For Institutional Investors Only

New Approaches to Active Management & The Need for Manufacturing Flexibility in an Era of Asset Class & Factor Investing

Citi Business Advisory Services

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Introduction & Key Findings

Our 2016 report focused on how the industry had reached a tipping point on passive investing where product and technology innovation combined with growth in ETF trading products were starting to create a network effect that made it as easy for large institutions to trade exposures as it has been for them to trade individual securities in the past.

With a diversified set of low-cost passive style box and smart betas to choose from, institutional investors had begun to "bar-bell" their portfolios—constructing a diversified passive "cube" of betas as the foundation of their portfolio construction.

This shift in approach changed the nature of what institutions sought from their active managers. Rather than delivering products that offered beta and some outperformance relative to a benchmark, institutions were looking for performance enhancement to augment their passive core.

We forecast at the time that this shift in demand would prompt active portfolio managers to re-package their skills into new funds or offerings that sought to reduce beta and/or cost as a result.

This year's 8th Annual Industry Evolution survey updates that story in three ways:

Sections I and II explore the drivers of passive fund growth to determine if any of the influences that were accelerating uptake of passive products have moderated and examine an oft-asked question about what role ETFs might play in a future market or liquidity crisis.

Sections III, IV & V highlight the product development opportunities that large active managers are exploring and showcase the type of new funds they are designing to work more effectively with bar-belled portfolios.

Sections VI & VII detail the changes that asset and wealth managers are making to compete in the emerging environment, breaking the industry down into supply-chain terms. Within this construct, we explore how firms are building flexibility into their manufacturing and product development process leading to enhanced packaging and distribution capabilities geared to accommodate an upcoming era of mass customization.

Key findings from this year's report are highlighted below:

Section I:

Each of the passive drivers we highlighted in last year's report remaining force.

Though the low-yield environment appears to be easing, investors seem to have internalized industry-wide messaging about the negative impact of fees on investment returns. Globally in 2016, 75% of mutual fund inflows were directed to funds with <10 bps expense ratio and collectively, funds with >50 bps fees experienced net outflows.

Despite anticipation that political winds might be shifting in terms of bank regulations, securities available for sale on both U.S. and European bank balance sheets continued to fall, extending the trend of institutions' favoring index over individual security exposures in certain regions and markets to minimize liquidity concerns.

Increased industry spend on risk technologies continues to provide democratized access to complex risk factor models that enable investors to more easily construct and manage a set of core beta exposures. Worldwide Google search interest shows a sharp increase in inquiries on "factor investing"—a sign that awareness of the bar-belled approach is permeating beyond sophisticated institutional audience.

Faced with an expected +50% increase in the population of individuals age 65+ between 2017 and 2030, global regulators are focusing more on consumer protections with the Department of Labor Fiduciary Rule becoming effective in June 2017. Both U.K. and European regulators released reports promoting the need for automated platforms to ensure broader access to low-cost investment advice. Robo-advisory AUM continues to grow and these offerings are increasingly being seen as ETF distribution platforms.

Underscoring the power of these forces, passive inflows in H1 2017 set a new record of +$418 billion and actively managed strategies witnessed their third consecutive year of net outflows (-$261 billion in H1 2017 alone). If growth continues at its current pace to year end 2017, +$1.9 trillion will have moved into passive funds and actively managed funds would have net outflows of -$1.5 trillion between 2015 and 2017. ETFs would remain the fastest growing segment of passive with ETF AUM having already risen to a new record of $4.0 trillion in H1 2017.

Section II:

While the share of total market AUM represented by ETFs is nominal, they have an outsized impact on trading. In the U.S., ETF equity holdings accounted for <10% of equity market capitalization, but 18% of share volume and 27% of dollar volume in H1 2017.

Historical trading patterns show ETF dollar volumes surging in high volatility periods. Deeper analysis of what may occur during a crisis reveals the following patterns to watch for if past behavior offers a roadmap for a future event:

There could be less selling pressure from investors in index funds as a whole and ETFs in particular as compared to mutual funds. Net U.S. equity ETF issuance has gone up while U.S. equity mutual fund flows have gone down during the Tech Bubble, the Global Financial Crisis and the equity turbulence of 2011.

Backlogged sell orders, particularly at the start of the trading day, could prompt limit up limit down (LULD) moves that would diminish opportunities for ETF arbitrage. This may result in a temporary dislocation of ETF spreads, but such backlogs should be worked though in an orderly manner due to new prohibitions on stop-loss and GTC orders in the electronic execution queue.

Authorized participants monitoring block trades can watch for a shift in interest from "redeem for cash" to "redeem in kind for securities" as a signal that demand is re-emerging and this could push these primary market makers to step in and begin arbitrage trading even if market makers in the secondary markets remain sidelined.

Once ETF arbitrage trading resumes, any dislocations should revert and normal trading should commence. Whether this happens as a one-time event or becomes a recurring cycle, the overall mechanics of the ETF industry should hold if historical evidence offers a guide.

Having sustained confidence in ETF products will be an important factor for the first of the new product development opportunities discussed by survey participants—the emergence of new fund offerings that mix active and passive investing.

Section III:

Survey participants identified two new product offerings that mark a shift away from the formulation of "active versus passive" to a new formulation of "active and passive".

Multi-factor smart beta funds that focus on factor allocation or rotation are a new type of market-timing product that relies on dynamic signaling to determine when to shift capital. These funds have launched at a rate 3 times greater than the other types of smart beta strategies since 2015. This is the first "solution" targeted at wealth advisors in the factor space.

Distinct from a multi-factor solution, survey participants also highlighted the emergence of a new type of multi-asset class solution (MACS) that mixes active and passive building blocks and that is targeted at delivering a "bar-bell" type package to a retail or wealth client. We have labeled these products MACS 3.0 to differentiate them from the balanced, target date and TAA funds in the traditional MACS 1.0 category and from the multi-strategy and outcome-oriented solutions offered in MACS 2.0.

Section IV:

The next set of innovation products cited by survey participants focuses on thematic trading—an approach that looks to return the investment management industry to the more opportunistic trading style employed prior to the emergence of today's style box orthodoxy.

Custom themes target long-term trends which may transform aspects of society. Companies in these portfolios can cross sectors, regions and market cap size. A portfolio focused on an aging population, for example, could be comprised of companies across sectors as diverse as healthcare, consumer discretionary and real estate.

Funds that focus on companies that exhibit good long-term governance or sustainable principles are another variation of this thematic approach and one that is becoming a priority for large pensions and sovereign wealth funds. These organizations have invested $346 billion in environmental, social and governance funds (ESG) as of H1 2017.

Individual investment in ESG funds has also grown significantly to $238 billion. ESG is one of a range of products that investors consider that offer a mix of both investment and societal alpha. Reduced availability of capital for charitable giving due to the low-yield environment and rising social activism tied to recent political developments are both creating a bottoms-up demand for ESG, socially responsible investing (SRI) and impact investing products.

Section V:

While passive fund inflows at +$1.7 trillion from 2014 to H1 2017 attract the bulk of industry and press attention, alternative products have actually attracted significantly more capital with inflows of +$2.7 trillion in the corresponding period. The most illiquid alternative products, including private equity, real estate and infrastructure, attracted 75% of those inflows. Finding ways to provide individual investors access to these illiquid products through publicly traded

market structures was cited by survey participants as our third area of product innovation.

With fewer companies choosing to enter the public markets or waiting until they have attained mid-cap or even large-cap size to consider an initial public offering (IPO), a set of active fund managers are using the flexibility of the 1940 Investment Company Act and the UCITS structures to build exposures to private firms as part of their publicly traded funds. Morningstar listed 194 mutual funds that include private company exposures.

Closed-end fund funds that offer access to listed private equity (LPE) are trading at steep discounts to NAV due to liquidity issues on the secondary market, but a new breed of open-ended mutual funds and ETFs are emerging that provide access to either the stock of publicly traded private equity firms or to indices that track their deal value.

Section VI:

Though not a traditional way of describing the industry, we are borrowing supply chain terms to highlight changes happening across the entire lifecycle of investment management and wealth advisory—focusing first on efforts to create greater flexibility in the manufacturing of investment ideas, portfolio construction and performance attribution.

The amalgamation of buy-side fundamental and quantitative research disciplines is creating three distinct "quantamental" approaches. Quantamental Phase 1 brings together the strength of traditional fundamental hypothesis-building with the automated screening and vast data mining capabilities of traditional quantitative teams. Quantamental Phase 2 uncovers a new type of upstream fundamental analysis that leverages big data tools and new data sources to provide real-time signals on macro and company related developments. Quantamental Phase 3 features artificial intelligence algorithms using cognitive analytics to automate portfolio selection, construction and trading.

Two entirely new research models are also developing—the first linked to data firms that have opted to keep their inputs proprietary and trade off of those insights for only a limited set of investors; the second linked to crowd-sourcing platforms that are making their data, modeling and back-testing tools open to a community of quantitative developers to build trading algorithms, the best of which are compensated and included in investment portfolios open to outside investors.

A new type of factor attribution analysis is emerging for traditional long only fundamental portfolio managers to provide them insights on their own factor biases and help them better describe, understand and optimize their models.

Section VII:

Recent advances in product packaging and distribution aim to extend this goal of flexibility by creating bespoke trading solutions for institutions and tailored portfolio options for individual investors via platforms designed to provide the scale for the industry to deliver on a promise of mass customization.

Two new platforms focused on institutional investors are helping to optimize the promises of factor investing. The first performs portfolio analysis to identify factor concentrations, gaps or tilts and then creates and manages bespoke trades that offer specific factor exposures. The second reconstitutes traditional asset class based portfolios into their factor constituents and then optimizes those factor exposures to lower the costs and improve the diversification and management of those portfolios going forward.

The addition of robo-advisory tools to traditional wealth platforms helps refocus advisors on relationship management as opposed to core investing functions. New risk tools are helping advisors to better align individual investor portfolio selection to a broad and growing set of models that are increasingly being delivered via a 'single ticker', diversified solution.

Digital marketing and sales tools are also becoming a priority at wealth advisory firms as today's financial consumer is using the vast amount of publicly available information to formulate their investment views long before they contact a human advisor. These tools use behavioral profiling, journey tracking, cognitive analytics and automated intermediaries such as chatbots to engage these consumers throughout this investigative stage and then determine the right moment to insert the human advisor to maximize the likelihood of a client conversion.

Collectively, the findings in this year's report show an industry still grappling with the rapid growth of passive investing and the emergence of a secondary factor driven framework that sits alongside the industry's traditional asset class focused foundation. In the past year, however, active managers are finding traction in their efforts to repackage their skill sets into new products that move away from a benchmarked, style box approach. This shift is being supported by changes enabling increased flexibility in their manufacturing, packaging and distribution processes.

Methodology

For this, our 8th Annual Industry Evolution report, we interviewed investment managers, investors and intermediaries across the world. Collectively they manage **$37.5 trillion of assets.**

We interviewed **almost $6T of investors and intermediaries**. On the investor side, we engaged Sovereign Wealth Funds, Pension Funds, Family Offices, and Endowments and Foundations. The intermediary firms which we interviewed included Wealth Advisors, Investment Consultants, Vendors and Platform Providers. **Investment Managers comprised 60% of our interviews and represented almost $32T of AUM, or around 40% of global AUM.** These included a variety of Asset Managers, Hedge Funds and Private Equity Firms.

The geographic breadth of our interviews (shown below), as well as the spectrum of firms interviewed, helped us understand the industry trends and dynamics from many different angles, and get a better idea of just how pervasive they are, and the different attitudes towards them.

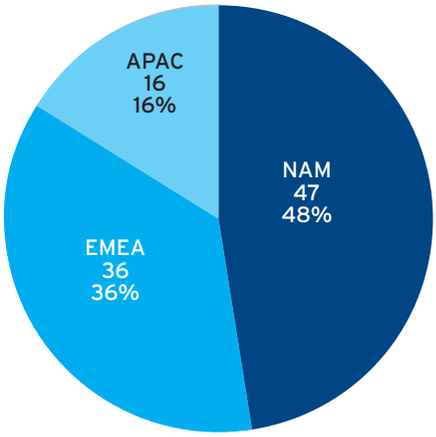
Our interviews encompassed a wide variety of roles: CEOs, CIOs, COOs, CFOs, CTOs, Business Heads, Senior Portfolio Managers, Investment Consultants, Heads of Research, and other investment professionals. The **99 in-depth interviews**, with **over 130 individuals**, were the starting point for our analysis presented in this paper. As in previous years, throughout the report we have included a selection of anonymized quotes to give a flavor of those conversations and the insights interviewees shared.

During the course of each interview, we discussed the themes and challenges faced by the industry; both current and potential. Interviews lasted on average 45 minutes and took the form of a free-flowing conversation rather than a scripted questionnaire, with our respondents guiding the discussion to the areas that they considered most important and interesting.

Below is a summary graphic of this year's interviews.

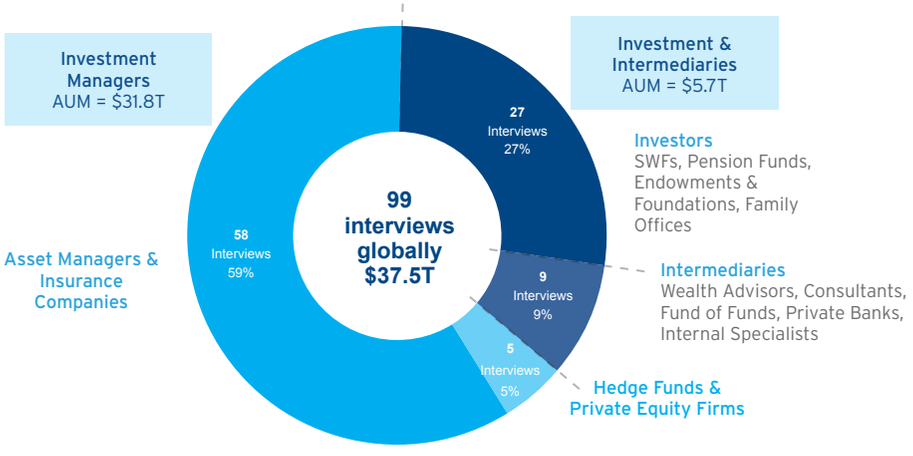
We are delighted to share the findings of this year's report. We would like to express our gratitude to all those individuals who once again participated in our survey and were so generous with their time. Thank you. We hope you find it useful.

Geographic breakdown of 99 Interviews



Source: Citi Business Advisory Services

Breakdown of Interviews



Source: Citi Business Advisory Services, AUM from Company Wedsites

New Approaches to Active Management & The Need for Manufacturing Flexibility in an Era of Asset Class & Factor Investing

Section I: Industry Continues to Grapple with Growth in Passive Investing

In last year's 7th Annual Industry Evolution survey, we highlighted four trends that we saw acting as tailwinds to drive the industry to a tipping point that favored passive over active investing.

These were 1) the low return environment causing an increased focus on how fees affected long-term return prospects; 2) Basel III rules pressuring banks to reduce inventories which raised liquidity concerns for individual securities; 3) new risk technologies enabling democratized access to complex factor models that sparked demand for new types of index products; and 4) demographic changes heralding increased retail control of assets, prompting regulators to focus on consumer protections and fostering increased adoption of digital advisory platforms that rely on low-cost trading products.

In Section I, we update our analysis of these factors and examine whether they continue to exert the same influence on the overall landscape. We also explore potential headwinds that survey participants suggested might be altering the industry dynamics, including perceptions that we may be entering a more favorable set of market conditions for active managers.

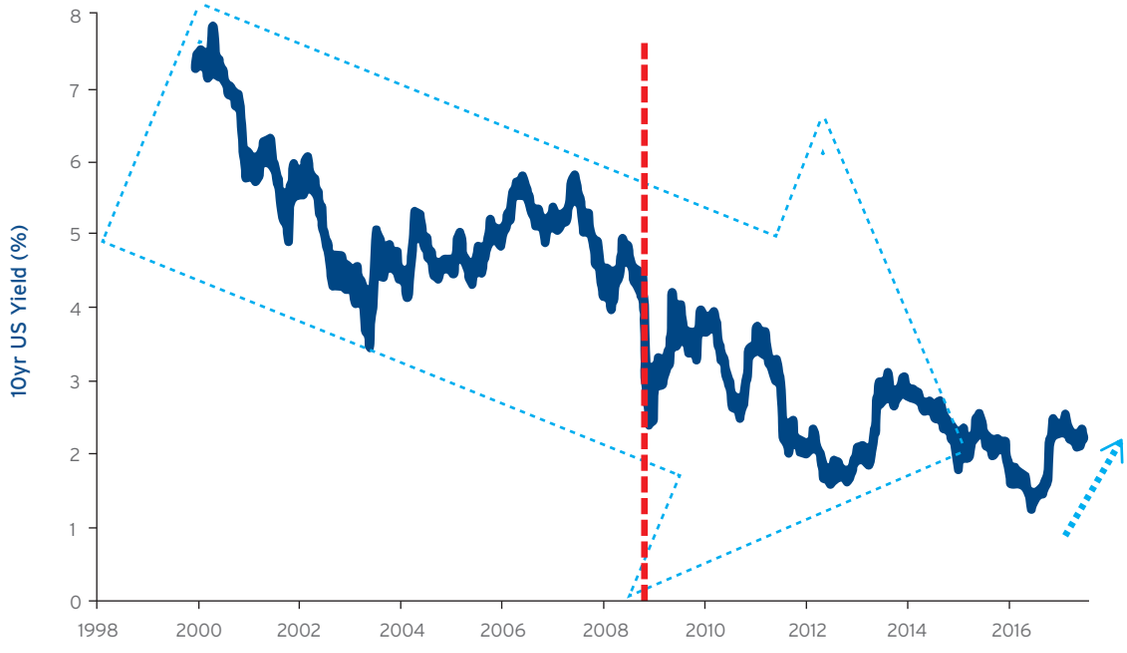
To provide nuance around the impact of passive incursions, we look at AUM, flows and market characteristics both globally and regionally to understand the pace of change and the possible path of continued growth in the coming period. In particular, we look at the uptake of ETFs and how these products are accelerating the shift to passive.

We conclude this section with our outlook for passive AUM growth.

Downward Pressure on Yields Abating but Focus on Low-fee Products Persists

Survey participants have cited the low-yield environment as a negative drag for active managers and discussed the difficulties they encountered in trying to identify and harvest meaningful investment opportunities given the industry's macroeconomic backdrop since the Global Financial Crisis (GFC) in 2008.

Chart 1.1: 10yr US Treasury Yields (2000-17H1)



Source: Citi Business Advisory Services Analysis based on Bloomberg data

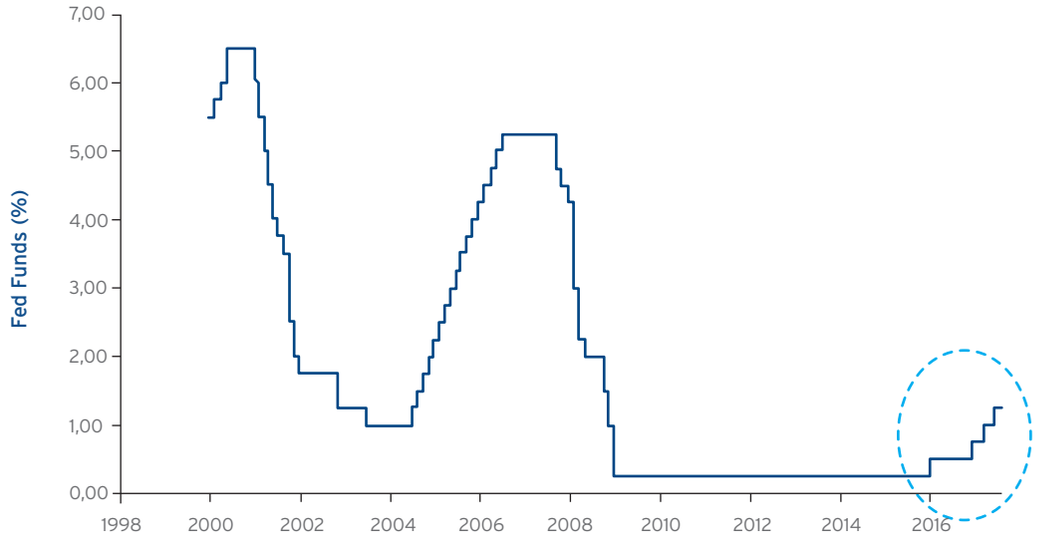
One of the most significant changes since last year's report is that, in the U.S. at least, the downward pressure on yields appears to be easing. Chart 1.1 shows the extended downtrend in 10-year U.S. Treasury bond yields and how declines that had begun back in 2000 accelerated after the 2008 crisis. It also illustrates how those yields have come off post-GFC lows in the latest few months.

Driving the improved outlook has been growing confidence from the U.S. Federal Reserve that the U.S. economy is strengthening and that interest rates can rise. The U.S. Jobless Rate fell to a 16-year low in May 2017 and Federal Reserve Chairman Janet Yellen announced that "We have confidence in the robustness of the economy and its resilience to shocks."[1]

The Fed has already increased policy rates twice in 2017 as shown in Chart 1.2. Though European and other central banks have yet to follow suit, there was growing confidence that the downward pressure on yields may finally be abating.

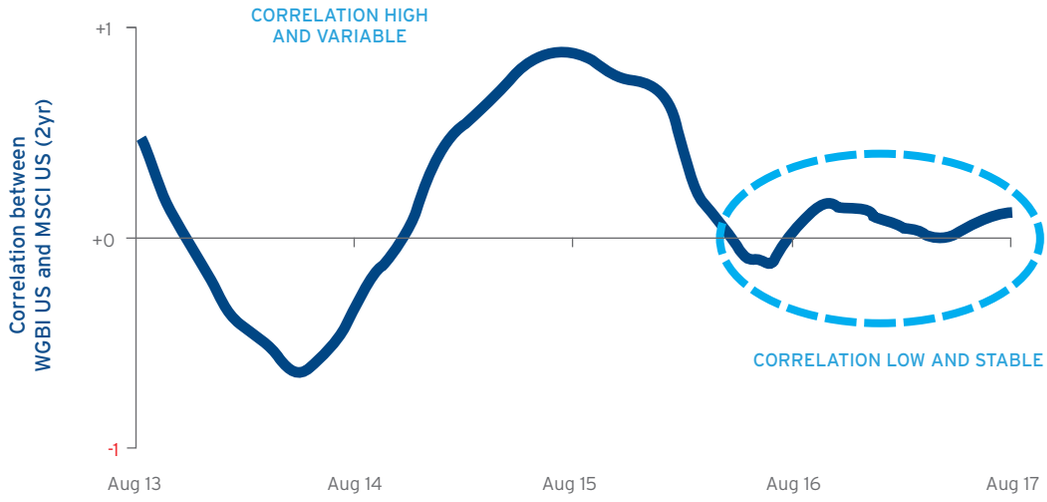
There is also evidence that the high correlation between equities and bonds that has challenged investment managers in recent years is becoming less of a concern. Chart 1.3 shows that there has

Chart 1.2: US Policy Rate Cycle (2000-2017)



Source: Citi Business Advisory Services Analysis based on Bloomberg data

Chart 1.3: Correlation between US Bond and Equity Indices



Source: Citi Business Advisory Services Analysis based on Bloomberg data

1 "Yellen Tells Investors After Rate Hikes that the Message is Simple: The Economy is Doing Well", Jeff Cox, March 15, 2017, CNBC.com, https://www.cnbc.com/2017/03/15/yellen-tells-consumers-after-rate-hike-the-simple-message-is-the-economy-is-doing-well.html

been a decisive shift in the last year to a lower and more stable relationship. Many survey participants expressed optimism that the current environment should allow active managers to identify more idiosyncratic opportunities and achieve stronger returns.

