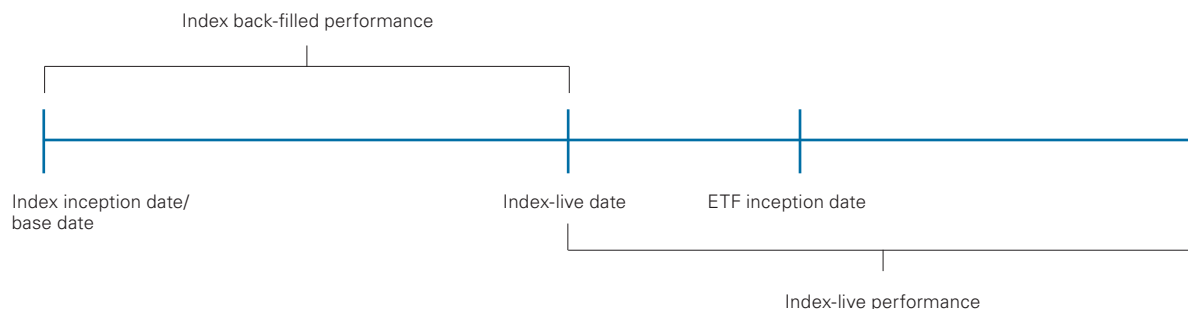
**Figure 2.** Equity index creation by different weighting methods: 2000–2011

The weighting methods and selection criteria on which indexes are based have also grown significantly.



Notes: Figure shows percentage of indexes by weighting criteria that were launched in each year (based on a total of 637 indexes that “went live” after 2000). “Price-based” weighting methods include weighting based on momentum, price, and volatility. “Characteristic-based” weighting methods include weighting based on earnings, revenue, fundamentals, and dividends. “Other alternative” weighting methods include equal, tiered, proprietary, and multifactor.  
Sources: Vanguard, based on data from Strategic Insight’s Simfund and IndexUniverse.

**Figure 3.** Timeline of index and ETF creation



Source: Vanguard.

### Key terminology

**ETF inception date.** The first date that an ETF starts to track an index.

**Event study.** An empirical study of prices or returns just before and after an event such as an announcement, merger, or dividend payout.

**Index back-filled (or back-tested) performance.** Performance data based on retroactively applying the index methodology to historical data as if the index had existed during that time period.

**Index inception date/base date.** The date that back-filled performance data are first available for the index.

**Index-live date.** The date an index is first published to the public and starts calculations using live data.

**Index-live performance.** Performance of an index after the index-live date, using methodology on real-time data.

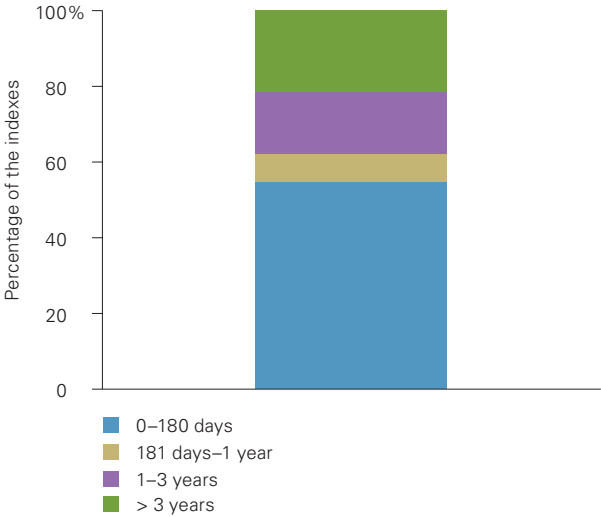
### Index development and ETF launch

The rest of this paper examines the development of ETFs and the associated indexes they seek to track. As a guide, **Figure 3** depicts a framework for this analysis by highlighting different dates along the process from an index's creation through an ETF's launch (see the accompanying box, for definitions of terms used in the timeline).

Of the approximately 1,070 indexes that serve as ETF benchmarks, we were able to obtain "index-live" date information for 775 indexes from index-provider or ETF-sponsor websites. We focused on the 637 indexes that "went live" after 2000. Of these, we found that 370 indexes had either back-filled (i.e., back-tested) performance data or live performance data of at least six months, while 219 did not have any back-filled data, and 48 had back-filled data or performance of less than six months. (Note that back-testing is done by retroactively applying the index methodology to the historical data as if the index had existed previously. Index providers provide back-filled performance information to illustrate how the index would have performed in the past.) Our analysis considered an index to have back-filled data only if we could find at least six months of such data. We compiled ETF inception dates and monthly ETF cash-flow data from Strategic Insight's Simfund.