Yet, despite the trading environment appearing to be more conducive for active managers, there remains some question as to whether a performance rebound will stem the flow of money out of actively-traded and into passively-traded funds.

Survey participants noted a perhaps irreversible change in investor attitudes about the need for low-fee products. Multiple years of news coverage appear to have permeated the general investor mindset and driven up understanding of how management and expense fees negatively impact investment returns. What was once primarily an institutional concern about fees has spread to the less savvy mass affluent and retail audience.

One signal of this shift in views is the dramatic increase in Google searches related to the term "passive investing" shown in Chart 1.4.

Between 2008 and 2010, Google reported a similar number of searches for both 'active investing' and 'passive investing' but search interest around the two terms diverged as global equity market returns dipped in 2011. This period marked the start of widespread press coverage about the impact of fees on investment returns. By 2012, searches for active investing began tailing off and searches for passive investing started to grow. As press coverage relating to the shift from active to passive investing increased over the past 18 months, searches for passive investing spiked.

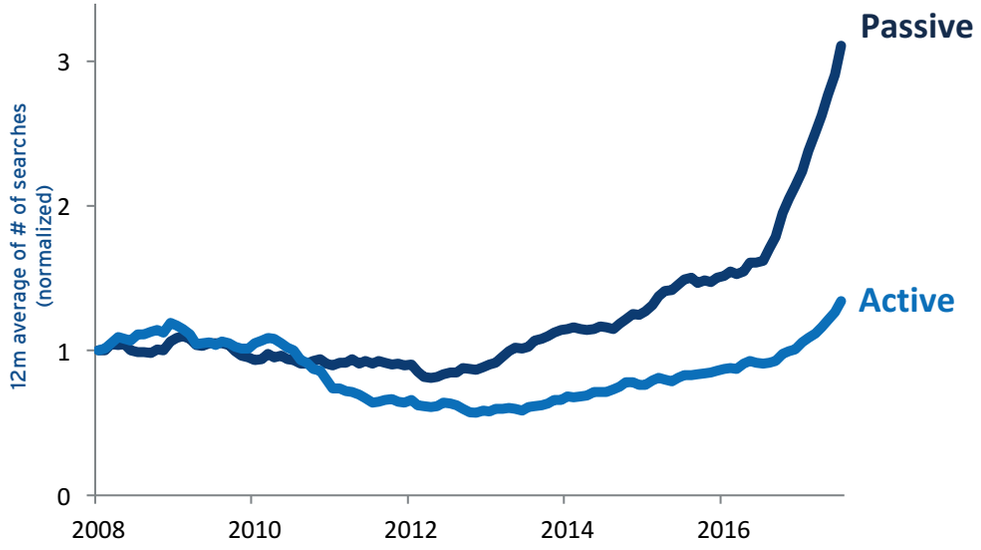
While there is not a quantifiable link between this search data and actual investor behavior, the message may indeed be influencing real world activity and we may now have reached a point in the industry where the willingness of retail investors to unquestioningly or unwittingly pay high fees for investment products has perhaps changed forever. This change in behavior is evident in U.S. mutual fund flows shown in Chart 1.5.

U.S. mutual fund flows provide a good proxy for retail behavior as 92% of equity, bond and hybrid mutual funds were owned by individual investors in 2016 according to the Investment Company Institute.[2] As Chart 1.5 shows, there was a clear correlation between the average expense ratio charged by these funds and flows during 2016.

An expense ratio captures "the annual fee that all funds or ETFs charge their shareholders and the percentage of assets deducted each fiscal year for fund expenses, including 12b-1 fees, management fees, administrative fees, operating costs and all other asset-based costs incurred by the fund."[3]

In 2016, U.S. mutual fund investors directed $326 billion in net inflows to mutual funds with an expense ratio of <10 bps. These extreme low-cost funds accounted for 3/4 of total net inflows. Indeed, all net inflows were confined to funds charging less than 50 bps with all funds charging more than that figure posting net outflows. More than half those outflows came from the highest expense ratio category of funds charging more than 90 bps.

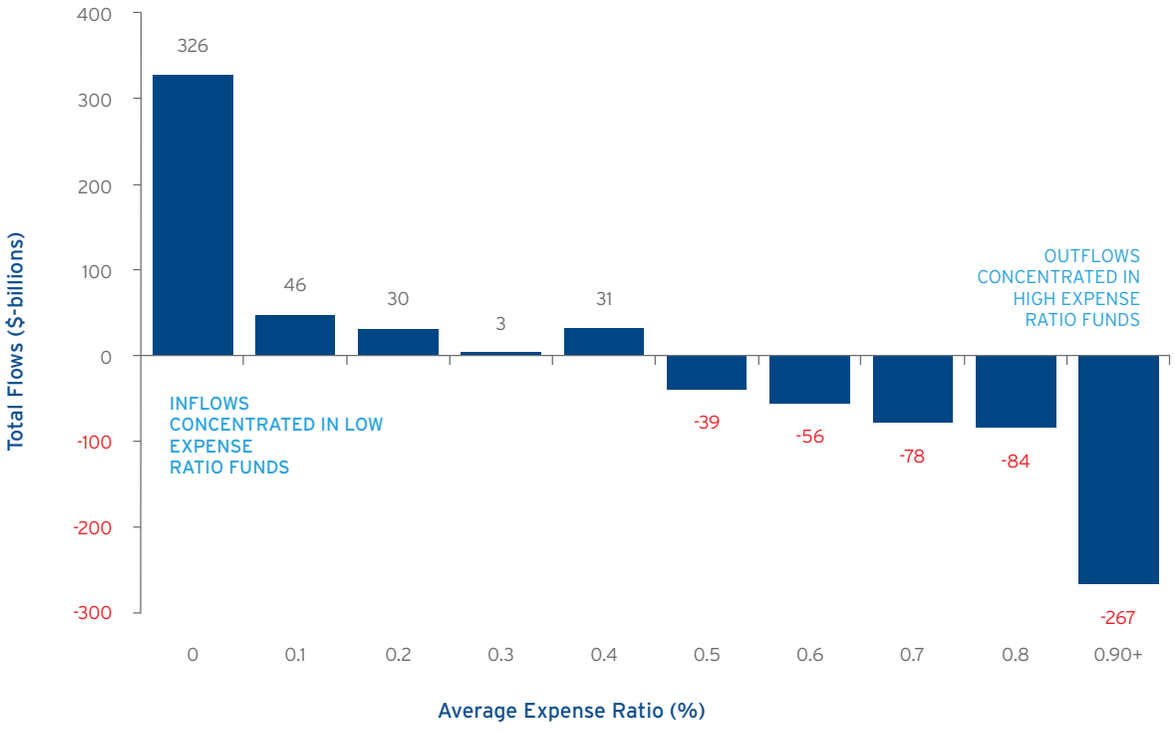
Chart 1.4: Worldwide Google Searches for 'Active' and 'Passive' Investing



Source: Citi Business Advisory Services Analysis based on analysis from GoogleTrends
https://trends.google.com/trends/

2 2017 Fact Book, Investment Company Institute, ICI.org, Table 60, Mutual Funds: Individual and Institutional Ownership, http://www.icifactbook.org/data/17_fb_data
3 Morningstar.com, Glossary, www.morningstar.com/InvGlossary/expense_ratio.aspx

Chart 1.5: US Mutual Fund Inflows Split By Expense Ratio (2016)



Source: Citi Business Advisory Services Analysis based on Bloomberg Intelligence data

Given this result, we feel confident asserting that investors' focus on fees, which was borne out of and accelerated by the low return environment after 2008, continues to drive AUM towards low-cost products, which is currently synonymous with passive and ETFs. That situation has not changed materially from when we examined it in last year's report.

"QE has driven a lot of the flow to passive." Global Asset Manager >$1T AUM

"In a low-yield environment it is extremely difficult to have high fees" EMEA-based Asset Manager $500B-$1T AUM

"The single most important determinant of your investment outcome is your beta, and not your alpha. The investment management industry as a whole is massively resistant to accepting that reality. Turkeys don't vote for Christmas. But consumers do." Global Asset Manager >$1T AUM

Basel III Concerns Shrink Bank Balance Sheets to Lowest Levels since GFC

The second factor contributing to the growth of passive that we detailed in last year's report was a rise in liquidity concerns related to investors' ability to access individual securities. This was linked to the Basel III accords and the accompanying regulations enacted in the aftermath of the Global Financial Crisis (GFC). These regulations forced a reduction in bank balance sheets which limited banks' risk taking (an intended consequence) but also led to a dramatic decrease in liquidity as banks were less willing, and able, to warehouse risk (an unintended consequence).

Survey participants noted that the resulting uncertainty and concern about the variability of liquidity, in all asset classes, and especially in stress situations, has driven a self-feeding preference amongst institutional investors for index exposure over individual security exposures. This reflects a belief that it will be easier to exit or hedge exposures in indices during periods of market disruption than move in and out of individual securities, a perception borne out by evidence in past stress events as will be discussed in Section II.

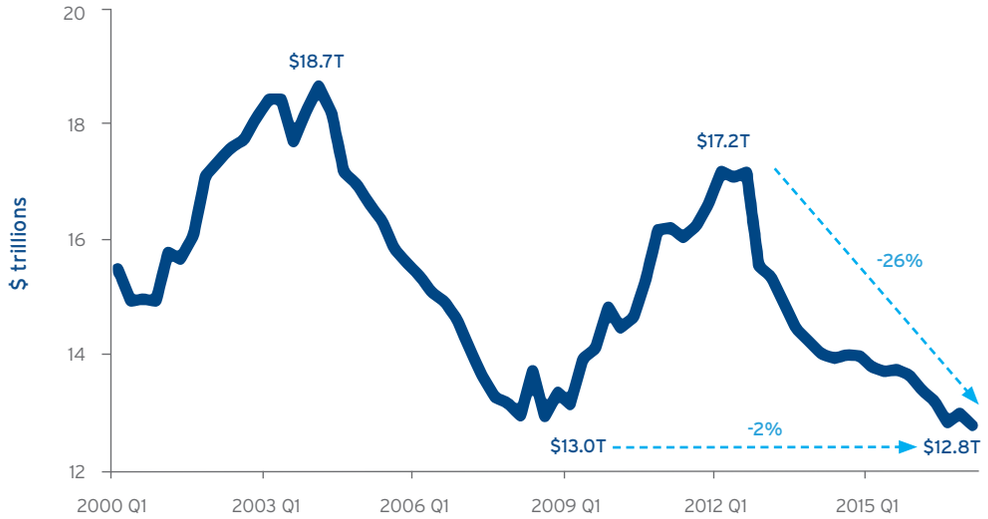
One year on from our original discussion of this trend, there has not yet been any sign that falling bank inventories have either stabilized or reversed. Chart 1.6 shows that securities for sale on U.S. bank balance sheets hit a new post-2000 low in Q1 2017 falling to only $12.8 trillion, a figure 2% below the GFC trough

of $13.0 trillion and a level 26% below the $17.2 trillion noted back in 2011 when the Basel III rules took force.

Similar declines in securities held on European Union (EU) bank balance sheets are also evident. As shown in Chart 1.7, equities and bonds held on EU bank balance sheets peaked at €7.9 trillion in the aftermath of the Global Financial Crisis but have fallen by 18% to only €6.5 trillion in Q1 2017.

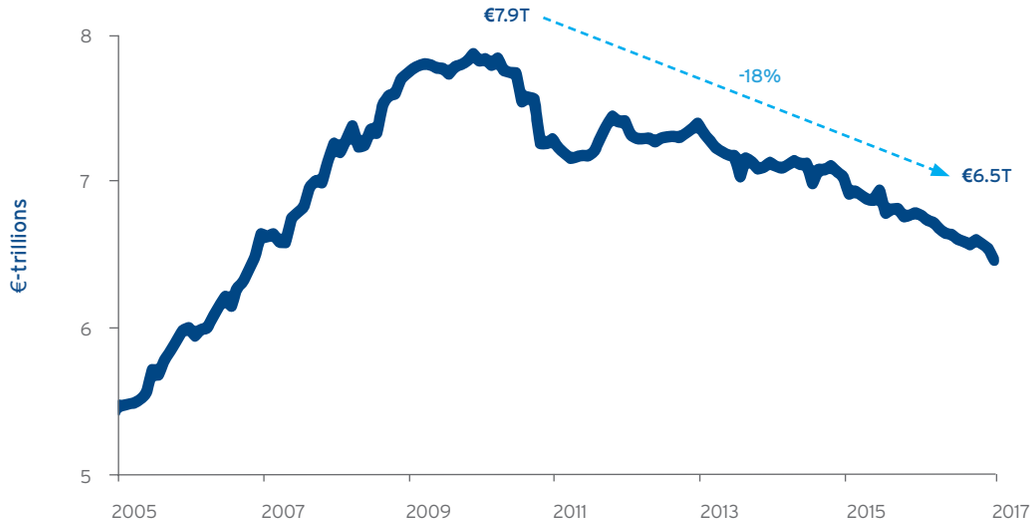
While the nascent optimism among active managers around improving conditions for active management linked to the turn in the U.S. rate cycle and consequent increase in yields is arguably well-founded, optimism that political events in the past year could result in an easing of regulatory pressures that in turn would allow banks to rebuild their balance sheets to support higher inventory has yet to pan out, even in the U.S. Indeed, Federal Reserve Chairman Janet Yellen said in late August 2017 that "any adjustments to the regulatory framework should be modest and preserve the increase in resilience at large dealers and banks associated with the reforms put in place in recent years."[4]

Chart 1.6: Securities Available For Sale on US Bank Balance Sheets



Source: Quarterly Trends for Consolidated U.S. Banking Organizations Q1 2017, Federal Reserve Bank of New York, https://www.newyorkfed.org/research/banking_research/quarterly_trends.html

Chart 1.7: Equity and Bond Securities held on EU bank balance sheets



Source: ECB Statistical Warehouse data
https://www.ecb.europa.eu/stats/supervisory_prudential_statistics/consolidated_banking_data/html/index.en.html

4 "Yellen Warns Against Erasing Regulations Made After Financial Crisis", Binyamin Applebaum, August 25, 2017, New York Times.com, https://www.nytimes.com/2017/08/25/us/politics/yellen-warns-against-erasing-regulations-made-after-the-financial-crisis.html?mcubz=1

Survey participants continue to cite reduced bank inventories, and the associated low or variable liquidity, as an impetus to encourage large institutions to use index exposures in certain regions and markets, and thereby continue to fuel the move to passive. This second pillar of passive growth is also thus still intact, despite developments over the past year.

"We don't give liquidity enough attention. In a crisis banks no longer have the balance sheet to take the other side of moves." EMEA-based Asset Manager $500B-$1T AUM

"What has changed is the ability of banks to provide liquidity and the impacts of QE. The buy-side may have to be more involved in providing liquidity and that comes at a risk. I am worried about central clearing and too big to fail." Platform / Distributor

Democratized Access to Risk Technologies Driving Broad Expansion of Factor Investing

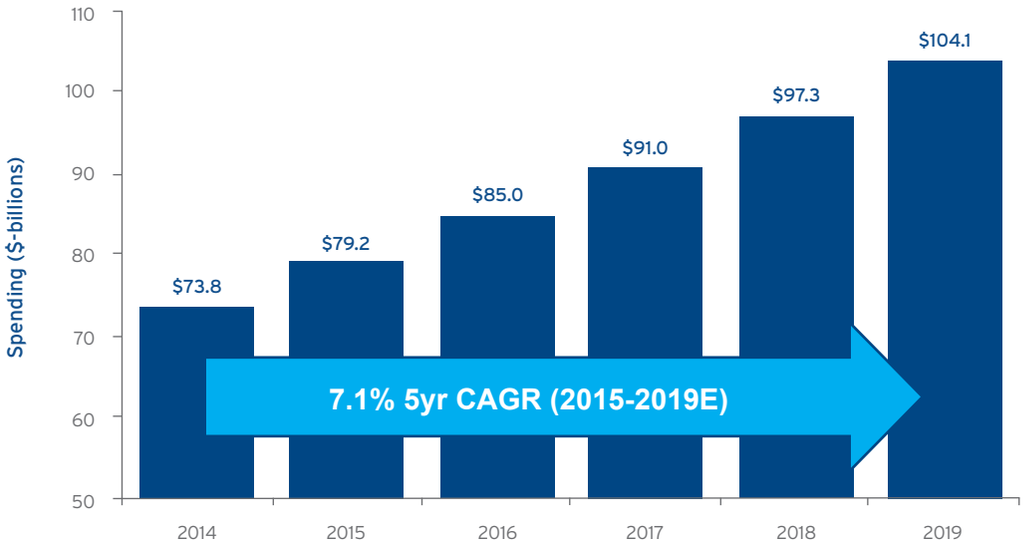
Last year's report explored how emerging technologies were democratizing access to sophisticated risk factor models and how advances in processing power were allowing such models to be applied in real-time capabilities that had once been the domain of solely select quantitative firms. Broader access and ability to deploy these models has enabled some institutional investors to develop a deeper understanding of their portfolios and to adopt a much more targeted approach to portfolio construction, risk budgeting, asset allocation, and risk management. This in turn is helping drive the emergence of new index products that focus on certain factor characteristics and combinations.

BlackRock's Aladdin risk platform was cited by many survey participants as the gold standard for sophisticated risk analytics and reporting. According to the company's materials, Aladdin is currently used by over 25,000 investment professionals around the world.[5] Their risk module alone is thought to be running "tens of trillions of dollars in risk analysis" each day for outside clients as well as for BlackRock's own investment teams.[6] Aladdin plans to expand beyond its institutional focus and begins to promote Aladdin Risk for Wealth Management to the broader investment community, signing on UBS Wealth Management as their launch client in May 2017.[7]

Other risk providers have also seen a sharp uptick in demand. IDC Financial Insights puts worldwide spend on risk technologies in the Financial Services industry at $85.0 billion in 2016, a 15% increase in just 2 years from $73.8 billion spent in 2014. Their projection puts total risk IT spend at $104.1 billion by 2019 based on a 7.1% 5-year CAGR. This outlook is detailed in Chart 1.8.

Public announcements by some pension funds such as Denmark's ATP stating that they would no longer "place a given investment in a single risk class, but will 'decompose' it into risk factors" raised awareness of how sophisticated institutions are shifting to this new

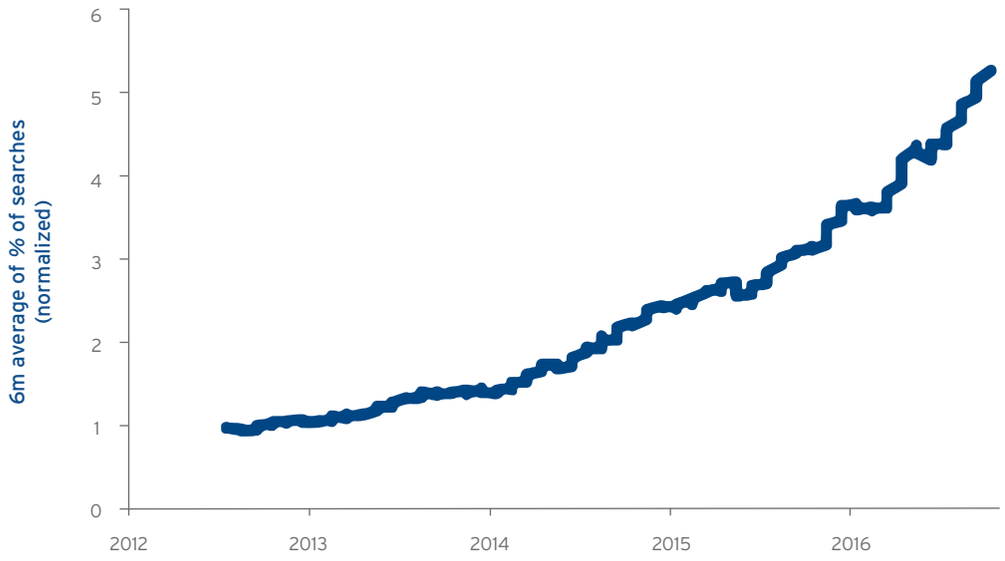
Chart 1.8: Financial Services Risk IT Spend



Source: IDC Financial Insights Annual Report, http://www.idc.com/getdoc.jsp?containerId=US41189916

5 https://www.blackrock.com/aladdin/offerings/aladdin-overview
6 "Wall Street's Smart Money Continues to Bet on the New Financials", Antoinne Gara, July 26, 2017, Forbes.com, https://www.forbes.com/sites/antoinegara/2017/07/26/wall-streets-smart-money-continues-to-bet-on-the-new-financials-from-blackrock-to-blackstone/#78d30ac41acb
7 "UBS Wealth to Use BlackRock's Aladdin", May 11, 2017, Barron's.com, http://www.barrons.com/articles/ubs-wealth-to-use-blackrocks-aladdin-1494528294

Chart 1.9: Worldwide Google Searches for 'Factor Investing'



Source: Citi Business Advisory Services Analysis based on analysis from Google Trend
https://trends.google.com/trends/

investment approach.[8] Asset managers as well have been publishing and promoting white papers that focus on this topic as part of their marketing campaigns to promote new smart beta and risk premia funds (as will be discussed in Section III).

The result is that institutional interest in factors is building and starting to spill over into the retail and high net worth sectors. Increased interest is clearly evident when viewing worldwide Google searches for the term "factor investing" as shown in Chart 1.9.

Based on these signs, there is no evidence that there has been any type of slowdown in the interest, understanding or use of factors. AUM in smart beta and risk premia funds, which are almost wholly composed of index products, continues to rise. The outlook is for this interest to continue to promote increased use of passive funds.

"We have a stronger belief in the diversification of the portfolio when we look through the factor lens than when we were looking exclusively through the asset class lens. We don't feel the need to do as much active hedging because we understand its dynamics and behavior much better now." Pension Fund

"Moving forward we'll move towards a factor-based approach to risk." Large Pension Fund

"Factors give you better visibility on the dynamics of the return function." EMEA-based Asset Manager $500B-$1T AUM

Global Demographics Augur Increased Retail Participation, Focus on Fees and Shifts in the Advice Model

The fourth and final factor we highlighted in last year's report helping to explain the growth in passive investing related to population demographics. There are 3 aspects to this demographic story:

1) Forecasts for substantial growth in self-directed retail investing spurred by retiring Baby Boomers and a rapidly growing global middle class;

2) Continued efforts by regulators to protect the swelling ranks of individual investors by enforcing more fiduciary standards and fee transparency and promoting more automated advisory channels;

3) The transition of technology-savvy Millennials into their peak earning and savings years and their foundational experience of growing up in a low-yield environment.

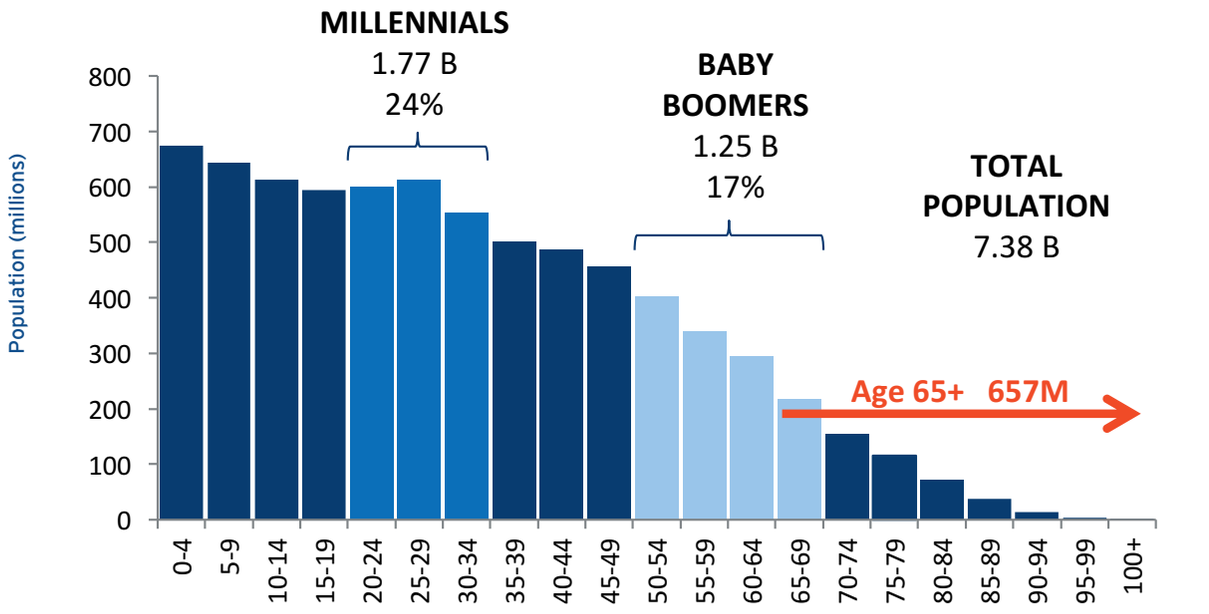
8 "ATP Returns 17.5% in 2015; Unveils New Risk Factor Asset Allocation", Sophie Baker, February 4, 2016, Pension & Investments, http://www.pionline.com/article/20160204/ONLINE/160209914/atp-returns-172-in-2015-unveils-new-risk-factor-asset-allocation

We will examine each in turn to more fully understand their impact and determine if any shift has occurred in the past year. We begin with some high level observations.

The next 10-20 years will bring broad generational shifts as shown in Chart 1.10. Baby Boomers will all be over age 65 and focusing on retirement. Millennials will be into their 30's to 40's and building their families and financial futures. The paths of both these segments will dictate to a large extent how the investment management industry evolves.

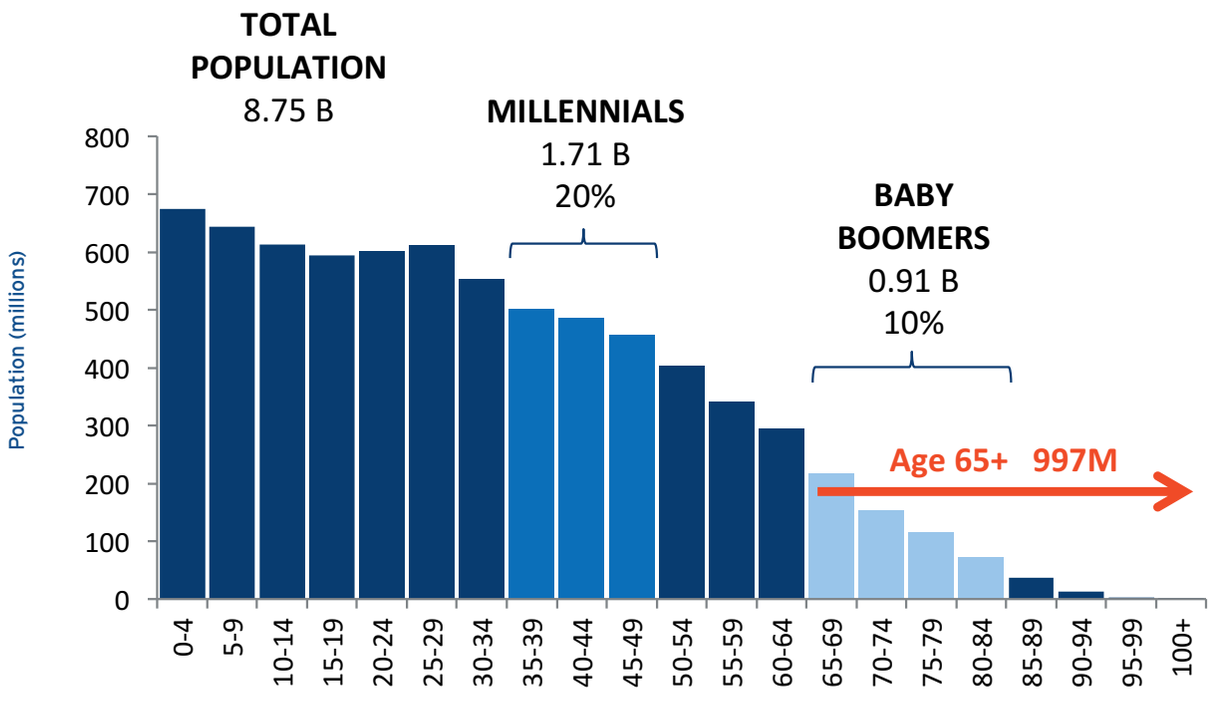
The global middle class is also expected to increase dramatically. According to the Brookings Institute, the size of the middle class is seen expanding 79% between

Chart 1.10A: Global 2015 Population Distribution (millions)



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

Chart 1.10B: Global 2030 Estimated Population Distribution (millions)



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

2015 and 2030, rising from 3.0 billion to 5.4 billion in that period.[9] Data shows that growth in this segment is accompanied by increases in both spending and retirement savings.

Aging Baby Boomers & Growing Middle Class to Boost Retirement Savings

Baby Boomers began entering retirement (age 65+) just after 2010 and this entire generation should be out of the workforce by 2030. Because of increased longevity, the size of this retiree pool is expected to be the largest in recorded history. The U.S. Census Bureau estimates that the worldwide population of individuals age 65+ in 2017 was 657 million people and by 2030 that total should jump 52% to 997 million.[10] Proportionately, men and women age 65+ will increase from 9% to 12% of the total population.

The arithmetic of this expansion is daunting. Willis Towers Watson estimates that 52% of global pension assets today are in defined benefit plans.[11] As they enter retirement, Baby Boomers will be looking to be paid out, drawing down the assets of the fund and shifting the burden for managing the investment of that capital to the individual retiree. The length of retirement these funds must cover is also expected to grow with average life expectancy seen exceeding 90 years by 2030.[12]

On the verge of these pension withdrawals, indications are that the majority of defined benefit plans may not be able to meet their full liabilities. Many plans are underfunded as the gap between long term return assumptions and actual returns post-GFC has been chronic. According to a new paper released by the World Economic Forum, the global retirement funding gap could reach $400 trillion by 2050 with $224 trillion of that coming from the world's six largest pension saving systems—the U.S., U.K., Japan, Netherlands, Canada and Australia."[13]

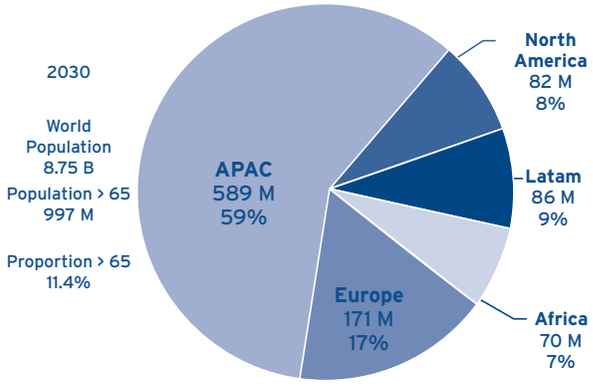
Defined benefit pension schemes account for 80% or more of total pension assets in 4 of those 6 countries: Japan (96%), Canada (95%), Netherlands (94%) and the U.K. (82%). Even in the U.S., defined benefit plans account for 40% of pension assets.[14] Faced with the prospect of potentially having less to retire on than anticipated and the need to make those savings stretch as long as possible to match their increased life expectancy, retirees that withdraw their pensions may look toward low-fee investments.

Those individuals participating in defined contribution plans have fared slightly better showing per annum global growth of 5.6% over the last 10 years versus only 2.6% for defined benefit plans.[15] The U.S. accounts for 76% of global defined contribution plan assets, but even in that country the uptake of such offerings is sub-optimal.

According to the U.S. Bureau of Labor Statistics, the take-up rate of those eligible and participating in a defined contribution plan in March 2016 was only 69% for civilian workers, 72% for private workers and 46% for state and local government workers. This means that at least 1/4 and in some cases as many as half of those eligible to place assets into voluntary retirement savings are opting out of the plans. This may leave a significant number of those individuals underfunded as they enter retirement as well and thus incented to focus on low-cost investments.

As concerning as these statistics appear, the U.S. is at least more prepared than other regions. Willis Towers Watson estimates U.S. pension savings at $22.5 trillion in 2016—62% of the global figure of $36.4 trillion. By 2030 21% of the U.S. population is expected to be 65 years of age or older, but these individuals are expected to be the smallest set of retirees as measured across the largest 3 regions. This is shown in Chart 1.11.

Chart 1.11: Estimated Population over 65 in 2030 (millions)



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

9 "The Unprecedented Expansion of the Global Middle Class-An Update", Homi Kharas, Global Economy & Development Working Paper 100, February 2017, https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf
10 Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.
11 "Global Pensions Asset Study 2017" Willis Towers Watson, https://www.willistowerswatson.com/en/insights/2017/01/global-pensions-asset-study-2017
12 "Life Expectancy Forecast to Exceed 90 Years in Coming Decades", Sarah Boseley, The Guardian, https://www.theguardian.com/society/2017/feb/21/south-korean-womens-life-expectancy-exceed-90-years-2020-study
13 "Global Pension Timebomb: Funding Gap Set to Dwarf World GDP", World Economic Forum, May 26, 2017, https://www.weforum.org/press/2017/05/global-pension-timebomb-funding-gap-set-to-dwarf-world-gdp/
14 "Global Pensions Asset Study 2017" Willis Towers Watson, https://www.willistowerswatson.com/en/insights/2017/01/global-pensions-asset-study-2017
15 Ibid.

Estimates from the U.S. Census Bureau show that U.S. based individuals age 65+ are only projected to reach 74 million by 2030 (7% of the global pool). This compares to 169 million in Europe (17%) and 592 million people in Asia (59%).

The preparedness of these other countries to meet the needs of these retirees is a concern. Pension assets from European countries covered by Willis Towers Watson totaled only $6.1 trillion in 2016, 17% of the global pool, and Asian pension assets (inclusive of Japan and Australia) were only $5.5 trillion, 15% of the global pool.[16]

One factor that may help this situation, however, is the projected growth in the middle class. Middle class consumption accounted for over 1/3 of the global economy in 2015 according to the Brookings Institute report[17], and, in the U.S., (the largest middle class population in terms of consumption in 2015) analysis reveals rapidly rising and record levels of retirement savings.[18] If other regions show the same correlation between a growing middle class, increased spending and rising retirement savings, that pattern could help mitigate some of the pension shortfalls, particularly in Asia as shown in Chart 1.12.

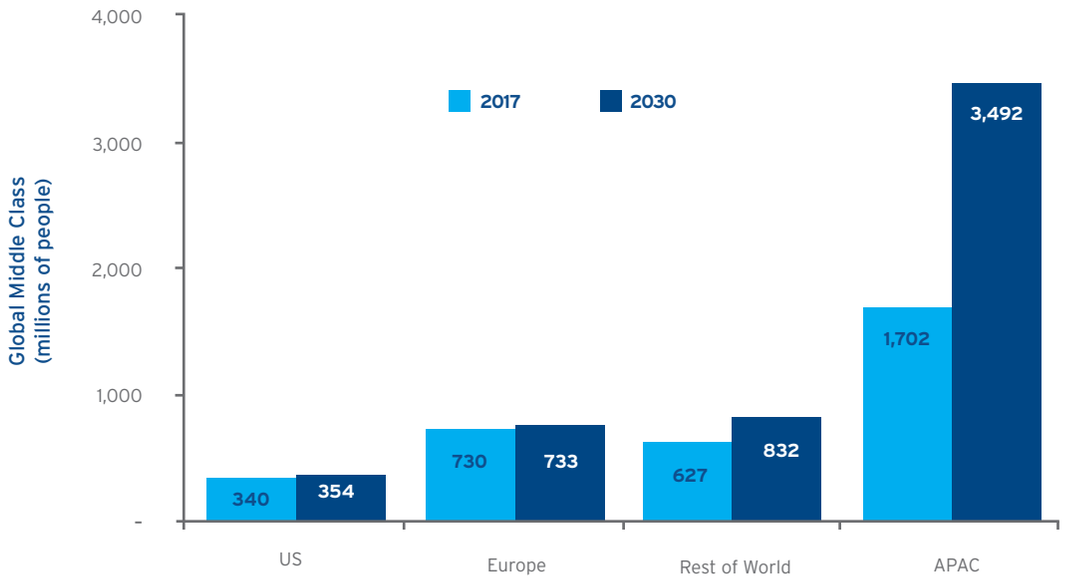
The size of the Asian middle class is expected to more than double between 2017 and 2030, rising from 1.7 billion to 3.5 billion people. Asia is expected to grow from representing 50% of the world's middle class to 64% in that corresponding period.[19]

Regardless of whether the source of savings is from defined benefit pensions, defined contribution plans or personal savings, the outlook is for a rapid rise in the overall pool of retirement assets. Faced with this outlook, global regulators have already begun to implement policies aimed at protecting individual consumers from financial services industry practices that could adversely affect their ability to maximize their retirement savings.

Financial Industry Regulators Turn their Focus to Consumer Protections

Efforts to create consumer protections for retail investors began in Europe. In 2013, new Retail Distribution Review rules pushed by the U.K.'s Financial Services Authority went into effect. These rules banned commissions for retail investment advice in the U.K. Revised MiFID II rules also ban commissions when independent advice is provided. Though the MiFID II rules are not due to take effect until January 1, 2018, several countries have already implemented rules banning commissions for investment advice including Germany, the Netherlands and Australia.[20]

Chart 1.12: Estimated Growth of Middle Classes



Source: Citi Business Advisory Services based on data from Brookings Institute, Global Economy & Development Working Paper 100#, February 2017, The Unprecedented Expansion of the Global Middle Class, Homi Kharas - https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf

16 Ibid.
17 Source: Citi Business Advisory Services based on data from Brookings Institute, Global Economy & Development Working Paper #100, February 2017, The Unprecedented Expansion of the Global Middle Class, Homi Kharas - https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf
18 "Middle Class Retirement Accounts at Record Levels; Low-Income Households Still Saving Little", Andrew Biggs, December 23, 2016, Forbes.com, https://www.forbes.com/sites/andrewbiggs/2016/12/23/middle-class-retirement-accounts-at-record-levels-low-income-households-still-saving-little/#37359c08553f
19 Source: Citi Business Advisory Services based on data from Brookings Institute, Global Economy & Development Working Paper #100, February 2017, The Unprecedented Expansion of the Global Middle Class, Homi Kharas - https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf
20 "The UK Ban on Commission Relating to Retail Investment Advice—A Good Example for German Law?", Charlotte Baumanns, May 29, 2017, University of Oxford, https://www.law.ox.ac.uk/research-subject-groups/commercial-law-centre/blog/2017/05/uk-ban-commissions-relating-retail

European efforts sparked U.S. regulators to reconsider the market for retirement advice. Broad plans by the U.S. Department of Labor that oversees retirement accounts in the U.S. were outlined during the Obama Administration with the primary piece of legislation termed the "fiduciary rule."

Originally scheduled to become effective in April 2017, the rule was delayed by an executive order from the Trump Administration mandating that the Department of Labor perform an "economic and legal analysis on the fiduciary rule's potential impact". Despite this postponement, the department determined that there was no "principled legal basis" to postpone the rule's effective date further. The fiduciary rule became law on June 9, 2017 with an enforcement date of July 1, 2019.[21]

The rule "requires that fees and commissions be clearly disclosed to clients, and it expands the reach of the law to a wider range of financial professionals. Previously only Registered Investment Advisors (RIAs) and their representatives were considered to be fiduciaries for advisory and consulting services. The new rule applies the requirement to anyone making a recommendation or solicitation to any kind of retirement account."[22]

Rule-Making around consumer protections is likely to continue. Already in Europe, a Financial Advice Market Review (FAMR) of the RDR rules concluded that "though RDR reforms led to a higher quality of advice, and higher business standards in the financial services sector, it left many investors struggling to find affordable investment advice and they concluded that a significant number of banks had shifted to only advising high-income investors."[23]

As such, the FAMR report identified the automation of advice as a promising way of lowering the cost and distributing investment advice to a larger group of investors. Similar recommendations were echoed by a report on automation in financial advice from three European Supervisory Authorities (EBA, ESMA, and EIOPA). This report suggested that automated advice may be of higher quality than that of human advisors, as it is more consistent, based on the most up-to-date market information, and can be recorded more readily.[24]

These findings may prompt continued growth in robo-advisory platforms—forums that have become key distribution points for low-cost passive products. These offerings may be particularly important to Millennials.

Tech-Savvy Millennials Come of Age in Low-yield Environment

Aging Millennials are due to enter their peak earning (and saving) years in the coming period. Numerically, these individuals are expected to account for about 20% of the total population by 2030 and as was the case with the Baby Boomers, the vast majority of these individuals are projected to be located in Asia. The U.S. Census Bureau projects that 82% of Millennials will reside in Asia, accounting for more than 1.05 billion people.[25]

Survey participants were aligned in their view that as they mature, Millennials need to finance more traditional expenditures such as housing, children and education, which may drive these individuals toward seeking investment advice. Yet, there was also a broad recognition that the foundational experiences of this generation may influence their investment behavior to focus on low-fee, passive products.

Millennials have grown up with technology—and technology has grown up with them. As a consequence, their expectations of products and services are much higher, more immediate, and much more digitally focused. This is already challenging the way in which the financial services industry is looking to attract talent from this generation and it is driving a wave of innovation in wealth management platforms (both topics that will be discussed more thoroughly in Section VII).

Yet before the vast majority of Millennials have sufficient capital to qualify for most wealth management programs, they are learning investment behavior from a set of new online entrants that are geared to servicing their need for low-cost investment products that can be entered into with minimal amounts of capital.

In the U.S., platforms like Stash tout their ability to digitally "open an account and start trading in less than 2 minutes and with as little as $5."[26] Stash and Acorns, another platform targeted at Millennials, both allow investors to link their debit and credit cards to their investment account and fund their investing activity by rounding up the total on purchases to the next highest dollar. Acorns is provided free of charge to college students and accounts below $5,000 are charged just $1.00 per month.[27]

What Millennials are looking for from their accounts may also diverge from older, more traditional investors.

21 "Labor Department delays fiduciary rule implementation date", Elizabeth Dilts, August 9, 2017, Reuters.com, https://www.reuters.com/article/us-usa-wealth-fiduciary-rule/labor-department-delays-fiduciary-rule-implementation-date-idUSKBN1AP2KF
22 "DOL Fiduciary Rule Implementation Finally in Sight", Brian Mineckella, June 8, 2017, Forbes.com, https://www.forbes.com/sites/brianmenickella/2017/06/08/dol-fiduciary-rule-implementation-finally-in-sight/#52c6966c7a56
23 "The UK Ban on Commission Relating to Retail Investment Advice—A Good Example for German Law?", Charlotte Baumanns, May 29, 2017, University of Oxford, https://www.law.ox.ac.uk/research-subject-groups/commercial-law-centre/blog/2017/05/uk-ban-commissions-relating-retail
24 Ibid.
25 https://www.census.gov/data.html
26 https://www.stashinvest.com/
27 https://www.acorns.com/

Generationally, their entire view of investments is being shaped by the low-yield environment. Low returns are the norm for Millennials and as the Google search data we presented earlier shows, the messaging around low-fee passive investing is resonating.

Betterment, a robo-advisory platform originally geared toward Millennial clientele, touts on their front page their philosophy that "over the long term, a diversified portfolio of low-cost index funds is likely to outperform a high-cost, actively managed portfolio."[28]

Whether these views persist as Millennials age is impossible to determine but their core understanding of investing is one that may prompt them to be cautious about the value that higher fee products can deliver.

Given these three trends—the dramatic increase in retirement savings anticipated in coming years from an expanding middle class and from Baby Boomers that need to finance longer life expectancies on potentially lower than expected savings; increased regulatory actions to protect individual investors; and the rise of tech-savvy Millennials that have come of age in the low-yield environment—we anticipate that demographic forces will continue to push the industry toward low-cost investment products.

All the tailwinds we identified in last year's report thus continue to exert influence as summarized in Chart 1.13.

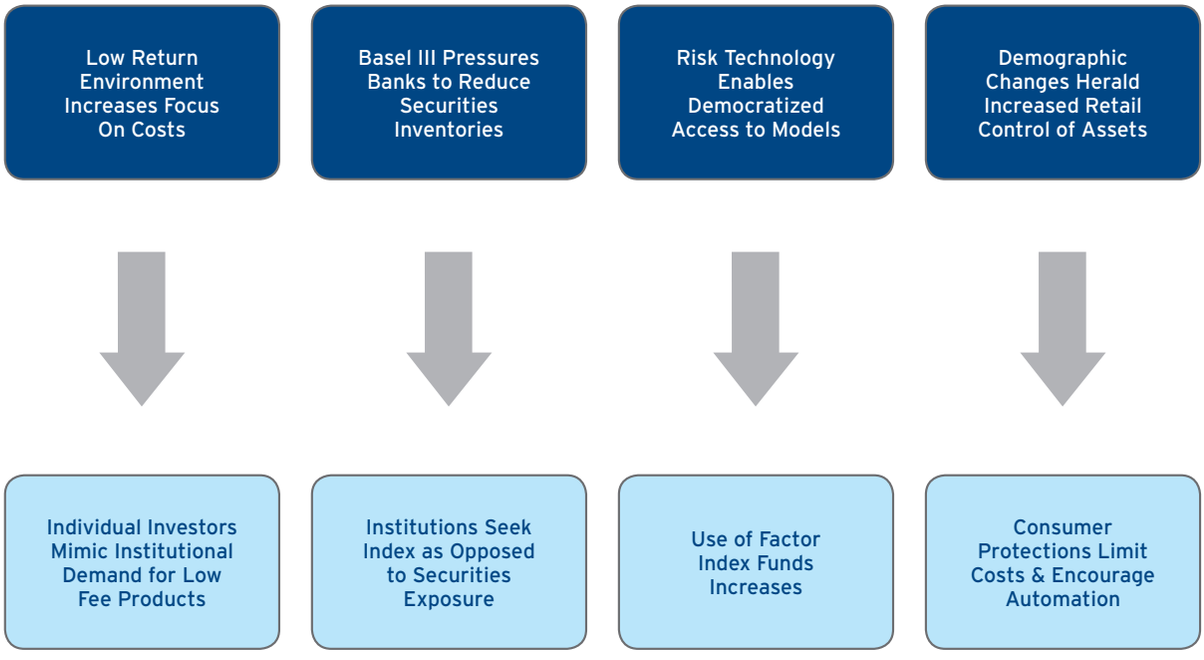
"We will see much greater fee pressure, on the cost of advice and on distribution, not just on management fees. Regulation is shining a light on the train of the costs." Global Asset Manager >$1T AUM

"Future inheritance means we need to widen the scope of our clients and attract the clients of tomorrow, not just today." APAC-based Asset Manager <$500B AUM

"MiFID 2 will force people to be more transparent on their fees and their models and how they charge their investors." Platform / Distributor

"[Robo-advisory] has led to the evolution of distribution. There's going to be a continued demand for lower touch and lower fee distribution through technology." NAM-based Asset Manager <$500B AUM

Chart 1.13: Factors Driving Increased Adoption of Passive Trading Strategies



Source: Citi Business Advisory Services

28 https://www.betterment.com/why-betterment/

Passive Inflows Accelerate as Active Outflows Continue

The clearest signal that the drivers of passive fund investing continue to influence investor behavior can be seen in global flows. Chart 1.14 summarizes flows through the end of 2016 and for the first half of 2017.