**Figure 4.** Time gap between index-live date and ETF launch: 2000–2011

More than 50% of the 739 indexes we analyzed had an ETF seeking to track them within 180 days of their index-live date.



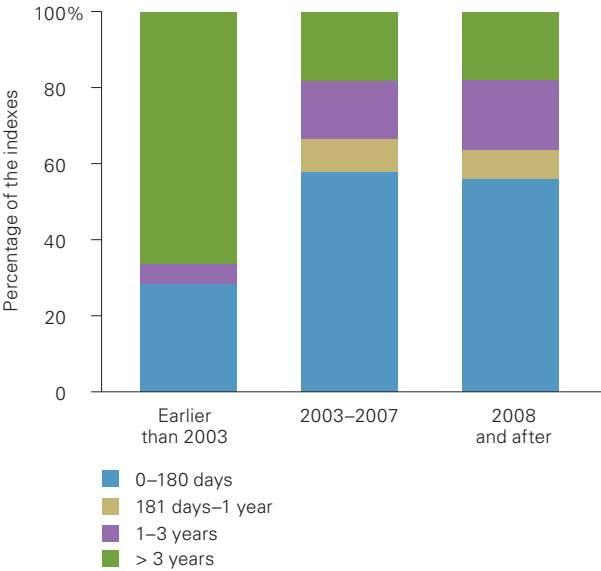
Note: For this aspect of our study, a total of 739 indexes were analyzed.  
Sources: Vanguard, based on index-live data from index-provider and ETF-sponsor websites.

**Gap between index and ETF inception**

Many investors have traditionally thought of an index as an unbiased, objective representation of a market or market segment. As suggested in Figure 2, however, the concept of an index as a basket of traditional, market-capitalization-weighted securities to represent broad market segments has been greatly expanded in terms of number of indexes created, variability in weighting methods, and narrowness of market subsegments. Our analysis suggests that new index creation may be increasingly linked to the marketing, development, and differentiation of new ETFs, rather than being an approach of simply providing “unbiased” investable benchmarks for stock and bond market segments.

**Figure 5.** Time gap between index-live date and ETF launch based on ETF’s launch year

The median time gap between index and ETF creation has narrowed considerably since 2000.



Note: A total of 739 indexes were analyzed.  
Sources: Vanguard, based on index-live date data from index-provider and ETF-sponsor websites.

To investigate this proposition, we examined the time gap between an index creation date and ETF inception dates. As shown in Figure 4, 60% of the indexes tracked by ETFs were less than one year old when their associated ETFs were launched. Figure 5 shows that the time gap between index and ETF creation has narrowed considerably over the past decade. The median time between index and ETF creation has decreased from almost three years in 2000 to just 77 days in 2011. As a consequence, most indexes have little live performance history for investors to assess in the context of a new ETF investment.

## Use of back-filled data by index providers

Sponsors of the majority of indexes we studied provided back-filled performance history before the index-live date. Even though the use of back-filled performance in marketing materials for most U.S. mutual funds and ETFs is prohibited by the Financial Industry Regulatory Authority (FINRA), an index provider not affiliated with a fund or ETF tracking its index generally is not subject to these regulations.<sup>2</sup> One result of this difference in the regulatory framework between ETFs and index providers is that most index providers do offer such data through public means, typically their own websites and third-party data providers such as Bloomberg.

Notwithstanding the availability of back-filled data, the key question for investors is this: *Are back-filled data a reliable indicator of how the index will perform after it is launched?* Our answer is a decided no. Of the 775 indexes for which we were able to obtain index-live date information, 370 indexes had at least six months of back-filled data and six months of live data in the period from 2000 through 2011. We analyzed the performance of these indexes both in the back-filled data period and in live data and found that on an annualized basis, although 87% of the indexes outperformed the broad U.S. stock market<sup>3</sup> for the time in which the back-filled data were used, only 51% outperformed the broader market after the index was launched. In our view, a major reason for the outperformance of back-filled data is likely that sponsors tend to develop new products based on what has performed well recently.

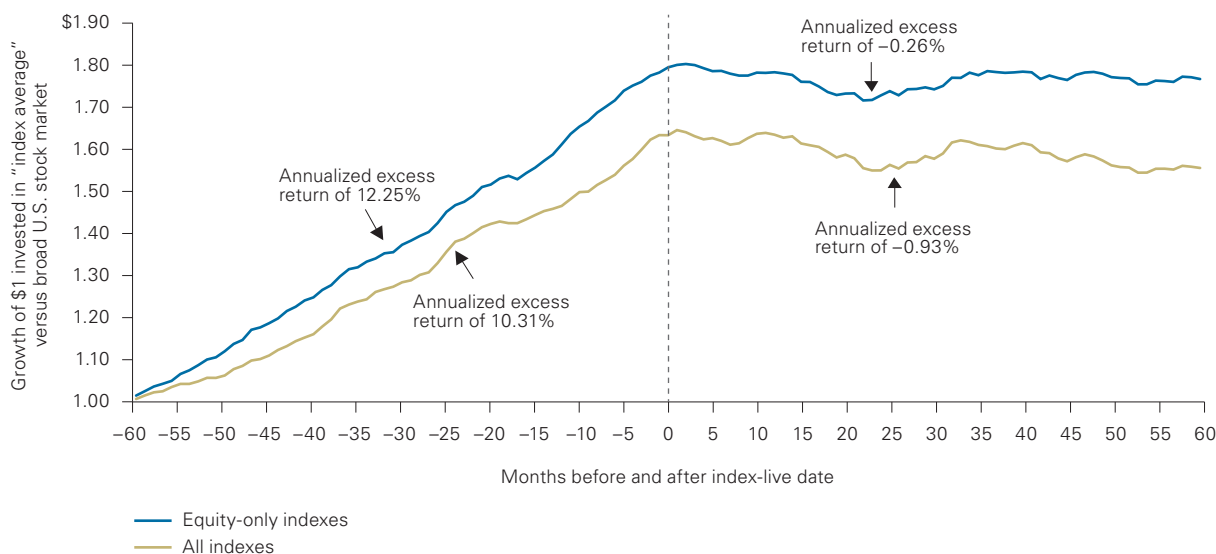
To take an aggregated look at index performance, we produced an event study to compare indexes' performance five years before and five years after their live date. Specifically, we measured the performance of the 370 indexes with back-filled performance against the total U.S. stock market (as represented by the Dow Jones Wilshire 5000 Index before April 22, 2005, and the MSCI US Broad Market Index thereafter) (see **Figure 6**). We selected a broad U.S. equity index because investors commonly compare returns of different asset classes with the broad U.S. stock market when choosing between potentially risky investments. We show findings both for all indexes and for equity benchmarks only.

Figure 6 compares the excess return obtained from \$1 invested in a hypothetical index representing the "index average" result versus the results of the broad U.S. stock market for 60 months before and after the index live date. To calculate the "index average return," for each index we designated the index live date as the "zero-month" event on the timeline (the vertical line in the figure delineates the "before and after" performance). We then summed the returns of all the indexes for each month over the five years before and after their respective live dates and calculated the "index average return" for each month. As shown in Figure 6, the index average for all the indexes outperformed the broad stock market at an annualized rate of 10.31% as measured by five years of back-filled data, but underperformed at an annualized rate of -0.93% over the five years following the index live date.

2 FINRA recently brought an enforcement action against an ETF distributor, in part for allegedly approving advertising and sales literature for ETFs that misrepresented the historical performance of indexes used by those ETFs. (Source: Financial Industry Regulatory Authority Letter of Acceptance, Waiver and Consent, No. 2009018186201.)

3 As measured by the Dow Jones Wilshire 5000 Index before April 22, 2005, and the MSCI US Broad Market Index thereafter.

**Figure 6.** Comparison of “index average” excess return versus broad U.S. stock market: Hypothetical growth of \$1 over five years before and five years after index-live date



Notes: Analysis includes data from 370 indexes versus the total U.S. stock market (as measured by the Dow Jones Wilshire 5000 Index before April 22, 2005, and the MSCI US Broad Market Index thereafter). Dashed vertical line in figure separates “before” and “after” performance. See text for description of “index average return.”