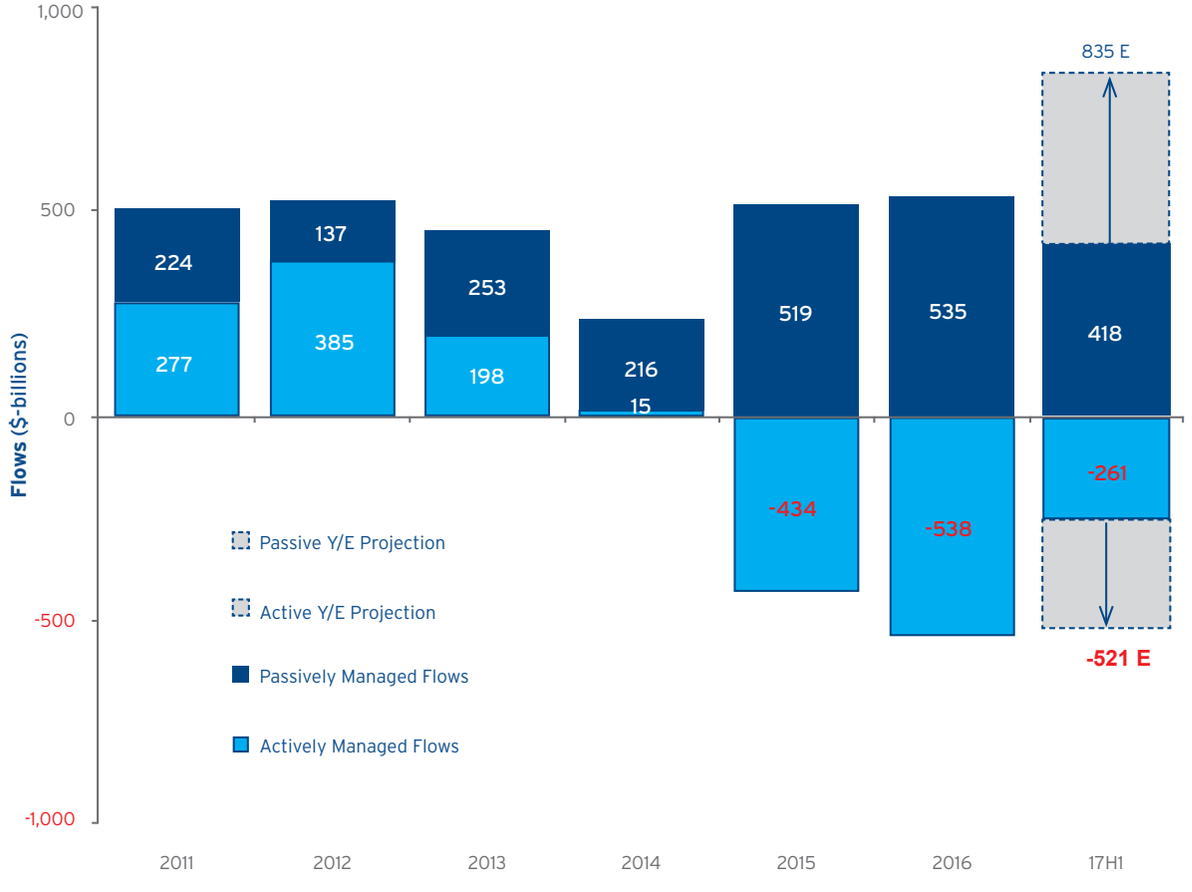
As shown, net flows into passively traded products in the first half of 2017 reached +$418 billion. This performance is not only a new record, but marks acceleration over 2016 when total inflows for the entire year were +$535 billion and over 2015 with annual inflows of +$519 billion.

If passive inflows for the first half of 2017 are extrapolated through the remainder of the year, total net inflows could amount to +$835 billion. This means that in a one-year period, passive funds would have registered inflows equivalent to the cumulative set of flows experienced in the 48 months between 2011 and 2014 (+$830 billion). It would also put total net inflows for passive since 2015 at $1.89 trillion.

Meanwhile, actively managed strategies continued to experience net outflows of -$261 billion in in the first half of 2017. If outflows continue at this pace in the second half of the year, outflows in 2017 could exceed $500 billion for the second year in a row, reaching -$521 billion by year end. This would be only a smidge below the record $538 billion in outflows posted in 2016. If that projection proves correct, total outflows from actively managed products since 2015 could reach $1.49 trillion

Weakness in actively managed fund flows is coming despite indications of improved performance in some categories. Chart 1.15 shows the relative outperformance of several Investment Association sector categories as listed by Morningstar against their relevant market benchmarks through late August 2017.

Chart 1.14: Net Flows into Active and Passive (2011-2017)



Source: Citi Business Advisory Services analysis based on proprietary data subscription to eVestment

Chart 1.15: Select Performance (Net of Fees)

eVestment Category vs. Benchmarks	Percent Outperforming through H1 2017	Percent Outperforming 2016
Global Equity vs. MSCI World	64%	50%
US Equity vs. S&P 500	64%	42%
Europe Excluding UK Equity vs. MSCI Europe ex UK	75%	57%
UK Equity vs. FTSE All Share	83%	20%
Global Emerging Markets Equity vs. MSCI Emerging Markets	60%	59%
Japan Equity vs. TOPIX	68%	63%

Source:Citi Business Advisory Services analysis based on proprietary data subscription to eVestment

Survey participants explained continued outflows from actively managed products despite improved performance as linked to growing recognition of the benefits offered by the ETF structure and the emergence of an ETF "network effect".

"If an active product delivers close to the index return after fees then that is going to push people towards beta. That raises the bar for active as passive provides the floor for active fees." EMEA-based Asset Manager <$500B AUM

"It's not just active/passive, it's really high-fee vs low-fee." Global Asset Manager >$1T AUM

ETF Products Draw the Bulk of Passive Fund Inflows as Network Effect Develops

Passive index exposure can be engineered via single security purchases either outright or via a separately managed account or it can be purchased through mutual funds, collective funds or ETFs. Of these channels, ETFs have been attracting a disproportionate share of flows in recent years. Inflows to these products accounted for 60% of passive inflows through H1 2017 even though these products were only ~30% of total passive AUM.

According to ETF.com, total net inflows into ETFs in the first six months of 2017 amounted to +$249.4 billion versus +$287.5 billion in the full 12 months of 2016.[29] If ETF inflows continue at this pace they would reach $498.8 billion by year-end. At this level new capital added to ETFs in just 2017 would nearly equal the size of the entire ETF industry back in 2006 ($533 billion).

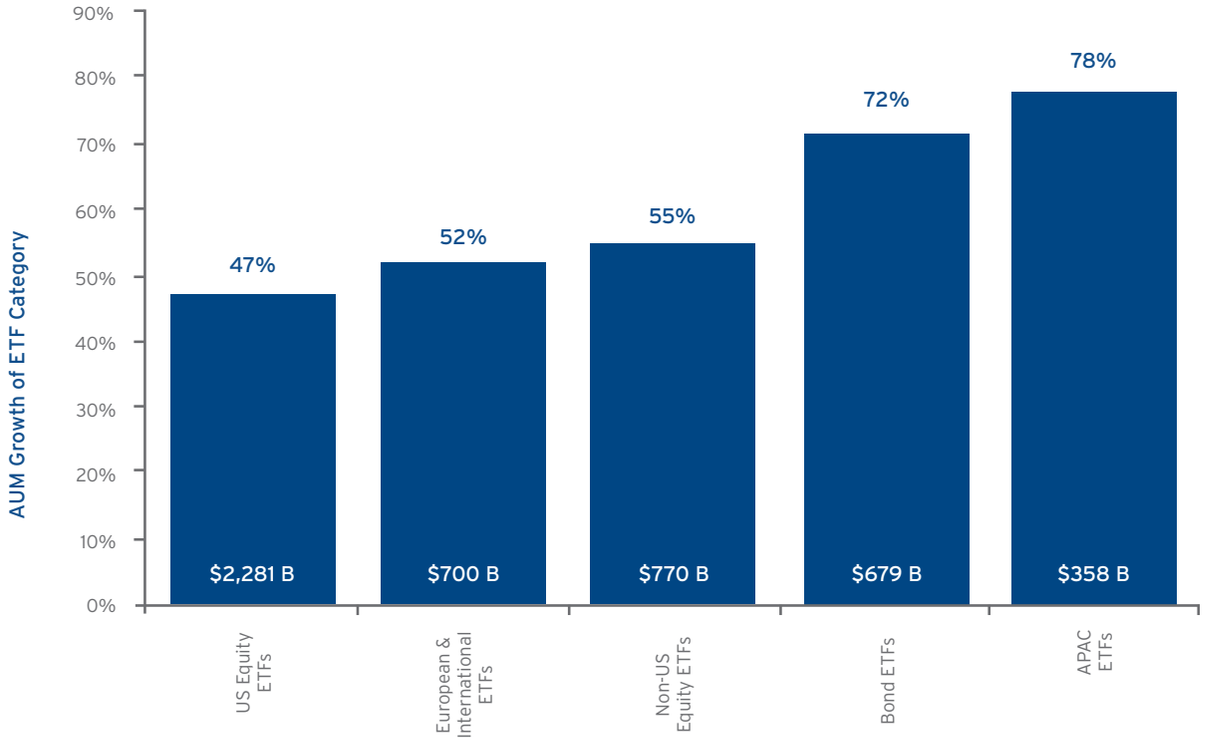
Last year's report detailed several benefits of ETF over mutual fund ownership that were helping to draw investors to these products. The two primary attractions being the ability to trade these funds intraday like a security and that those who buy ETFs have exposure to the actual securities that comprise the index, not to shares of a fund that owns the securities. This allows owners of ETFs to benefit from dividends and corporate actions.

As investors' understanding of ETFs builds and the number of funds in the ETF wrapper increase, the ability to use these products to quickly and easily establish or hedge an exposure to a specific sector, country or region grows. This is leading to a network effect. As the popularity of ETFs increase, more investors use the products, encouraging the launch of more ETFs and the expansion of AUM in already existing ETF funds. As the set of ETFs in different regions and sectors grows, the ability to quickly and easily move exposures around increases and more investors are drawn to using the products.

The impacts of this network effect are readily apparent in Chart 1.16. AUM held in U.S. equity ETFs has grown +47% in just 2.5 years since 2014. These are the slowest growing ETF category. Non-U.S. equity ETFs increased +55% since 2014; bond ETF AUM was up +72%; APAC ETF AUM jumped +78% and AUM in European and international ETFs grew by +52%. Though U.S. equity ETFs remain dominant in terms of AUM ($2.3 trillion), assets in other categories are all reaching significant levels.

29 "Nearly $250 Billion Inflows So Far in 2017", July 3, 2017, ETF.com, http://www.etf.com/sections/monthly-etf-flows/etf-monthly-fund-flows-june-2017?nopaging=1

Chart 1.16: Growth in ETF AUM by Category (2014 to 17H1)



Source: Citi Business Advisory Services analysis based on proprietary data subscription to SimFund

Non-U.S. equity ETFs reached $770 billion AUM in H1 2017 versus only $496 billion in 2014. Bond ETF AUM grew to $679 billion versus $395 billion in 2014. ETFs based on APAC indices hit $358 billion versus only $202 billion in 2014 and AUM in ETFs based on European or international indices grew to $700 billion from $461 billion in 2014.

Many survey participants expressed concern about this rapid growth in ETF AUM.

> Some worried that the amount of money moving into ETFs would begin to distort the pricing of the individual securities that made up the relevant index and cause the linkage between the company fundamentals and security pricing to diverge.
>
> Others worried that ETFs constructed in a schema that emphasized something other than capital-weighting might artificially increase demand for more thinly traded constituents and create shortages or extreme volatility in the availability of those securities.
>
> Still others expressed concern that rules-based ETFs that held only a sampling of the core constituents might be caught without requisite securities in a market or liquidity event, causing broad selling across all securities in the index.

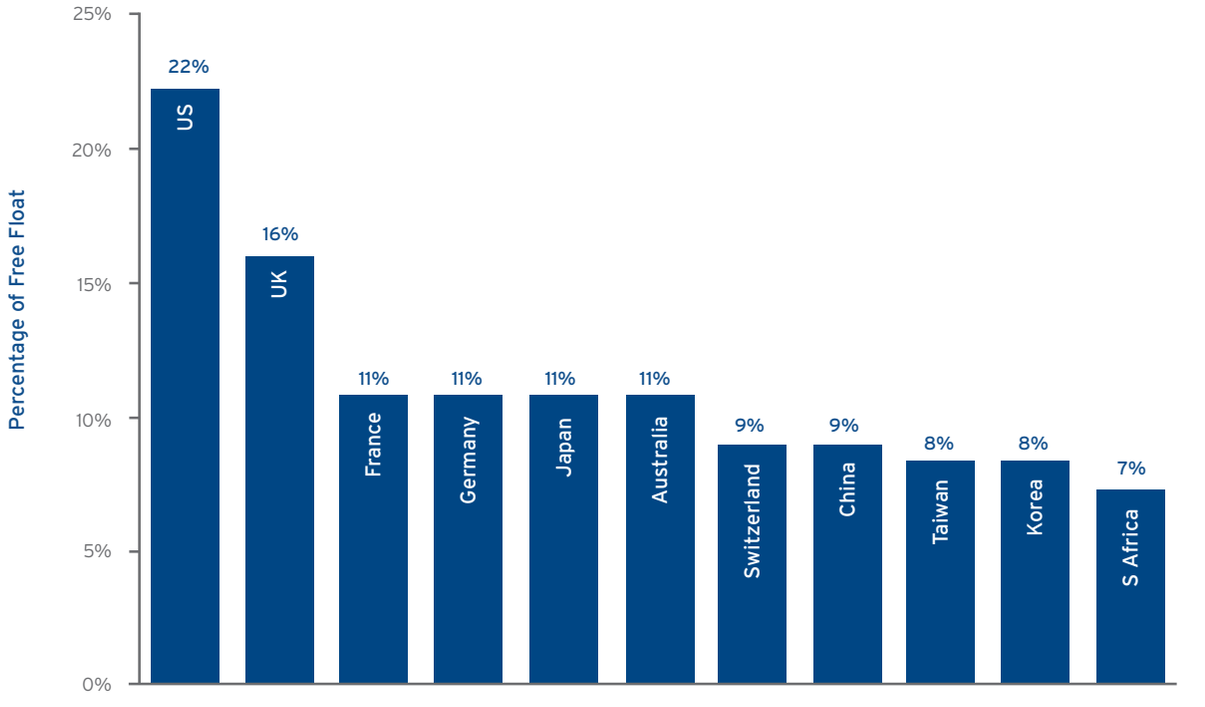
To put these concerns in some perspective, we offer Chart 1.17.

As shown, even in U.S. equities where AUM in ETFs is nearly $2.3 trillion, passive holdings as a whole across SMAs, mutual funds and ETFs still only represent 22% of the market's free float.

Free float measures the proportion of outstanding shares in the hands of institutional investors and private investors freely tradable on the secondary market (not held by the company itself). This is an important measure because trading in these shares represents how market forces are valuing the company. Viewed in this way, it seems unlikely that the holders of 22% of the free float shares in the U.S. equity markets would have a disproportionately greater influence on pricing and trading of those securities than the other 78% of share owners.

Passive ownership of the free float in other equity markets is even lower. Of the major equity trading centers, passive funds own only 9% of the free float shares in Switzerland, 11% in France, Germany, Japan and Australia and only 16% in the U.K. Given these totals, it is unlikely that we are at a point where passive trading is going to distort pricing and the availability of securities for any prolonged period.

Chart 1.17: Proportion of Equity Free Float Owned by Passive



Source: Global Equity Strategist, Passive Market Ownership by Robert Buckland
https://www.citivelocity.com/t/eppublic/14SWh

By far the most commonly cited worry, however, was that liquidations of ETFs in a future market event might exaggerate market declines and result in short-term issues and potentially another crisis for the global financial industry. These concerns warrant a more in-depth look since ETFs play a much larger role in the trading of the markets than they offer in the ownership of the underlying securities. This will be the focus of Section II.

Before we turn to that examination, however, we will conclude our update on passive trading with our forecast for AUM growth.

Bar-Belling of the Industry Sets the Stage for Passive AUM to Hit $25 Trillion by 2022

In our flow analysis presented earlier, we highlighted the aggregate level of money coming out of actively managed funds, but we did not delve into what type of funds were losing assets. Data shows that outflows from actively managed products continued to originate primarily from "active core" funds that trade in highly liquid asset pools. These include large cap equities, investment grade bonds and developed nations' sovereign debt. These are the funds most easily replicated by major market indices as the index constituents are highly liquid. Survey participants in both last year's and this year's interviews noted that it has been especially hard for active portfolio managers to outperform the indices in these products.

According to the Standard & Poor's Index Versus Active 2016 scorecard (SPIVA), fewer than 20% of active managers in U.S. large cap funds beat the index when viewed on a 3-year, 5-year, 10-year and 15-year period. Fewer than 25% of credit managers beat the U.S. investment grade index in those periods and the performance was even worse for U.S. government long funds with fewer than 10% of active managers beating their relevant index in those periods. International equity managers fared slightly better in the 3-year and 5-year windows, but even then no more than 1/3 of active funds outperformed their indices. Of the major active core categories, only global income funds showed a better intermediate term outcome but even in those funds less than 40% of active managers proved able to outperform.[30]

These SPIVA figures do not present an entirely accurate view because they use straight index performance unadjusted for fees as their comparison, but directionally the data is highly indicative.

AUM growth in these products has been much more subdued than in other fund categories. Active core as a whole only achieved a 3.9% 5-year CAGR between 2011 and 2016. Our outlook is for growth to slow at a greater rate from that level and to actually turn negative in line with the accelerated inflows into passive.

30 S&P Dow Jones Indices, LLC https://us.spindices.com

In the first 6 months of 2017, institutional market participants posted net outflows of -$227 billion from active core fund categories according to eVestment.[31] Annualized, that total could reach -$554 billion by year-end if institutions maintain that same pace of withdrawals. In parallel, Morningstar estimates that retail participant outflows from active core products could reach -$247 billion by year-end. Combined outflows would then total -$701 billion if these numbers prove accurate.

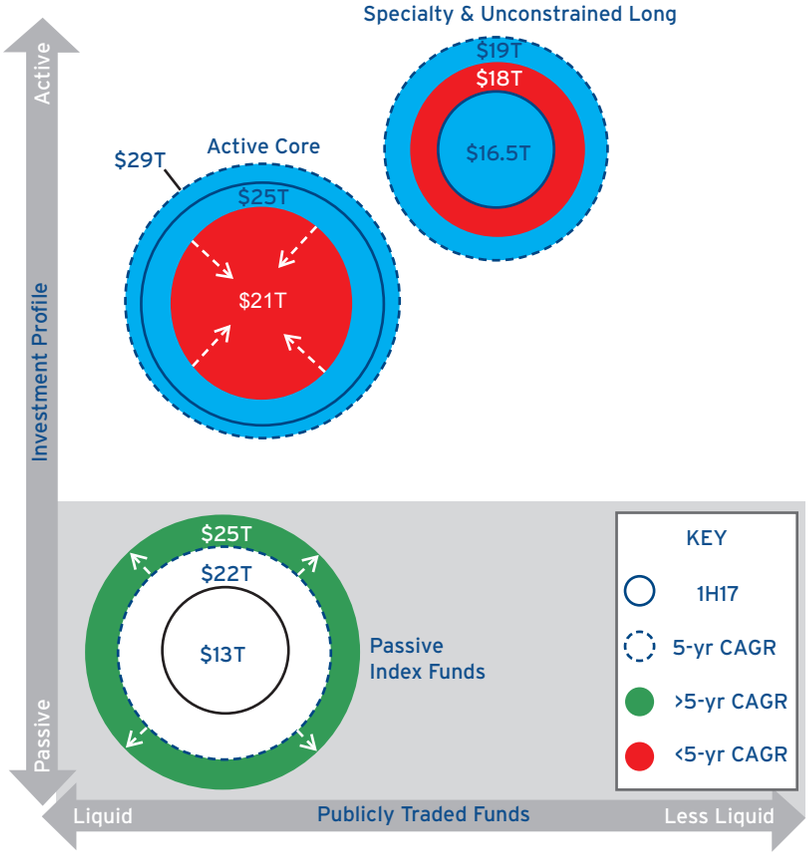
Conversely, the indices that these active core funds represent are the products with the highest (and growing) amount of AUM in ETFs. This movement of money reflects a "bar-belling" of the industry according to survey participants. Investors are replacing their most liquid, higher priced active products, where outperformance is seen as negligible, with lower cost index products to replace those exposures.

The impact of that bar-belling is clear in Chart 1.18.

At the end of 2017, our projections put active core funds at $25.1 trillion. To arrive at that figure, we adjusted down the 5-year growth projection by the pace of outflows. If outflows ceased and active core funds resumed growth in line with their 5-year CAGR, AUM by 2022 would be expected to reach $28 trillion. Instead, we have modelled outflows continuing to deflate the growth rate with the size of such outflows increasing by a modest 10% per year. If that outlook proves correct, the pool of active core AUM could actually shrink to as little as $21 trillion by 2022.

Other actively-managed long only funds captured under the category "specialty and unconstrained long" reflect small and mid-cap equities, convertible bonds, high yield bonds, emerging markets equities and bonds and some international fund categories as well as some opportunistic fund types. There is typically less liquidity in these securities and a perception that there is more of an information edge to be found that could support outperformance by active managers.

Chart 1.18: Current (H1 2017) & 5-Year (2022) AUM Projections



Source: Citi Business Advisory Services projections based on data from eVestment (proprietary subscription); Investment Company Institute Yearbook (www.ici.org); Citi Research, SimFund (proprietary subscription); Hedge Fund Research (proprietary subscription)

31 Citi Business Advisory Services analysis based on proprietary data subscription to eVestment.

Survey participants expected these products to continue to grow, but perhaps less quickly as substitution with passive funds may occur, but at a slower rate. Our projections adjust the 5-year CAGR down by 50% to +1.7%. If this figure is used, our projections show AUM in this category increasing from $16.5 trillion at year-end 2017 to $18.0 trillion by 2022.

Given recent flow data and the views of survey participants, we expect passive index funds to be the beneficiary of declines in active core and slowing growth in specialty long assets. Based on this view, we anticipate that AUM in passive index funds might grow more quickly than recent 5-year CAGRs would suggest.

Since ETFs are the fastest growing portion of this total, we increased the 5-year CAGR for these products by 35% in our model to arrive at an adjusted 5-year CAGR of +21.0%. If realized, this would boost ETF AUM from an estimated $4.1 trillion at the end of 2017 to $10.7 trillion by 2022. While this number seems large, remember that ETF AUM has more than doubled between 2012 and 2016.

We then evaluated assets in other passive products, increasing their 5-year CAGR by 10% to arrive at an adjusted CAGR of +8.9%. This would result in AUM in other passive products increasing from an estimated $9.1 trillion at the end of 2017 to $14.0 trillion by 2022.

If these models prove accurate, total passive index fund AUM could rise from $13.1 trillion at the end of 2017 to $24.7 trillion in 2022. This would make passive index funds the largest pool of AUM globally. One factor that may influence these figures up or down could be how ETFs and overall passive products perform in a major market or liquidity event. We will explore this topic in Section II.

"I think the reason people are using ETFs is because it's low-cost – that's what's driving investor value. It's liquid and low-cost. And it's tradeable in a digital way." NAM-based Asset Manager <$500B AUM

"I think active to passive shift is still underway. If anything, it has accelerated. … You don't read much or hear much about fixed income, but the trends accelerated and the market share of passive is growing out." NAM-based Asset Manager $500B-$1T AUM

Section II: Concerns Grow about Impact of ETF Trading in Potential in Market Correction

While the share of total market AUM represented by ETFs is still nominal, their importance in daily trading is substantial. Concerns about how ETFs will behave in a potential liquidity event or market crisis were widely noted across survey participants. Dislocations that occurred in August 2015 were cited as a potential warning signal and heightened such uncertainty.