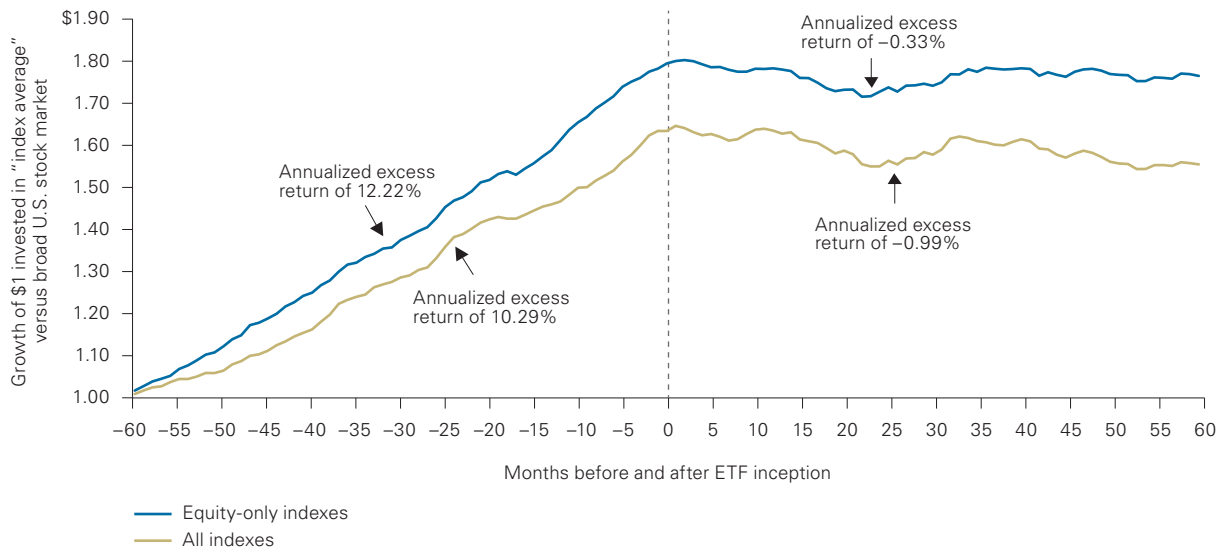
Sources: Vanguard, using index-return data from Bloomberg. Index-live-date data from index-provider and ETF-sponsor websites.

The difference in the performance relationship was also highlighted when we considered the excess returns of the “index average” versus the broad U.S. market indexes before and after the ETF inception date to which each index is managed, as shown in **Figure 7**, on page 8. Clearly, the choice to launch an ETF is influenced by the past performance (either live or back-filled) of the index that it aims to track. Figure 7 shows the excess return resulting from \$1 invested in the “index average” versus the broad U.S. stock market (again, as measured by the Dow Jones Wilshire 5000 Index before April 22, 2005, and the MSCI US Broad Market Index thereafter) 60 months before and after ETF inception. As shown in the figure, the index average outperformed the broad U.S. market at an annualized rate of 10.29% before the ETF that tracked its index was launched, but underperformed at an annualized rate of -0.99% for the 60 months after the ETF inception.

### Back-filled data and differences in cash flows

To analyze the impact of back-filled performance information on ETF investors, we studied average cash flows into ETFs during the first six months following their inceptions. We divided the ETFs into two categories: (1) those seeking to track an index *without* back-filled performance data and (2) those whose indexes used back-filled performance data. As seen in **Figure 8**, on page 8, average cash flows during the first six months for ETFs seeking to track indexes with back-filled performance data were higher than the average for all ETFs represented by indexes without back-filled data, with the exception of indexes linked to fixed income products.

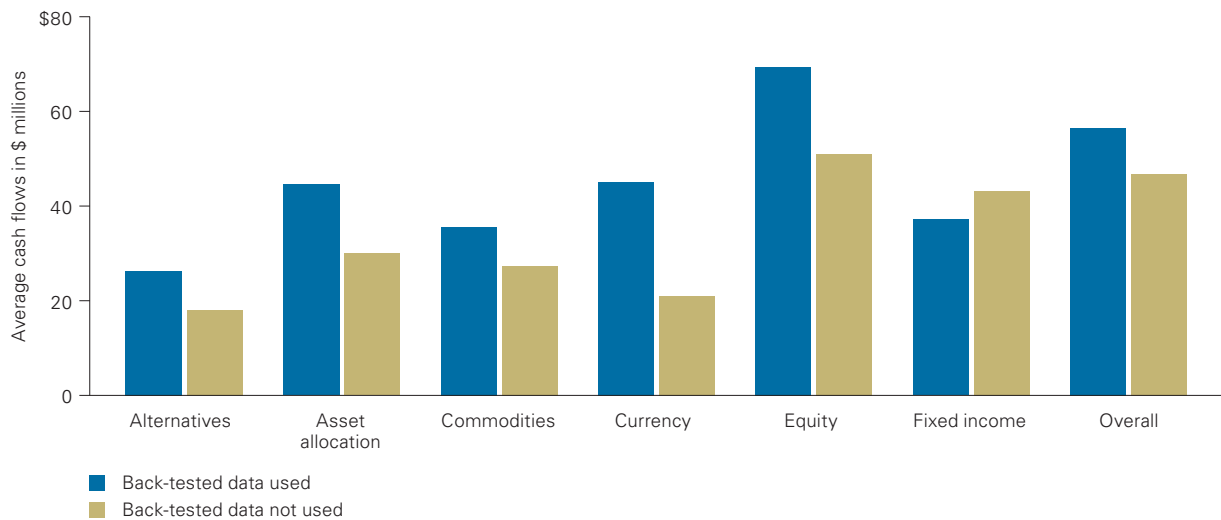
**Figure 7.** Comparison of “index average” excess return versus broad U.S. stock market: Hypothetical growth of \$1 over the five years before and five years after ETF inception