Though these concerns may not alter the trajectory of growing ETF use, we thought that a brief exploration of how these products may behave in a liquidity or market event was warranted given the number of questions we receive on this topic and given the growing role we see ETFs providing in the creation of new investment products as will be discussed in Section III.

Understanding ETF mechanics is critical to this discussion because unlike mutual or UCITS funds, ETFs offer real-time create and redeem capabilities that allow them to act as both an investment product and a trading tool. Thus, while in a major correction or liquidity event ETFs may amplify market moves, such dislocation may be moderated by the ability to arbitrage ETFs for cash or actual shares of the underlying securities. Indeed, unlike mutual funds that tend to exhibit outflows during major market or liquidity events, ETFs actually tend to see inflows.

As will be discussed, concerns about their effect are possibly overblown in normal market conditions and misunderstood in a prolonged liquidity or market event.

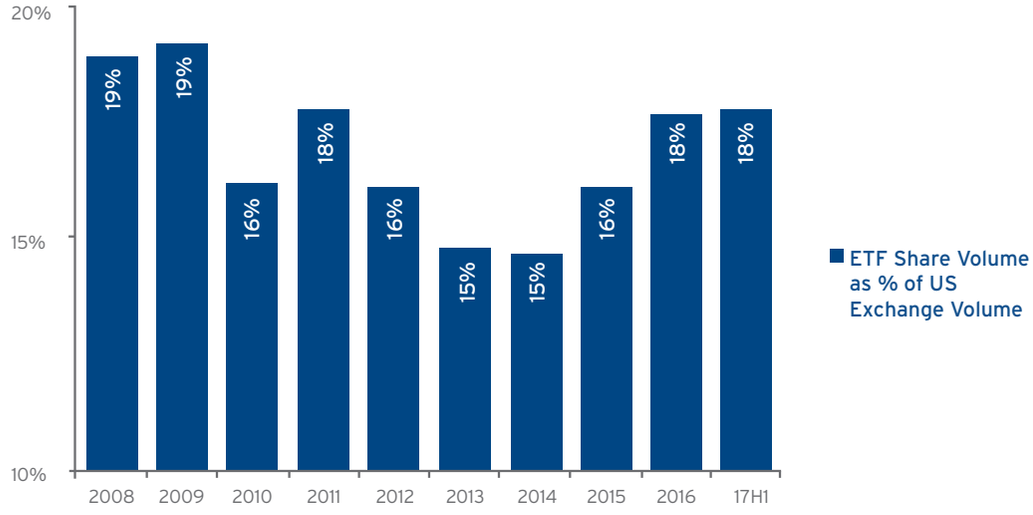
ETFs' Dual Role as a Trading Tool and an Investment Product

While the growth in ETF AUM has been significant, these products still only represent a small portion of total securities assets. This is true even in the United States, the largest holder of ETFs. Total AUM in U.S. equity ETFs reached $2.3 trillion by H1 2017, but this figure equates to less than 10% of total U.S. equity market capitalization estimated at $25 trillion in early 2017.[1]

ETFs are not used solely as an investment product, however. They were originally designed as and continue to be used broadly as a trading tool, particularly by institutional market participants. Their impact as a trading vehicle can be seen clearly in Chart 2.1. As shown, U.S. equity ETF share volume at 18% of overall share volume in H1 2017 was nearly double the asset value of these products. This means that nearly 1 in every 5 U.S. equity trades is related to an ETF.

Share volume is only one measure of the importance of ETFs as trading tools, however. A second measure is dollar volume. This is defined as "a stock or exchange-

Chart 2.1: ETF Share Volume as % of US Exchange Volume



Source: Citi Research, ETF Sponsors ETF Perspectives: Tail Wagging the Dog? Not Yet!

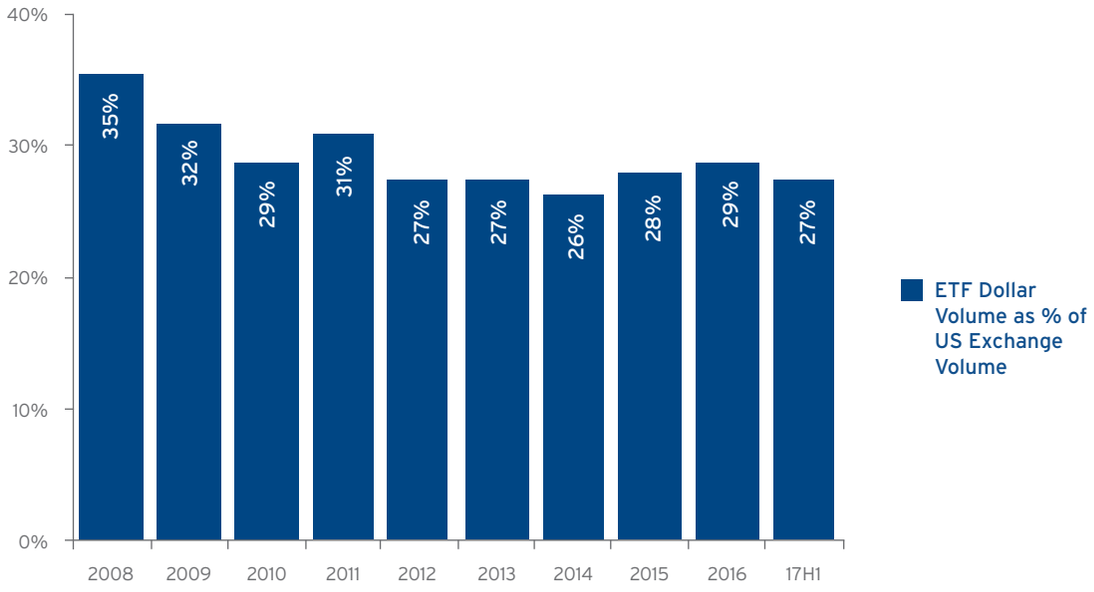
1 "U.S. Stock Market Tops $25 Trillion", Seeking Alpha, January 27, 2017, https://seekingalpha.com/article/4040012-u-s-stock-market-tops-25-trillion-1_9-trillion-since-election

traded fund's share price times its average volume. Dollar volume liquidity is important to institutional investors because they make such large trades. When a stock is highly liquid, it is easy to enter and exit positions and easy to buy and sell without influencing the stock's price."[2]

Chart 2.2 shows that U.S. ETF dollar volume accounted for 27% of U.S. exchange volume in H1 2017 and that this figure had risen as high as 35% of total U.S. exchange volume in 2008.

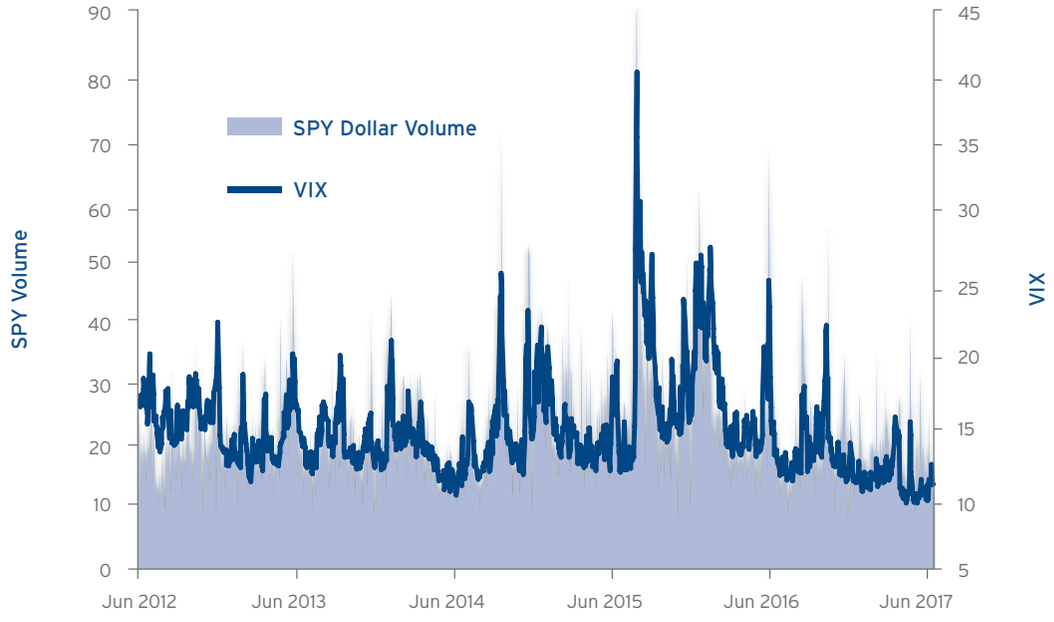
As the spike in 2008 shows, ETF dollar volumes tend to rise during periods of market uncertainty. Citi Research explored this phenomenon in a recent report and produced Chart 2.3 to illustrate this relationship.[3]

Chart 2.2: ETF Dollar Volume as % of US Exchange Volume



Source: Citi Research, ETF Sponsors ETF Perspectives: Tail Wagging the Dog? Not Yet!

Chart 2.3: SPY Volume and VIX



Source: Citi Research, ETF Sponsors ETF Perspectives: Tail Wagging the Dog? Not Yet!

2 Dollar Volume Liquidity, Investopedia, http://www.investopedia.com/terms/d/dollar-volume-liquidity.asp#ixzz4q7ytVo68
3 "ETF Perspectives: Assessing ETF Impacts", August 9, 2016

In that report they note that "hedging is a key shorter term trading application. Thus, for the broader market ETFs, volumes tend to rise during periods of market angst, which will often correspond to increased volatility measures. The correlation impact is somewhat causal as increased broader market ETF volumes will often be accompanied by both arbitrage and create/redeem activity, both of which will incorporate directional index basket trading."[4]

Said more simply, **market participants use ETFs to help manage their positions during periods of market uncertainty**. The ability to perform arbitrage trades between ETFs and underlying baskets of securities and the ability to adjust the number of ETF shares fluidly via the create/redeem process are the mechanisms that help enable such hedging. These additional activities supplement the secondary trading of shares and cause ETF volumes to become inflated in periods of increased volatility.

ETFs have also had an impact on the pattern of the trading day. Due to rebalancing trades, the majority of ETF volume typically occurs on either the open or the close. This factor, along with the increased influence of high frequency trading and algorithmic trading have resulted in a skewed liquidity profile as shown in Chart 2.4.

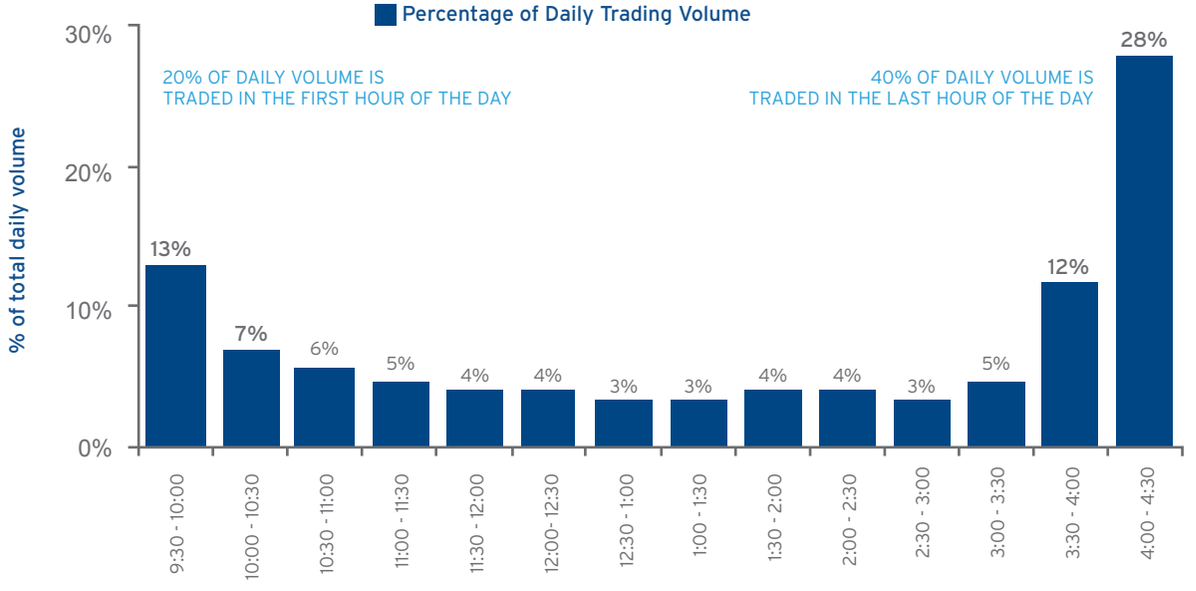
Whereas at one time, there was only a small lunchtime lull in the trading day, by mid-2017 it was clear that the majority of the day's activity (60%) was now occurring in the first and last hour of trading. Indeed, 41% of the day's activity was taking place in the first and last half hour of trading.

Thus, not only are ETFs significantly more important to the trading of the equity markets in the U.S. than their overall AUM would imply, but also the concentrated window in which this trading occurs raises concerns about whether ETFs will tend to exaggerate or extend a major market or liquidity event. In part, this is what occurred on August 24, 2015.

For many survey participants, the events of that day were a danger signal. Understanding the events of that trading session provide an important baseline that will allow us to imagine what might happen in a future market or liquidity event.

"People complain it's ETF or quant moving the markets, etc. but people just like pointing fingers at the unknown. The velocity of the money moving is certainly much quicker—but when you observe a bona fide dislocation in the quant world, it just doesn't happen as much as people think. People are just becoming much more aware of how the quant incurrent is affecting their portfolio," Sell-Side Specialist

Chart 2.4: US Stock Market Volume (half-hourly) 1H 2017



Source: Bloomberg, Citi Research

4 Ibid.

"We have had to adapt to the 'new trading day' over the past few years. ETF re-balancing has created a completely different environment." Family Office

"[Advisors] won't get beat up for owning ETFs because they go in the direction that they say they are going to. Investors and advisors are using ETFs to replace mainly high-cost, vanilla active." Global Asset Manager >$1T AUM

NYSE Trading in August 2015 Underscores Potential for ETF-Related Market Dislocation

After having already registered a 4-day decline during the previous week and in response to heavy selling in Europe and Asia overnight related to concerns about the Chinese economy, the S&P 500 was expected to see heavy selling into the open on Monday August 24, 2015. "What no one expected—and what many experts claimed couldn't happen—was that prices for many of the largest exchange traded funds fell more sharply than the stocks that they owned."[5]

"ETFs are supposed to—and generally do—trade in lockstep with the stocks they own, with very little tracking error. Yet when the S&P 500 fell as much as 5.3% in the opening minutes of trading, the $65 billion iShares Core S&P 500 (ticker: IVV) fell as much as 26%, some 20 percentage points below its fair value. Disorderly trading affected big ETFs from every major provider: The $18 billion Vanguard Dividend Appreciation (VIG) and the $12 billion SPDR S&P Dividend (SDY) plunged 38% apiece, while the PowerShares S&P 500 Low Volatility (SPLV) fell as much as 46% before clawing back an hour after markets opened."[6]

Much of the dislocation was due to excessive order imbalances. According to the New York Stock Exchange (NYSE), the volume of market orders on the opening was 4x the average volume of a normal trading day[7]. These orders looked to execute regardless of underlying price. Industry experts noted that "extensive use of market and stop-loss orders overwhelmed the immediate supply of liquidity, leading to severe price gaps that triggered numerous limit-up-limit-down (LULD) trading halts."[8]

These orders and trading halts affected both ETF and traditional security shares. In total, there were 773 limit-up trading halts and 505 limit-down trading halts noted that morning on the NYSE and as a result about 20% of exchange trading products experienced trading halts at some point in the day.[9] This is because the ETF arbitrage mechanism was unable to function effectively.

Understanding the mechanics of ETF trading and arbitrage are critical to interpreting the activities of that day as well as changes in the trading rules that have occurred in response to the August 24, 2015 events and the potential dynamics of a future market or liquidity event might unfold.

"Index doesn't mean passive and passive doesn't mean risk free. By being passive you're taking an active decision. Not taking a decision is making a decision." Pension Fund

"You'll never see a scenario where market participants sell lots of ETFs but not the market itself." Sell-Side Specialist

Understanding ETF Market Dynamics and Arbitrage Functions in Normal Market Conditions

The focus of what occurred on August 24, 2015 has thus far been on what occurred in the secondary markets where buyers, sellers and market makers were looking to deal with the bearish sentiment that carried into that trading session. There are, however, additional participants that have critical roles in facilitating and adjusting ETF pricing.

Chart 2.5 highlights the broad set of ETF players and their key activities in the ETF ecosystem.

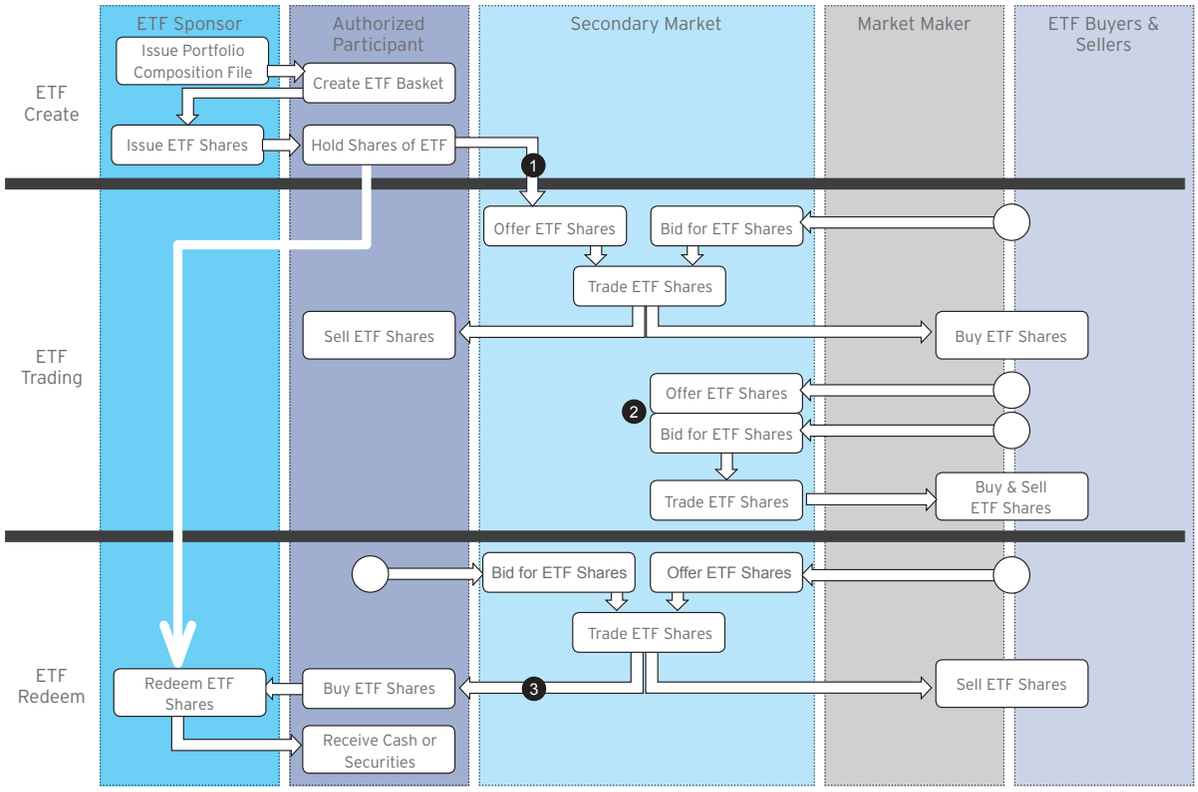
ETF sponsors work with a set of authorized participants to both create and redeem ETF shares. These participants represent a "primary" market for ETFs.

ETF Primary Market Mechanics

Authorized participants or APs work with the ETF sponsor to either expand the number of ETF shares (create) or reduce the number of ETF shares (redeem) based on market demand. Both activities can happen throughout the trading day although activity is aggregated and executed just once per day at NAV.[10]

5 "The Great ETF Debacle Explained", Barron's, Chris Dieterich, September 5, 2015, http://www.barrons.com/articles/the-great-etf-debacle-explained-1441434195
6 Ibid.
7 "ViewPoint—U.S. Equity Market Structure: Lessons from August 24", BlackRock, October 24, 2015, https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-october-2015.pdf
8 Ibid.
9 Ibid.
10 Ibid.

Chart 2.5: Overview of ETF Market Dynamics



Source: Citi Business Advisory Services

Activity 1 in Chart 2.5 illustrates the ETF Create process. As shown, the AP delivers in a create basket based on a portfolio composition file submitted the night before by the ETF sponsor. The sponsor's file shows the exact securities and weightings (or mix of cash and securities) required to create ETF shares. The sponsor, upon receipt of this basket, creates new ETF shares equivalent to the value of the securities that were submitted.

The AP can 1) deliver those ETF shares through to a specific buyer that may have put up the securities to build the create basket; 2) hold onto the shares themselves to have inventory, and enable functions such as "Create to Sell" for those looking to short ETFs or they can 3) offer their ETF shares into the secondary market where either a market maker or an ETF buyer can obtain those shares.

Activity 2 in Chart 2.5 shows the normal buying and selling of ETF shares in the secondary market. The AP's firm may be one of those buyers and sellers (or even a market maker), but such interest would be in a distinct role from their AP function in the primary market.

Activity 3 in Chart 2.5 shows the ETF Redeem process. In this case, the AP can redeem shares for cash equivalent to the value of the ETF shares or they can "redeem in kind" where they receive the underlying basket of securities from the ETF sponsor.

Beyond creating and redeeming ETF shares, the AP has one other crucial role in the ETF ecosystem—that is to use their ability to exchange ETF shares and securities to help ensure that there is a low tracking error between the ETF price and the price of the underlying securities. This is known as ETF arbitrage and the mechanics of this function are highlighted in Chart 2.6.

ETF Arbitrage

In normal market conditions, there should be little to no difference between the price of the index that the ETF represents and the price of the underlying securities that collectively make up that index. When this is true, the market is said to be equivalently priced.

Yet, at times, the index may trade at either a premium or at a discount to the underlying securities. In these instances, the AP puts on a spread trade that will help to narrow those discrepancies.

> If the index is trading at a premium to the underlying securities, the AP will sell short the ETF shares and buy the basket of underlying securities. They can then harvest the price differential between the two and submit the basket of securities to the ETF sponsor and receive back shares of the ETF. The AP would use these shares to cover their short ETF obligation.

The opposite holds true if the ETF is trading at a discount to the underlying securities. In that instance, the AP would sell the securities in the underlying basket and buy the ETF shares. As in the previous example, they would harvest the price differential between these two instruments and redeem in kind the ETF shares, receiving in the basket of underlying securities to zero out their short obligation. These actions are highlighted in Activity 1 in Chart 2.6.

ETF arbitrage is not limited to APs, however. Market makers can also play a role in the ETF arbitrage process as shown in Activity 2 in Chart 2.6. These participants typically hold some inventory of both securities and ETFs to ensure their ability to manage bids and offers. Similar to arbitrage in any single-stock security, they can use this ability to hold inventory to engage in arbitrage—selling ETF shares when the index is trading at a premium to the underlying securities and buying ETF shares when the index is trading at a discount.

Unlike the AP, however, the market maker takes on risk when engaging in arbitrage. They cannot utilize the "create" and "redeem" process to exchange ETF shares and securities. They must manage the shorts that they put on when the index is trading at a premium to the underlying shares in the hopes that the spreads narrow so that they can buy back shares and cover at a profit. Conversely, when the index is trading at a discount to the underlying shares market makers must be willing to hold the shares of the ETF that they purchase in the hopes that the spreads rebound so that they can sell the ETF shares at a profit.

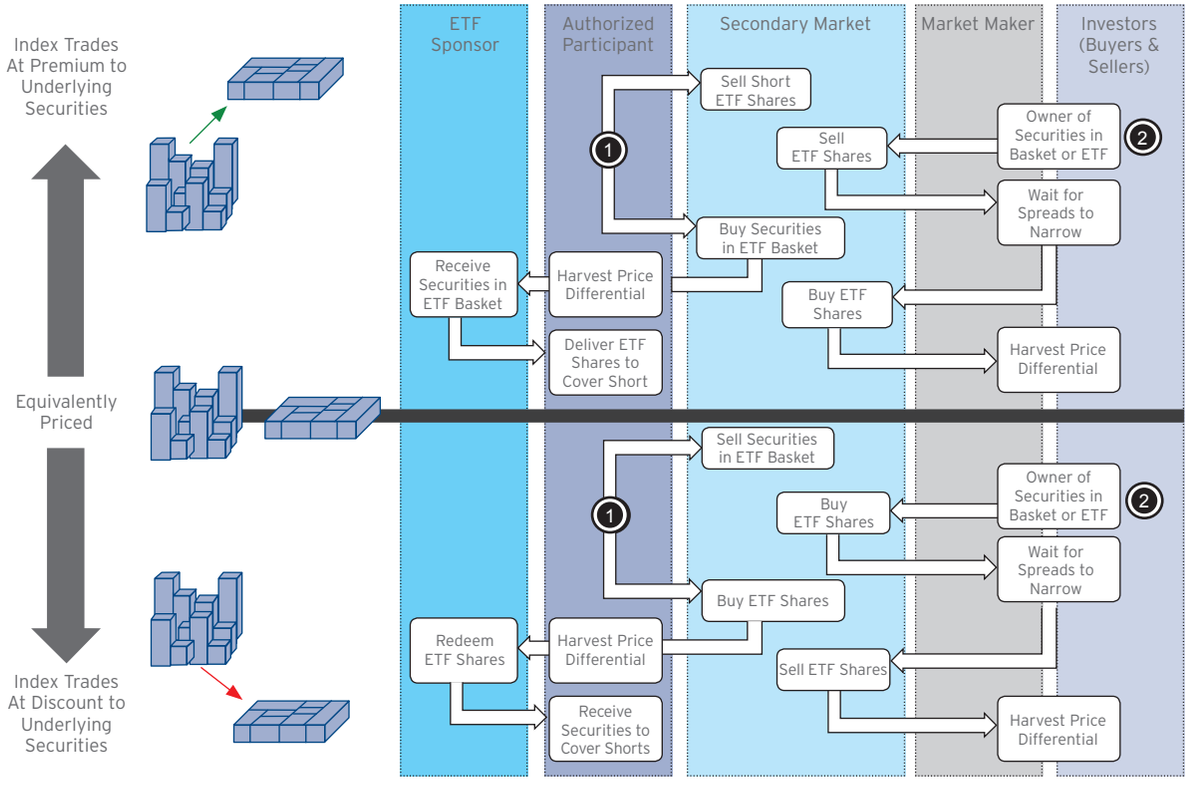
ETF Arbitrage in Normal Market Conditions

In normal market conditions, instances of the ETF and underlying securities moving out of sync tend to be short-lived. This is illustrated in Chart 2.7.

Though intra-day movements may cause minor dislocations, those episodes tend to revert back toward equivalent pricing quickly. Few if any survey participants expressed concern about the effectiveness of ETF pricing in routine trading sessions. However, there was widespread concern that in a more extreme price dislocation the ability of both APs and market makers to effectively arbitrage positions may be impaired. This was clearly what occurred in August 2015.

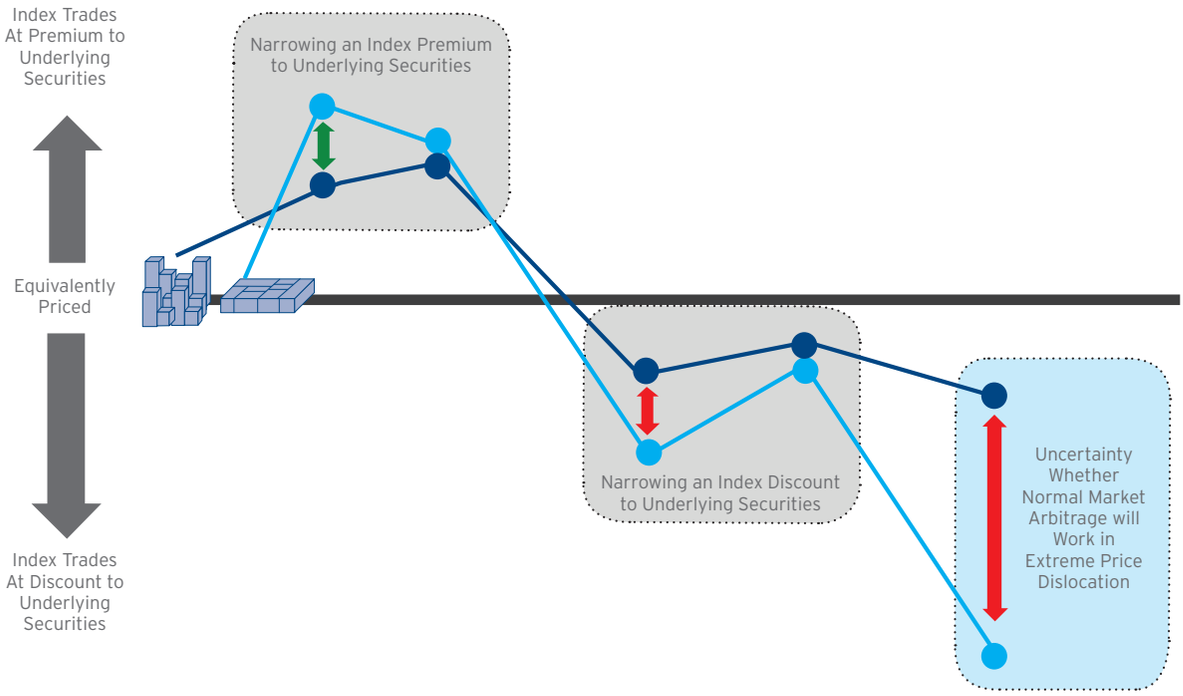
"ETFs are easy to wheel and deal, trade, and have the ability to be redeemed when there are only one-sided flows...can't say those things about many, if any, other products." Global Asset Manager >$1T AUM

Chart 2.6: How ETF Arbitrage Trading Addresses Pricing Imbalances



Source: Citi Business Advisory Services

Chart 2.7: Differentiating Between Normal & Extreme ETF Price Dislocations



Source: Citi Business Advisory Services

"In a major market crash, ETFs might have to have some sort of gating but it would be the same for all types of funds." Sell-Side Specialist

Industry Analyzes and Addresses Many of the Issues from the August 2015 Event

Retrospective analysis of what led to the extreme dislocations of August 24, 2015 revealed three key contributors.

Insufficient Information Flow: NYSE Rule 48 designed to help market makers achieve a more effective and efficient opening was invoked. This rule suspended the obligation of market makers to designate opening prices and to receive approval from floor officials prior to opening a stock. The unintended consequence of this action was that for an extended period market makers lacked the critical information on individual securities they needed to price ETFs.

More than half the NYSE stocks had not yet opened as of 9:40am.[11] The situation was exacerbated further because the S&P 500 Index futures contracts had fallen sharply enough to trigger a trading halt shortly before the NYSE opening. Market makers use the futures indicators to model their pricing and to hedge their trades. This too impaired their ability to price accurately. As a result, ETF market makers created excessively wide bid-offer spreads at the outset of the session.

Excessive Trading Halts: Many of the orders that were queued up to be executed electronically prior to the opening were market orders that required execution regardless of price. Once trading began, those orders were executed against the excessively wide bid-offer spreads. This in turn triggered limit-up-limit-down (LULD) curbs almost immediately upon the start of trading. As stocks and ETFs locked limit down, this price drop triggered good-till-cancel (GTC) sell orders and stop-loss orders that had been resting down in the electronic execution queue. Thus, instead of reducing, the size of the unexecuted pool of electronic sell orders continued to grow in the first few minutes of the trading day, creating a backlog. Reports showed that 327 ETFs experienced 5-minute trading halts that day and that 11 ETFs halted trading 10 or more times.[12]

11 ViewPoint—U.S. Equity Market Structure: Lessons from August 24, BlackRock, October 24, 2015, https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-october-2015.pdf

12 "The Great ETF Debacle Explained", Barron's, Chris Dieterich, September 5, 2015, http://www.barrons.com/articles/the-great-etf-debacle-explained-1441434195

Suspension of Arbitrage Trading: Another side effect of LULD curbs was that securities that normally showed a correlated relationship (such as securities in the same sector) were sometimes trading in completely divergent ways depending on the number of backlogged sell orders that were waiting to be executed. Market maker models that relied on correlations to compare the ETF to the underlying securities were confounded. Without an actual or a modeled price for the underlying basket, it was impossible to know whether there was a harvestable difference that they could capture via arbitrage. As a result, many withdrew from pursuing arbitrage trades for a period.

APs that could have also been initiating arbitrage trades were unable to participate for another reason. Their ability to sell the underlying basket of securities was blocked by the large order backlog and persistent trading halts. This left them unable to initiate their spread trades.

Once these issues got worked through in the first hour of the session, normal market making and arbitrage activities resumed. Indeed, August 24th 2015 was the 2nd largest trading day in U.S. equity history and exchange traded products accounted for 37% of that volume.[13] This was similar to the peak 35% of dollar share volume last noted back in 2008.

Regulatory Changes Since August 24, 2015

Knowing the root cause of the problems that led to the dislocation of ETF pricing allowed regulators to take actions in 2016 to redress some of these concerns.

The SEC approved a request to eliminate NYSE Rule 48 in July 2016.[14] New market volatility rules allow market makers to open trading in a security without pre-market indicators if the price is expected to be within 5% of the previous day close in normal market conditions and within 10% of the previous day's close in designated high volatility days.[15]

The NYSE also announced that, like NASDAQ, they were eliminating stop loss and GTC orders. These are orders that can sit in the order book for long periods of time without review, but upon being triggered become market orders instantly. The NYSE cited the risk of these orders being executed far beyond the intended price and the concern that the execution could occur at an extreme level that quickly saw the market revert.[16]

These changes are intended to curtail some of the excessive dislocation that might occur in a future liquidity or market event. With that background and an understanding of ETF trading dynamics, we can now examine what might happen should the market undergo another liquidity event.

"I haven't lost a lot of sleep on total ETF liquidity failures, though. The difference between liquidity shocks in 2008 or historically and now is the transparency of it all." NAM-based Asset Manager $500B-$1T AUM

"Don't forget one of the attractions of ETFs is that they can trade even when – for whatever reason – the underlying stocks aren't trading." Sell-Side Specialist

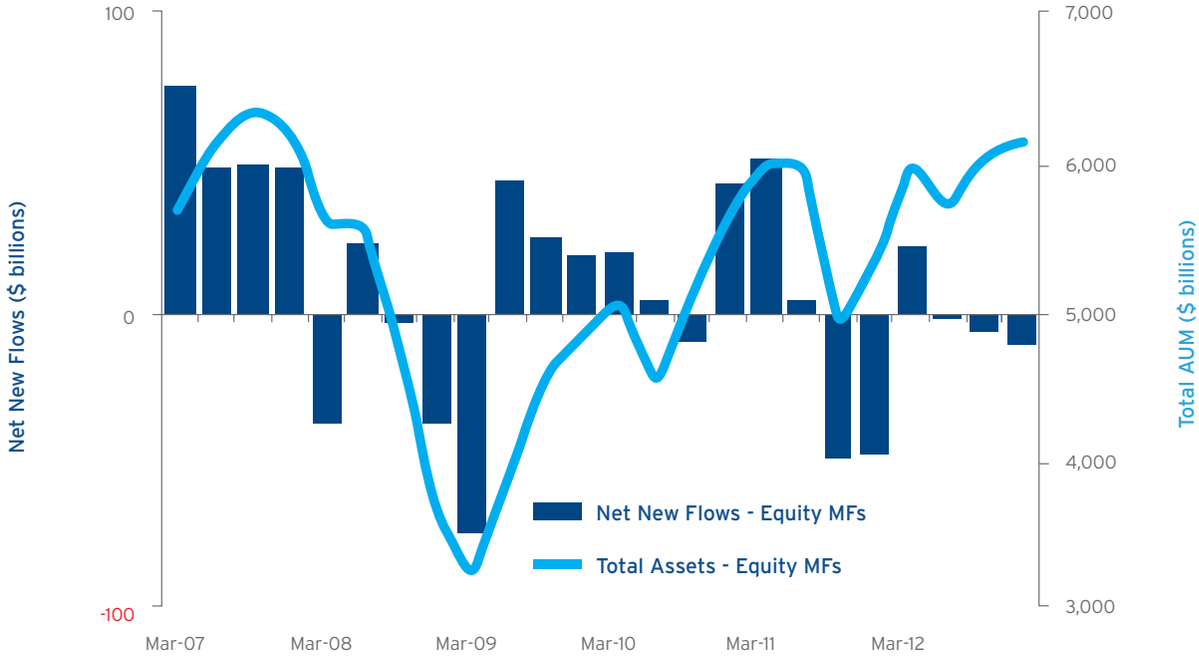
Rather than Experiencing Outflows, ETFs Draw Assets in Market Events

While the events of August 2015 present a cautionary tale with regard to potential trading issues around ETFs, the typical investor had little idea that anything was amiss. The majority of issues were resolved in the first hour of trading and the event drew little interest from the broader retail and mass influent set of investors. The mindset of these individuals is important to understand, however, in order to evaluate what might happen in a more prolonged market correction or liquidity event.

One consistent pattern we have seen in past events is that these investors tend to be more reactionary to significant market corrections. To proxy their behavior, we examine flows in U.S. equity mutual funds. According to the Investment Company Institute, 2016 U.S. equity mutual fund AUM was $8.6 trillion of which, 92% was owned by individuals ($7.9 trillion) and only 8% was owned by institutions ($672 billion). Individual ownership of U.S. equity mutual funds has changed little over time registering 94% in 2002, 93% in 2008 and 92% in 2011.[17]

13 ViewPoint—U.S. Equity Market Structure: Lessons from August 24, BlackRock, October 24, 2015, https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-october-2015.pdf
14 Securities and Exchange Commission Release https://www.sec.gov/rules/sro/nyse/2016/34-78228.pdf
15 "U.S. SEC Approves NYSE Request for New Volatility Rules", Chuck Mikolajczak, Reuters.com, July 6, 2016, http://www.reuters.com/article/us-usa-stocks-rule-idUSKCN0ZM2ES
16 "NYSE Joining NASDAQ in Eliminating Stop Orders", Steve Goldstein, November 20, 2015, Marketwatch, http://www.marketwatch.com/story/nyse-joining-nasdaq-in-eliminating-stop-orders-2015-11-18
17 "Investment Company Institute Fact Book 2017", ICI.org, http://www.icifactbook.org/data/17_fb_data

Chart 2.8: Quarterly Flows of US Equity Mutual Fund during the Global Financial Crisis



Source: Citi Business Advisory Services analysis Based on Proprietary Data Subscription to SimFund

When there is a major market correction underway, the tendency is for a portion of these investors to exit their equity mutual fund investments. This is illustrated in Chart 2.8.

Quarterly flows of U.S. equity mutual funds fell in the 1st, 3rd and 4th quarters of 2008 and in the first quarter of 2009. Net outflows from Q1 2008 through Q1 2009 amounted to -$125 billion according to SimFund. AUM declined from $6.3 to $3.2 trillion in the corresponding period. A similar move to exit equity mutual funds occurred in 2011 as well. Outflows in Q3 and Q4 2011 were -$95 billion according to SimFund as AUM declined from $6.0 to $5.3 trillion.

Chart 2.9 shows that while redemptions occurred in all fund categories, redemptions from mutual funds (the vast majority of which are actively traded) consistently exceeded redemptions from index funds (passively traded vehicles) during such events. In the 2000-2002, 2008 and 2011 market declines, the pace of mutual fund redemptions exceeded the pace of index fund redemptions in each instance.

The data reveals that both index and mutual fund redemptions are correlated with stock market performance, but that **index fund withdrawals are far less sensitive to the behavior of the US stock market.**[18] In their 2014 paper, Wealthfront Knowledge estimated that for U.S. mutual funds, a "1% decline in S&P performance causes a 0.12% increase in withdrawals. For index funds, a 1% decline in S&P performance causes a 0.07% increase in withdrawals."[19]

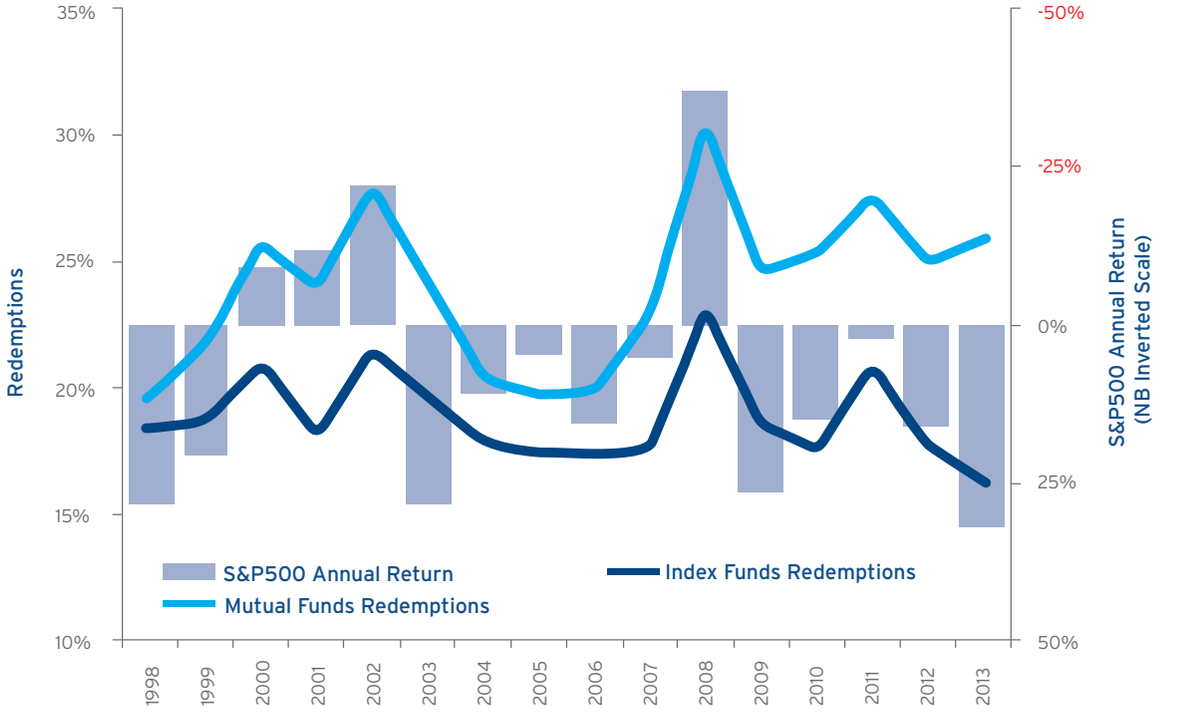
To explain this phenomenon, Wealthfront Knowledge posited that "passive (index fund) investors are far less likely to withdraw from the market when it declines than actively-managed mutual fund investors because, by choosing a passive investment strategy, they fundamentally believe it's not worth trying to time the market."

Since ETFs are the fastest growing component of the passive market, this thinking helps to explain why these products actually gain assets during market and liquidity events. The hesitancy to exit passive funds in order to avoid market timing coupled with expanded use of these products as trading tools in times of volatility both contribute to AUM gains. This is shown in Chart 2.10.

U.S. equity ETFs registered net fund increases in 2002 at the height of the Dot.com Bubble (+$15 billion); in 2008 during the Global Financial Crisis (+$144 billion) and in 2011 during the decline tied to European political uncertainty (+$69 billion). Net equity mutual fund flows in each of those same periods were negative—down -$29 billion in 2002; -$216 billion in 2008 and -$129 billion in 2011.

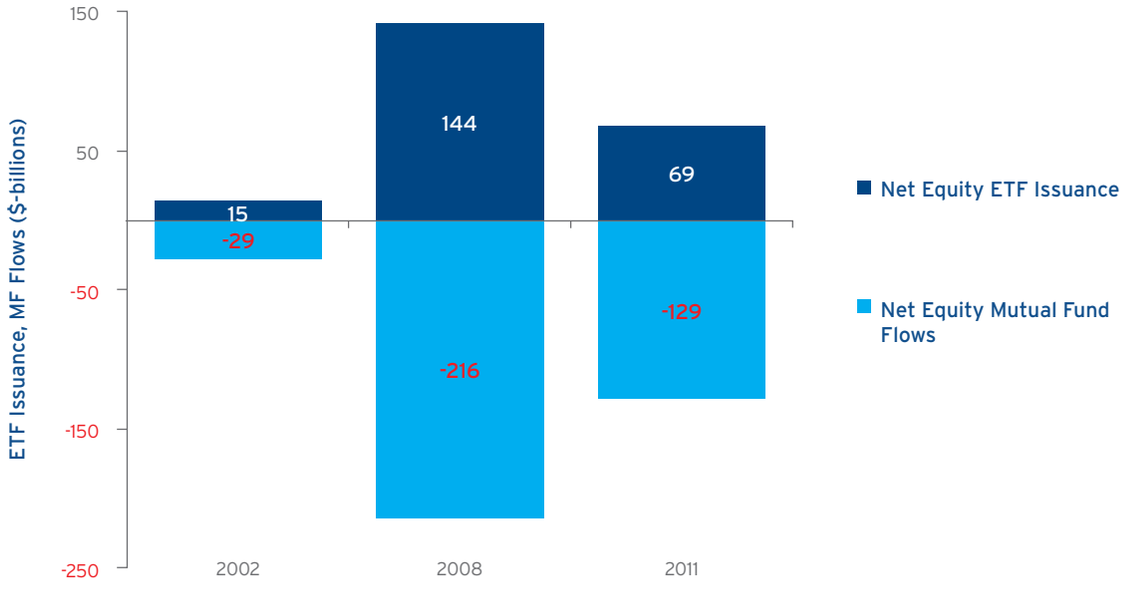
18 "Passive Investors Need Less Hand Holding", Wealthfront Knowledge, Andy Rachleff and Roberto Medri, September 18, 2014, Wealthfront, https://blog.wealthfront.com/passive-investors-need-less-hand-holding/
19 Ibid.
20 Ibid.

Chart 2.9: Redemption Rates of US Index and Mutual Funds versus S&P 500 Annual Returns



Source: Wealthfront.com; Investment Company Institute

Chart 2.10: Comparison of US Equity ETF Issuance vs US Equity Mutual Fund Flows in Select Periods of Market Turmoil



Source: Citi Business Advisory Services analysis Based on ICI data http://www.icifactbook.org/data/17_fb_data

Thus, **the first pattern to anticipate in a future market event (if historical patterns hold true) is that there should be less pressure from individual investors to sell ETF exposures, even if liquidation of equity mutual funds is evident.** Moreover, the market may even see net inflows into ETFs from increased trading activity.

While a seeming positive, this outlook does not negate the potential that there may still be temporary price dislocations between equity ETFs and their underlying securities.