Notes: Analysis includes data from 370 indexes versus the total U.S. stock market (as measured by the Dow Jones Wilshire 5000 Index before April 22, 2005, and the MSCI US Broad Market Index thereafter). Dashed vertical line in figure separates “before” and “after” performance. See text for description of “index average return.”

Sources: Vanguard, using index-return data from Bloomberg. ETF inception-date data from Strategic Insight’s Simfund.

**Figure 8.** Average cash flows into ETFs in first six months after ETF inception

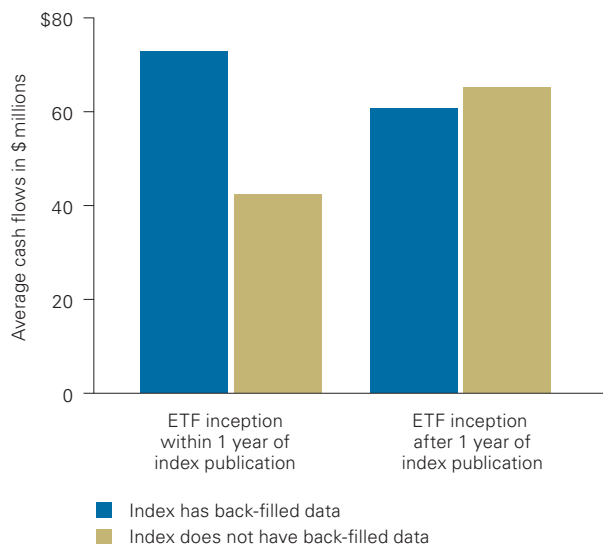


Note: Analysis based on available back-tested data from Bloomberg.

Sources: Vanguard and Strategic Insight’s Simfund. Index-publication dates obtained from index-provider and ETF-sponsor websites.



**Figure 9.** Average cash flows into ETF in first six months after inception, as variable of index-publication dates



Note: Analysis based on available back-tested data from Bloomberg.

Sources: Vanguard and Strategic Insight's Simfund.

Next we further divided the two categories into (1) indexes that ETFs sought to track within one year of index inception and (2) indexes that did not have an ETF seeking to track them until more than one year after inception. Thus, the former group had less than one year of index performance history when the ETF was launched. As shown in **Figure 9**, when an index had less than one year of live performance history (shown in the left side of the figure), use of back-filled performance data appeared to drive larger cash flows into the ETFs. However, as shown on the right side of Figure 10, when an index had a year or more of live performance history, use of back-filled data did not appear to help in garnering cash flows during the first six months.

## Conclusion

The impressive growth in the ETF industry has been driven by a coinciding spike in the number of indexes that ETFs seek to track. Despite the existence (as of November 30, 2011) of more than 1,000 such indexes from 75 different providers, the current U.S. regulatory framework does not directly govern performance presentation and marketing for those index providers. Thus, the majority of index providers are able to make back-filled performance data easily available to investors either on their own or third-party websites. As we have demonstrated, back-tested performance does not appear to persist, on average, past the live-index date. In our view, this is possibly because benchmarks are often being chosen for new products based on their attractive past performance history. Perhaps not surprisingly, ETFs that track new indexes with back-filled data gather more assets in the first six months after ETF inception. Overall, it appears that index creation activity has been transformed from an exercise of providing investable benchmarks for different asset-class segments to one of providing ETFs a way to market and promote new products with ready-made indexes that might jump-start the acceptance and viability of new offerings.

## References

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