"ETFs have enabled a lot of smaller scale investors to be a lot better diversified than they have been historically. That should mean there will be less panic selling in a correction." Pension Fund

"From the industry perspective, what is brilliant about ETFs is it does have the ability to work well under pressure. Any time we've seen dips or a bear market, we've seen ETFs be a good haven, because all you're doing is going to a different side of a trade. In terms of the synthetic side—there I don't disagree. This gets to where you need good risk and trading analytics." Global Asset Manager >$1T AUM

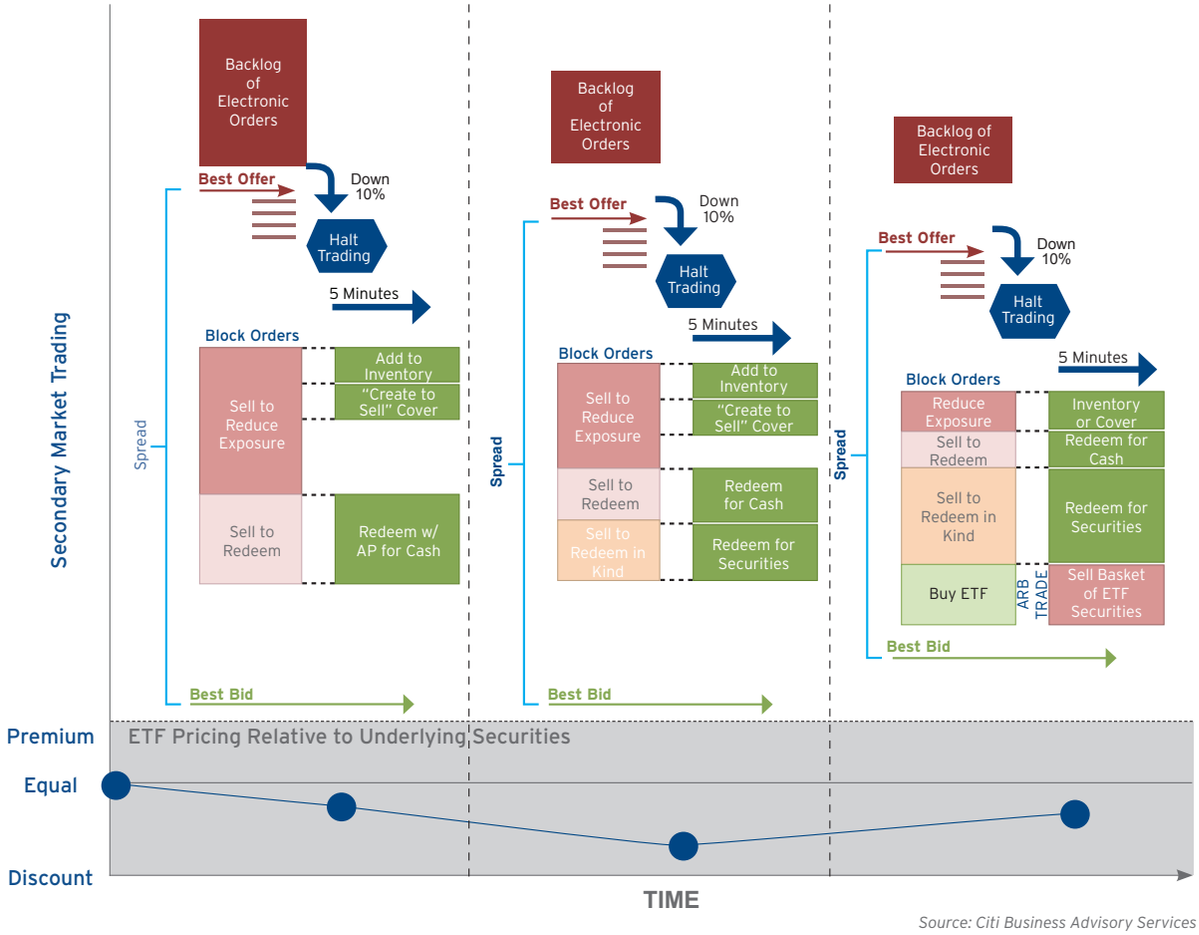
Temporary ETF Price Dislocations Could Still Occur as Participants Work through Order Backlogs

The second trading pattern to watch for in a future market or liquidity event is the potential for backlogged sell orders to delay the emergence of arbitrage trading.

This delay, however, may not be accompanied by the extreme price dislocations seen in August 2016 due to the rule enacted since 2016, such as the elimination of Rule 48.

Market makers should be able to wait and see where prices open rather than having to guess and create excessively wide bid-offer spreads due to a lack of price information. These participants can observe whether selling on the open is sufficient to trigger trading curbs and they can evaluate the backlog of electronic sell orders. This is illustrated in Chart 2.11.

Chart 2.11: Model of ETF Trading in an Extreme Price Dislocation



Source: Citi Business Advisory Services

Since there are no longer any stop-loss or GTC orders allowed in the electronic queue, the backlog of electronic orders should decline (or only expand based on new market orders being entered) each time the affected security reopens from that point forward after the mandatory 5 minute trading curb. How many times trading curbs kick in will depend on the size of the order backlog.

So long as the electronic backlog of orders is large and the ETF is experiencing trading halts, market makers may choose to hold off on arbitrage trading. APs may also not be able to execute any arbitrage trades as their orders to sell the underlying securities would be competing with other backlogged sell orders. Indeed, the only activity that may be occurring during these trading halts is APs and trading desks facing off to their institutional clients on block trades.

Clients may be looking to sell blocks of their ETFs to reduce exposure in the secondary market. APs and trading desks might be able to meet this selling demand for a portion of those orders either by buying those shares from the client and placing them into the firm's inventory or through buying-back any shares that they had created to sell as short ETF positions get covered. Not all these "sell to reduce exposure" block trades in the secondary market are likely to get done right away. A backlog of these positions may also persist for a time. If the backlog to sell ETFs is more extreme than the backlog to sell the underlying securities, this could cause the price spreads to widen for a brief period.

The third pattern to watch for in a future liquidity event is a shift in redemption interest from "redeem for cash" to "redeem in kind for securities" as a signal that arbitrage trading may soon resume. APs will be monitoring the redemption requests they are getting from their clients. Early in a price decline, these clients may seek to redeem for cash and may show little interest in redeeming in kind to receive securities, a sign that they are uncertain about the near-term scope of potential declines. APs should be able to absorb this interest by working with the sponsor who in turn can access their redemption lines of credit or cash reserves.

Eventually, as the spread between the ETF and its underlying basket of securities widens, APs will assess whether the block orders from their clients start to shift to "sell to redeem in kind". This would mean that there is growing interest in receiving securities, a sign that institutional traders may be anticipating an imminent stabilization or reversal of the price decline.

Once this signal occurs, APs may begin performing normal arbitrage trading. By this point, the backlog of block orders seeking to sell to reduce exposure should be erased or down significantly. Confidence that the APs will be able to successfully sell the underlying securities should increase and the normal arbitrage actions to narrow a discount between the ETF and the underlying securities should work to bring spreads back into alignment. Market makers as well may take this signal as a clue to resume arbitrage trades.

Once arbitrage activity resumes, the period of dislocations should be at an end and normal trading should commence. Whether this trading pattern happens once or whether it repeats daily throughout the period of the event is unclear, but the underlying dynamics of the ETF market should prove durable. Indeed, if investors behave similarly to previous market events, there should be less selling pressure on ETFs than on mutual funds (as discussed previously)[21] and there could be points when the ETF starts to trade at a premium to the underlying shares, offering opportunities to perform arbitrage trades in the opposite direction.

"I'm not worried about ETF liquidity. There's always fear of that but I don't think there's suddenly going to be a liquidity drought in asset classes. It's really at the very back of our heads." Large Pension Fund

Evidence Shows that Bond ETFs Operate as Release Valves and Remain Orderly in Stress Events

All of the dynamics discussed thus far have focused on what may happen in the equity markets due to equity ETFs in a potential market or liquidity event. Given the off-exchange nature of bond trading, particularly for corporate bonds, there is parallel set of concerns about what influence bond ETFs may exert since these products allow for bond price discovery in an equity structure.

There have been 5 credit events since 2013 where certain bond ETFs declined more than 1% in value in a single day. These include 1) the "Taper Tantrum" on June 19-24, 2013 when Fed Chairman Ben Bernanke announced the end of Quantitative Easing; 2) the Treasury "Flash Crash" on October 14, 2015 when the 10-year note fell 34 bps in a matter of minutes with no clear news and then quickly recovered; 3) the same August 24, 2015 event discussed previously; 4) High yield bond turmoil on December 7-11, 2015 tied to liquidation of credit mutual fund Third Avenue and 5) the "Relief Rally" on March 1, 2016 when strong economic data fueled expectations that the Fed would continue to raise rates and Treasuries fell sharply.[22]

21 "Passive Investors Need Less Hand Holding", Wealthfront Knowledge, Andy Rachleff and Roberto Medri, September 18, 2014, Wealthfront, https://blog.wealthfront.com/passive-investors-need-less-hand-holding/

22 "Corporate Bond ETFs Performing Under Pressure", Tony Barchetto, ETF.com, September 20, 2016, http://www.etf.com/sections/white-papers/corporate-bond-etfs-performing-under-pressure?nopaging=1

A white paper from the head of corporate development at BATS Global Markets examined the performance of bond ETFs during those events. There were several findings from that work:

Bond ETFs Operated as a Release Valve: Corporate bond ETFs provided incremental liquidity and price discovery to the market away from the underlying bonds themselves. Volumes increased sharply during stress periods in contrast to the actual underlying bonds where liquidity was either flat or down. This is illustrated in Chart 2.12.

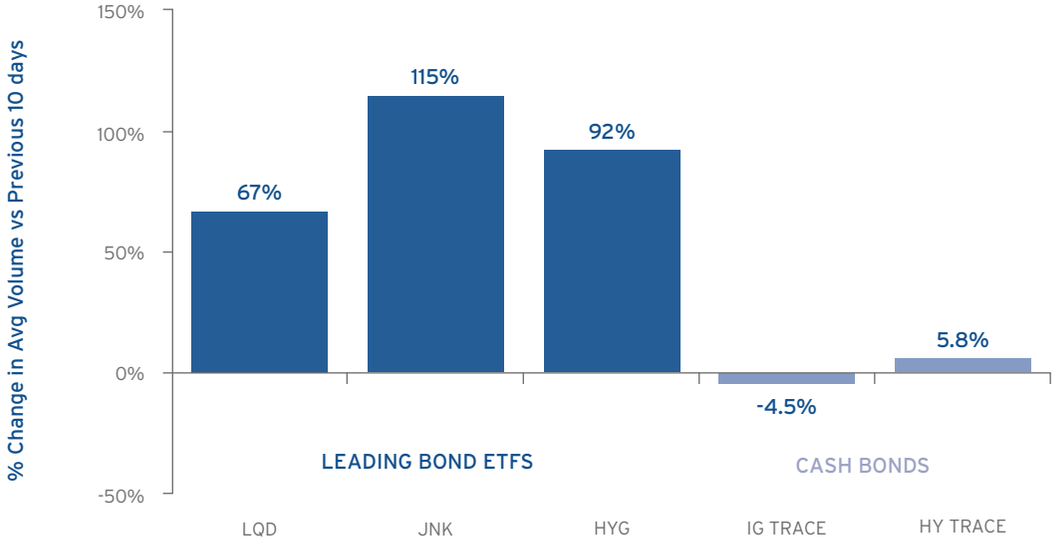
As shown, the iShares iBoxx High Yield Corporate Bond ETF (HYG) experienced a +92% increase in average volumes during the stress periods compared to the previous 10 day window; volumes for the SPDR Barclays High Yield Bond ETF (JNK) posted a +115% increase and the iShares iBoxx Investment Grade Corporate Bond ETF (LQD) saw volume gains of +66%. Meanwhile investment grade corporate bond transactions reported to TRACE decreased -4.5% relative to the prior 10-day window and high yield transactions reported to TRACE increased only +5.8%.[23]

Spread Increases Were Orderly: Although spreads between the ETF share and the underlying securities widened from normal levels during times of stress, trading in the certain corporate bond ETFs remained orderly. This was most evident in the Taper Tantrum– a sustained week of selling on fears of a sharp reversal in interest rate policy for the first time since the financial crisis. "Investors were able to transact with only modest increases in absolute spread (about 1 basis point) using corporate bond ETFs with the market under high levels of stress."[24] This orderly and limited expansion of spreads indicates that arbitrage mechanisms were functioning as intended to keep the bond ETF in alignment with the underlying securities.

Quoted Size of Bids and Offers Declined: Market participants not only widened their bid-offer spreads in the stress events, they also cut the size of those orders to help manage risk more fluidly. Analysis in the white paper showed the size of bids and offers during the stress periods declining about 25-35% for the high yield ETFs and only 1-8% for the investment grade ETF relative to their prior 10-day levels.[25]

This analysis concludes that in bond market stress events during the past 5 years, liquidity has not dried up in corporate bond ETFs and though spreads widened and volumes spiked, corporate bond ETFs did not respond dramatically differently than other ETFs with far more liquid underlying components.[26]

Chart 2.12: Changes in Bond ETF & Cash Bond Trading Volumes During Stress Periods vs Prior 10 Days



Note: Stress periods used for evaluation include 1) the "Taper Tantrum" on June 19-24, 2013; 2) the Treasury "Flash Crash" on October 14, 2015; 3) Chinese Economy Concerns August 24, 2015; 4) High yield bond turmoil on December 7-11, 2015 tied to liquidation of credit mutual fund Third Avenue and 5) the "Relief Rally" on March 1, 2016 when Fed confirmed intent to raise rates
Source: "Corporate Bonds ETFs Performing Under Pressure", ETF.com, Tony Barchetto, September 20, 2016, http://www.etf.com/sections/white-papers/corporate-bond-etfs-performing-under-pressure?nopaging=1

23 Ibid.
24 Ibid.
25 Ibid.
26 Ibid.

Final Observations

We conclude this examination of how ETFs might impact market conditions in a future liquidity or market event, with the following assessment:

ETFs do not act as a traditional mutual or UCITS fund during periods of market crisis. Selling interest from individuals who hold the ETF as an investment vehicle might not be as reactionary as in other products due to the pre-decision to pursue a passive market strategy that does not reward market timing. This does not negate the fact that there may be panicked sellers but there should not be as many panicked sellers in ETFs as in traditional investment vehicles if a future market event follows historical patterns.

Moreover, based on those historical patterns, use of ETFs as trading tools may actually cause AUM to rise in a stress event as buyers emerge in falling markets and sellers emerge in rising markets. The combination of participants looking to use ETFs as a hedging vehicle (or release valve) and increased arbitrage activity between the ETFs and their underlying securities could result not only in AUM gains, but in a spike in volumes, fed in part by smaller quoted size.

Temporary dislocations in spread prices could occur, if past market action provides a guide. Market protections that would halt trading to restore market order might in turn cause a backlog in orders, in turn which could delay normal arbitrage activity, but due to SEC and NYSE rule changes, normal arbitrage trading should resume once order backlogs are resolved.

These temporary dislocations could be interim events or in a prolonged crisis, they could repeat daily, but past events do not provide any evidence that point toward a long-term failure in ETF market mechanisms.

With this examination of how ETFs may influence the markets in a future event complete, we will now turn to the first of three emerging product innovation trends that survey participants identified. These new products define how active investment managers are looking to rethink their offerings. This first type of innovation product explores the boundary between active and passive fund management and is constructed using ETFs or other passive building blocks as part of their core value proposition.

Section III: Emerging Innovation Products Path 1: Active Managers Test the Boundaries of Active and Passive

As Sections I and II highlighted, the flow of assets out of actively managed and into passively managed funds in recent years has reached a tipping point with more than $1.0 trillion shifting categories. This dynamic is forcing active fund managers to re-examine the value proposition that they provide and find ways to reposition their skills.

Flows into products that track too closely to indices, particularly in the active core category, may not rebound if bar-belling of the industry continues. New active management products will need to enhance returns in portfolios that feature a beta core comprised of low-cost index funds.

The next three sections of this year's report will focus on the active fund management industry's response to the rapid growth in passive investing. Each section will highlight the product development opportunity spaces that active managers are exploring and will examine the types of new funds that are emerging as a result. The first path to be discussed in this section focuses on a set of products that mine the boundary between active and passive investing styles.

Many news articles and industry pundits frame the debate about the growth in passive investing as an either-or formulation: passive versus active. Survey participants instead highlighted a growing trend to view this debate in a more nuanced manner. New products being created re-frame their investment goal and approach to be one that leverages opportunities to use passive and active.

There are two emerging product sets in which this approach is being deployed. The first focuses on the growth and emergence of factor funds and how the multiple launches of "multi-factor" funds re-insert the active portfolio manager's expertise into orchestrating the use of passive factor exposures to obtain a more alpha-focused outcome.

The second looks at how traditional multi-asset class fund solutions (MACS) are evolving to use passive elements in the construction and hedging of their portfolios. These activities mark the third wave of innovation in the MACS space and a new category of solutions that seek to address investor concerns about fees.

To frame the evolution of these products, we will briefly revisit our analysis from last year's report that shows how and why "factors" are becoming important investment tools and building blocks.

"All of the data tells you that it is extremely unlikely that anyone will be able to pick an active large cap manager who consistently outperforms the index. So they go and buy an index, but then they want to hedge out some of the unwanted downside risks that exposes them to, and it creates a demand for the active products that give them the specific upside exposures they want." EMEA-based Asset Manager <$500B AUM

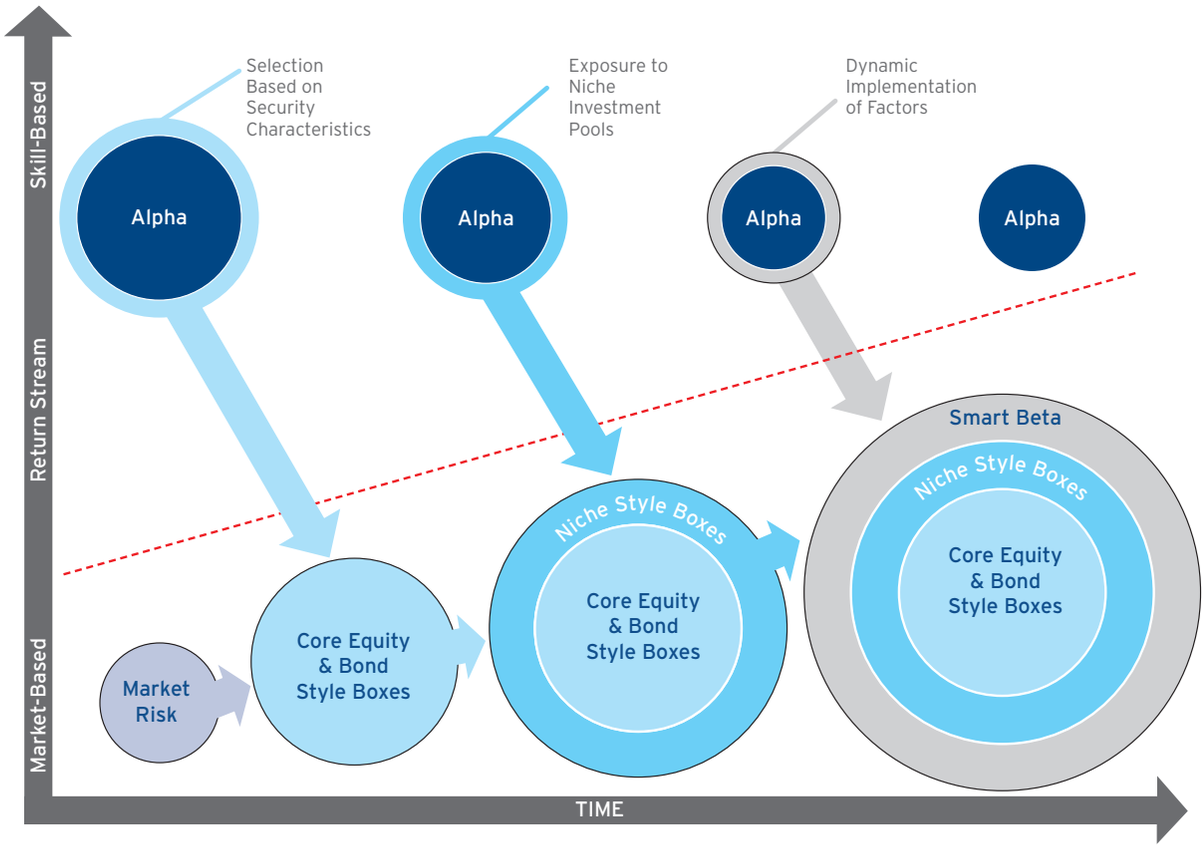
Decomposing Sources of Outperformance Leads to Emergence of Factor Funds

In last year's report, "*From Diversified Asset Classes to Factor-Driven Index Portfolios & the Re-Packaging of Active Investment Skills*"[1] , we laid out a framework that showed the gradual stripping away of sources of outperformance (alphas) and how the ability to isolate, measure and replicate those exposures via indices was expanding the number and type of betas that investors could use to construct their portfolio. The key chart we used to illustrate that progression is re-created in this year's report as Chart 3.1.

From the emergence of Modern Portfolio Theory (MPT) and the Capital Asset Pricing Model (CAPM) in the late 1950s/early 1960s, investors sought to capture two types of return streams in their portfolios--market risk or beta (the measure of what returns an investor could obtain through having broad exposure to the market) and outperformance driven by investment skill (alpha). For decades, investors would select opportunistic portfolio managers to capture that outperformance and measure their success against broad market indices. This changed in the mid-1990s with the publication of Eugene Fama's and Kenneth French's Factor-Model.

1 From Diversified Asset Classes to Factor-Driven Index Portfolios and the Re-Packaging of Active Investment Skills

Chart 3.1: Reclassification of Outperformance to Beta



Source: Citi Business Advisory Services

This model supplemented returns tied to market risk (beta) by identifying some common security characteristics that could be seen as having an inherent ability to drive outperformance. In equities, these factors related to size (capitalization) and to value (high book-to-market versus low book-to-market). In bonds, these characteristics related to maturity and credit quality. Once these characteristics were identified, they could be replicated through creation of indices.

This was the foundation of the style box system. Style box indices provided a new way of measuring whether an active manager was outperforming in their category of investing, not just against the broad market. As the number of indices linked to style boxes expanded, more passive funds were launched, making it possible to invest in the indices not just use them as benchmarks.

By the early 2000s, another set of factors were isolated to explain outperformance. These included sector and regional exposures, including global, international or emerging markets. Once again, the isolation of these factors allowed for a new set of niche style boxes, the creation of indices to measure performance in those style boxes and the launch of another wave of investable passive products to provide exposure to those indices.

Last year's report highlighted a third wave of market innovation enabled by the democratization of risk models discussed in Section I. For many years, quantitative traders could isolate technical factors (such as momentum or volatility) or fundamental factors (such as dividends or quality) as sources of outperformance, but capturing these factors was difficult for the average or even the institutional investor.

With the advent of enhanced computing power, it became easier to isolate and measure these exposures in a more real-time manner in order to construct rules-based indices to capture these quantitative factors either through systematic re-indexing around a factor other than capital weighting (Smart Beta) or through the isolation of certain affects (risk premia). As with the other waves of innovation, the emergence of indices in this space was quickly followed by the launch of investable products.

Taken as a whole, the explosion in investable indices that has occurred in the last 20 years across core style boxes, niche style boxes and smart beta/risk premia factors has been transformative. This diversity of passive exposures is what has allowed for the "bar-belling" in the industry to occur.

Investors today can capture their "betas" through a diversified set of passive index funds. We termed this the

"factor cube" in last year's report. If it is well constructed, the factor cube can deliver a large portion of what used to be considered outperformance from active managers in opportunistic portfolios, but at a lower cost.

"Traditional active and passive have begun to become more nuanced and complex. If you're a traditional fundamental active manager, you're a dinosaur—so you're either going to invest in big data and analytics for your quant process or you're going to refashion yourself as a factor/smart beta investor," Global Asset Manager >$1T AUM

"The active/passive debate is overplayed in the media as an either/or situation. In reality it isn't. We see many opportunities to combine the best of both approaches" EMEA-based Asset Manager $500B-$1T AUM

"I hope that 2017 will skewer the idea of 'active vs passive' as it is not 'either or', and the crescendo of criticism is proving to be premature." Investor

Smart Beta and Risk Premia Funds Emerge as Factor-Driven Investment Products

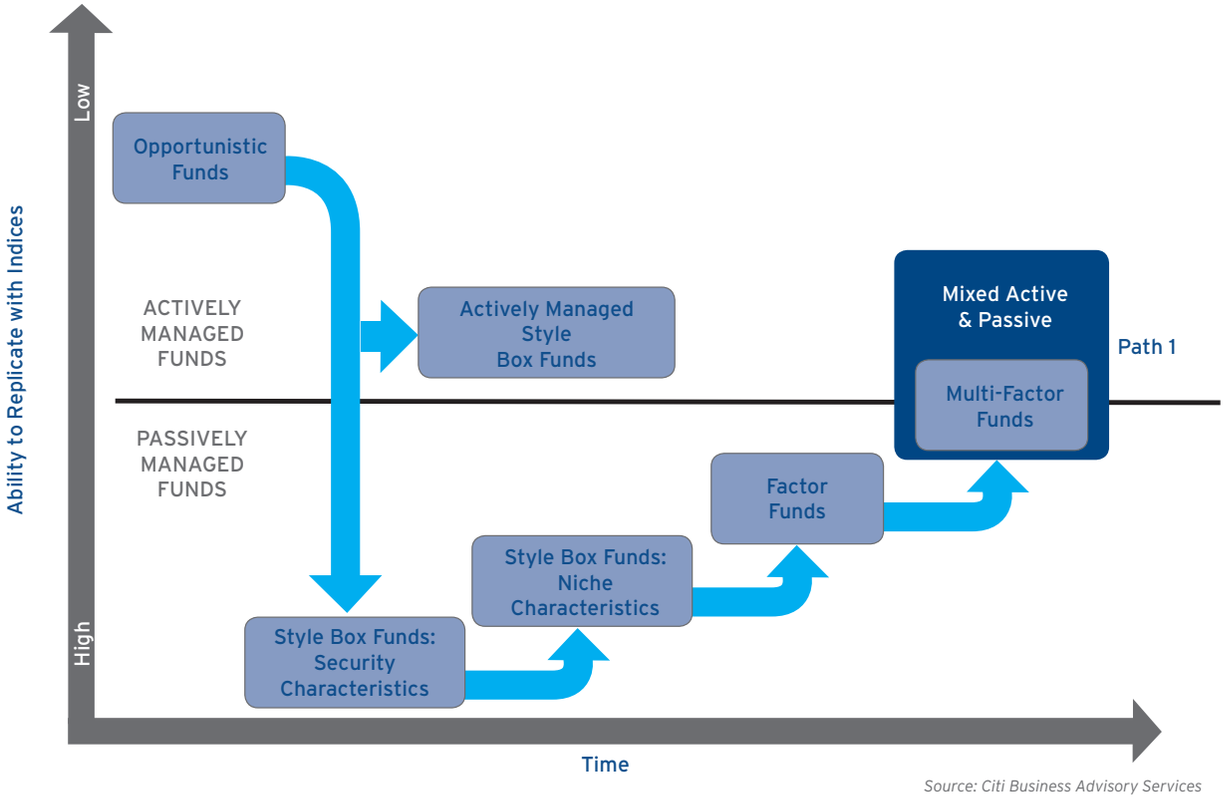
Chart 3.2 shows the progression of investable fund development outlined above. One important change that accompanied the emergence of passive style box funds was the move from opportunistic actively managed funds to actively managed style box funds. This shift reflected an attempt to create more precise benchmarking and better fit emerging style-box driven allocation models, but it also shifted active managers into territory where it was easier to replicate their returns with indices. That has been one of the foundational issues allowing the tail-winds discussed in Section I to have such sway.

Chart 3.2 additionally highlights how this innovation in the passive space is continuing with the emergence of multi-factor investment funds—products that move up to the boundary between active and passive. Before we examine these emerging products, we will explore the types of current smart beta offerings in order to lay the foundation to understand how these multi-factor funds differ.

As noted above, though quantitative investment managers had used factors in their own portfolio construction for some time, the toolkit to turn these exposures into funds has been a more recent phenomenon.

Prior to 2003, the translation of style boxes to funds had been about creating passive index products that tracked

Chart 3.2: Investment Product Development Path 1: Focus on Multi-Factor Funds



Source: Citi Business Advisory Services

a market, sector or geography. Passive mutual funds or UCITS funds were all designed to provide exposure to a specific style box index by mimicking the capital weighting of the securities in the index. ETFs were originally created as an interim trading tool to give investors a transition vehicle to equitize cash by allowing institutions to park their money in one of these indices to keep cash working between fund allocations.[2]

The first factor funds that chose to move away from straightforward replication of style box indices emerged in 2003. **Dividend funds** were the most enduring fund type to emerge from this period. These funds sought to isolate those securities that paid a higher dividend by systematically overweighting and underweighting index constituents based on this single factor—the strength of their dividend payouts.

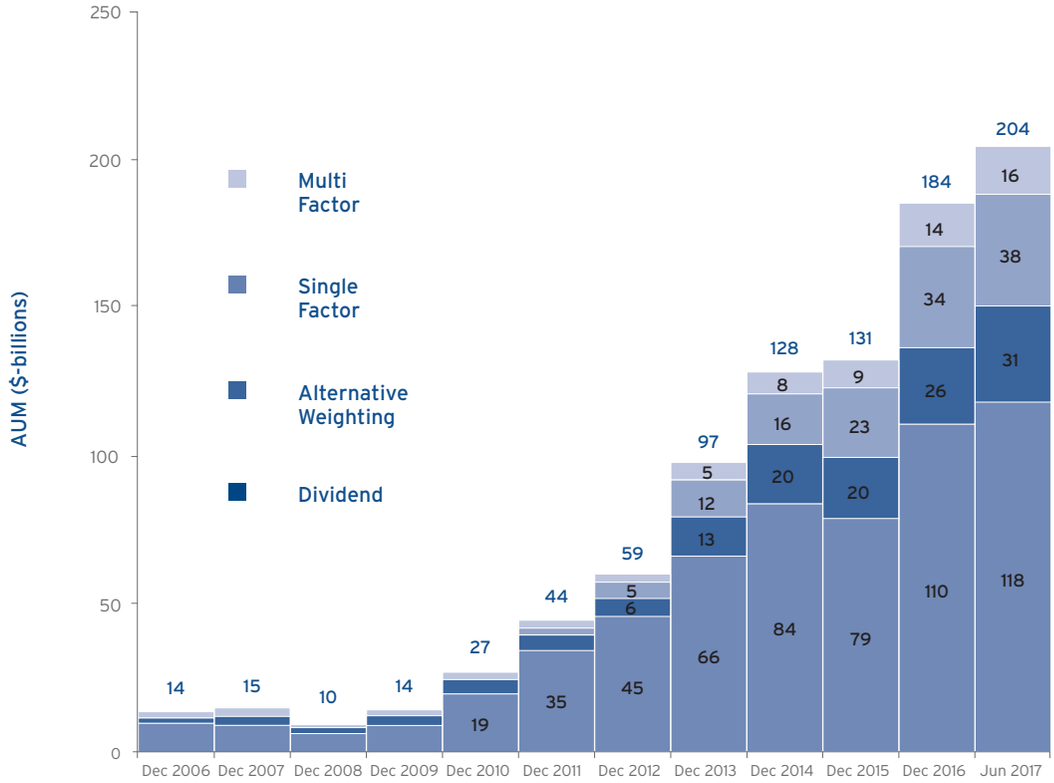
Over time, other **single factor funds** emerged that similarly reweighted an index based on systematic rules. These products offered an array of single factor options that spanned other fundamental factors (i.e.,, value) or technical factors (i.e.,, momentum or volatility). Systematically derived single factor index funds are used primarily as institutional tools to help augment or neutralize portfolio tilts. As such, many view single factor funds as tactical trading or exposure tools.

An article from Research Affiliates released in 2005 challenged the idea that equity indices could not offer outperformance. This article laid out a thesis that "an index that weights each listed company using several metrics of its economic footprint could earn a premium over comparable indexes which are based on market capitalization."[3]

Research Affiliates' "fundamental indexing" approach sought to construct an index around a set of metrics that "include book value, earnings, revenue, sales dividends and total number of employees."[4] These are the same type of inputs used in traditional fundamental analysis. New fund offerings emerged to provide exposure to the Research Affiliates Fundamental Index (RAFI). Other firms followed suit, creating their own rules-based fundamental indexes and product suites to access them. These products collectively became known as **alternative weighting factor funds.**

Collectively, the range of these rules-based indexes that rely on some weighting other than capital weighting began to be called "smart beta" or strategic beta to differentiate them from passive index beta. Though the name is highly polarizing, the products have grown steadily as shown in Chart 3.3.

Chart 3.3: Growth in Smart Beta AUM



Source: Bloomberg, Citi Research

2 "9 Landmark Smart Beta ETFs", Matt Hougan, July 26, 2016, ETF. com, http://www.etf.com/sections/features-and-news/9-landmark-smart-beta-etfs?nopaging=1
3 "Rob Arnott Reflects on a Decade of Fundamental Indexation", Robert Stowe England, February 17, 2015, Institutional Investor, http://www.institutionalinvestor.com/article/3428241/asset-management-indexing-and-etfs/rob-arnott-reflects-on-a-decade-of-fundamental-indexation.html#.WaMr8E2osrw
4 Ibid.

Citi Research indicates that through the first half of 2017, there are now 203 smart beta ETFs collectively managing $204 Billion in AUM.[5] These products are one half of the smart beta and risk premia category we track. How risk premia products differ will be discussed next.

While still a relatively small asset pool, these funds have doubled their AUM since 2014. Launches are also growing. Only 96 smart beta funds were created between 2003 and 2014. This compares to 107 fund launches in the past 2.5 years between 2015 and the first half of 2017.

Dividend funds, the most mature product set, are the largest smart beta product by assets ($118 billion) and by number of funds (48). These funds are highly tied to the credit cycle and given the Federal Reserve rate increases noted back in Section I, flows into these products have fallen sharply. From net inflows of +$18.9 billion in 2016, dividend ETFs took in just +$2.8 billion in H1 2017.[6]

Single factor funds have also seen interest slow. The 39 funds in this category had AUM of $38 billion as of H1 2017, but inflows in the first 6 months of this year were only +$1.3 billion versus $8.3 billion in 2016 according to Citi Research.

Interest in some of the smaller Smart Beta fund categories has been steadier. The 41 alternative weighting smart beta funds collectively had $32 billion in AUM as of H1 2017 and were the only sub-category to see an increase in flows in H1 2017 (+$3.6 billion vs. $2.9 billion in 2016).

The one area where launch activity has been strongest, however, has been in multi-factor ETFs, the first new product category that we see mixing an active and passive approach to create a new product offering.

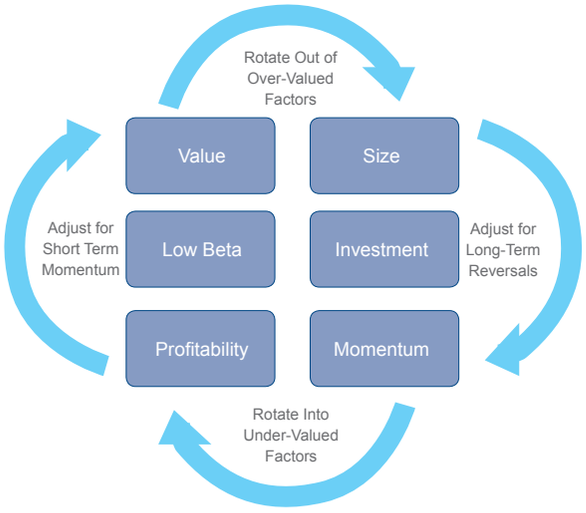
"You can see a future where instead of having lots of different funds in a portfolio an investor has one vehicle. As a manager you will have internal shares in an asset pool which you bundle into that vehicle. There will be far fewer products and an investor will own a customized multi-factor, multi-asset index." EMEA-based Asset Manager <$500B AUM

Multi-Factor Smart Beta Funds Apply Active Management Techniques Using Passive Building Blocks

Multi-factor smart beta funds focus on factor allocation or rotation to determine the best deployment of capital. These are market timing products, a technique very much linked to the active investment skill set. The products rely on a dynamic signaling to determine when to shift capital but express their trade ideas and build their market exposures using passive index-based building blocks of single factor funds.

Chart 3.4 provides a conceptual model around how certain multi-factor smart beta products operate.

Chart 3.4: Conceptual Approach to Multi-Factor Smart Beta



Source: Citi Business Advisory Services

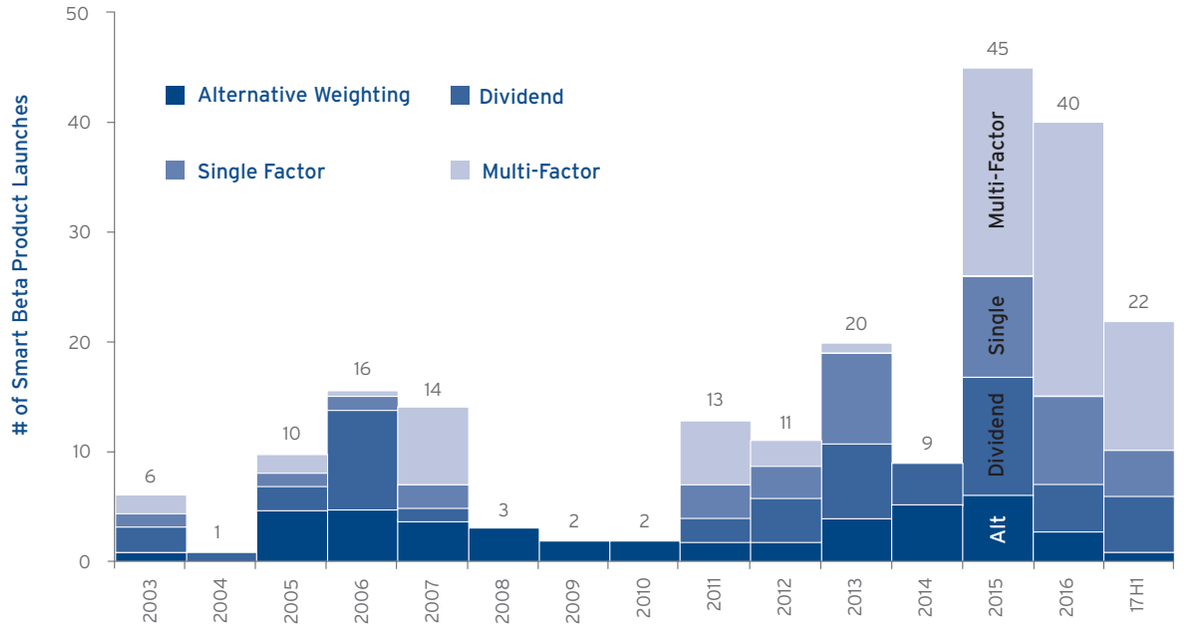
In the example, two dynamic timing factors are used to determine how to allocate capital across six single factor exposures. The first dynamic timing factor measures whether the individual factors are over-valued relative to recent market performance (in which case there will be a rotation out of the factor) or under-valued (in which case there will be rotation into the factor). The second timing factor evaluates the market environment for making the capital shift. In this instance, there is a short-term momentum screen that is compared to a long-term mean reversion screen.

While this model is based on a Research Affiliates product, other firms are creating their own proprietary approaches. The type of dynamic timing mechanism, the selection of underlying factors and the allocation approach are all potential sources of differentiation.

In a sense, these funds are akin to tactical asset allocation (TAA) products, but instead of using asset classes, they use passively constructed factor exposures as their sources of return. As such, many traditional long only managers known for their active approach to portfolio management are creating these products.

5 Citi Research "ETF Perspectives: Smart Beta & Active: Steady as They Go", Scott Chronert, July 24, 2017.
6 Ibid.

Chart 3.5: Number of Smart Beta Product Launches Per Year



Source: Citi Research, ETF Sponsors ETF Perspectives: Smart Beta & Active: Steady as They Go

Multi-factor smart beta funds have grown at a quickened paced over the last 18 months, launching at a rate 3 times greater than the other three smart beta strategies fund categories as shown in Chart 3.5.

As shown, in H1 2017, there were 22 total smart beta fund launches, over half of which were in multi-factor funds. Similarly, multi-factor fund launches accounted for 63% of 2016 launch activity (25 out of 40) and 43% of launches in 2015 (19 out of 45). Collectively, there are 74 multi-factor fund products according to Citi Research, 76% of which launched in just the past 2.5 years.[7]

While the number of launches is substantial, these products have yet to draw much in terms of AUM. In total, multi-factor smart beta funds were listed as having only $17 billion AUM in H1 2017.[8] In part, this may reflect the marketing challenge in getting target users to understand and adopt the product.

Designed as investment solutions for a more retail focused audience, these funds are being marketed to financial advisors and Registered Investment Advisors (RIAs).

Thus far, the average performance across the largest multi-factor ETFs has been lagging the S&P 500. Through June 2017, the median return for the broad universe of multi-factor funds was +10.5%, a figure 100 bps below the S&P 500. This actually marks some deterioration in returns as the median multi-factor fund trailed the S&P 500 by only 40 bps in 2016.[9]

One issue highlighted by Citi Research is that the majority of multi-factor smart beta funds have a "quality bias to their stock selection approach that has underperformed since Q1 2016."[10] Quality focuses on companies that have stocks with a low debt hurdle, consistently low standard deviation on earnings and strong return on equity and return on invested capital. They are often viewed as defensive stocks that historically have been well positioned to outperform in a market downturn.

Despite this modest underperformance, how these products perform over time is still unclear since the offerings are relatively new and their efficacy will be best judged over the course of a cycle.

"There is a second wave of thinking around factor investment. I never used to use the word factor three years ago. Now it's in every other conversation we have." Global Asset Manager >$1T AUM

"The move to commoditized building blocks is accelerating. These blocks are composed of index/ETF products and increasingly Smart Beta allocation." APAC-based Asset Manager <$500B AUM

7 Citi Research "ETF Perspectives: Smart Beta & Active: Steady as They Go", Scott Chronert, July 24, 2017.
8 Ibid.
9 Ibid.
10 "Smart Beta Faces an IQ Test in 2017", ETF Perspectives, Scott Chronert, January 19, 2017, https://www.citivelocity.com/t/eppublic/16jUH

Combined Smart Beta and Risk Premia AUM Continues to Post Strong Growth

Citi Research breaks out smart beta funds because of their ETF delivery mechanism and rules-based systematic approach to construction. The products are part of a broader set of factor funds, however, with risk premia funds representing the other half of the category.

Risk premia funds offer are a more dynamic approach to factor isolation. Long only risk premia funds look to over and underweight their position holdings to engineer their factor exposure. This is a screening approach that is part of the quantitative product suite.

As hedge fund firms turned to the indexing space, they began to create alternative beta funds that used a long-short methodology to more fully isolate the desired exposure. This long-short approach is also often referred to as alternative beta.

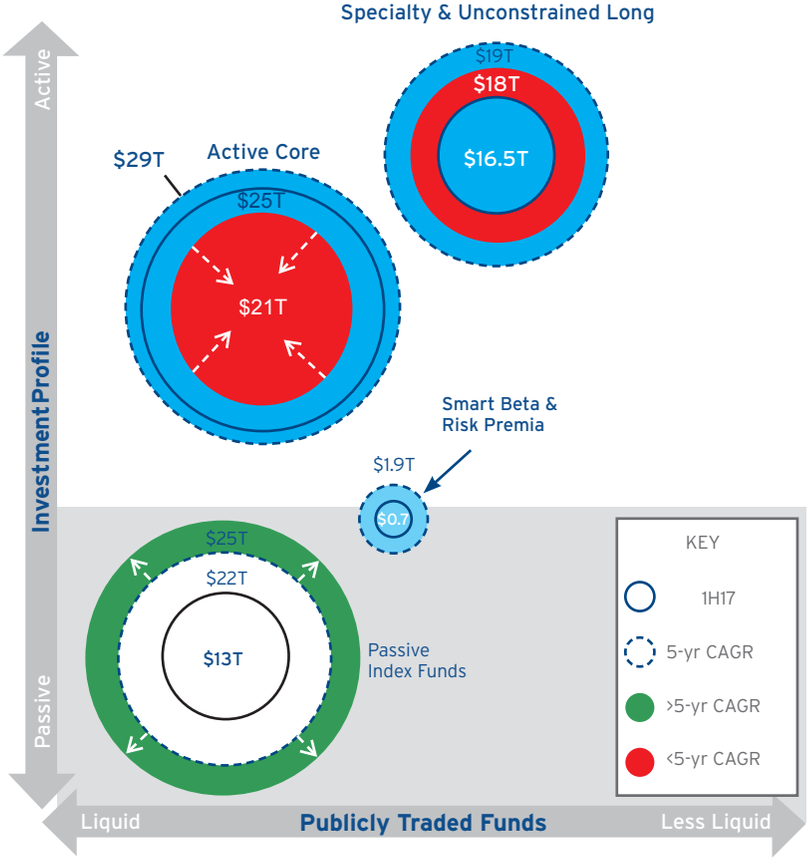
Our industry model shows that together, smart beta and risk premia funds experienced strong AUM growth in recent years, rising from an estimated $226 billion in 2014 to $737 billion by 1H 2017 - +21.0% CAGR. The results of that analysis are presented in Chart 3.6.

If this +21% CAGR continues, we show that smart beta and risk premia funds could reach $1.9 trillion AUM by 2022. While a relatively small pool of assets, these products could become building blocks themselves for broader investment industry solutions as will be discussed next.

"We're beginning to move away from general indices to smart beta indices. Our quant team has put it together, and it's now in the performance discussions. It's evaluated against any other mandate, which will live or die by performance." NAM-based Asset Manager <$500B AUM

"An index is nothing but a wrapper. Your IP is creating a customized portfolio which you can deliver in a traditional mandate or deliver in an index. We have created bespoke multi-factor indices for a number of clients." EMEA-based Asset Manager <$500B AUM

Chart 3.6: Current & 2022 Projected AUM Pools by Product



Source: Citi Business Advisory Services projections based on data from eVestment (proprietary subscription); Investment Company Institute Yearbook (www.ici.org); Citi Research, SimFund (proprietary subscription); Hedge Fund Research (proprietary subscription)

Multi-Asset Class Solutions (MACS) Evolve From Allocation to Dynamic Trading Products

Multi-Asset Class Solutions (MACS) have been an important and growing area of interest for traditional asset management firms looking to extend their product set beyond their traditional benchmarked relative performance funds. Investor appetite for these strategies remains robust and total global assets under management are estimated to have reached $10.2 trillion in H1 2017, bringing the size of the total MACS space into alignment with the entire passive fund industry.

While there is no one unifying description for multi asset class solutions, most industry participants can agree that MACS products are designed to gain exposure to a diverse set of asset classes and styles in a single investment portfolio. The goal of combining these exposures is to leverage both the portfolio allocation expertise of the manager and the strength of the investment ideas in the underlying portfolio holdings—a value proposition that offers a broader use of active management skills and allows for a focus on longer term portfolio goals rather than shorter term fund performance.

More broadly, MACs align the interests of the investor with the packaging and distribution capabilities of the investment manager. This alignment most frequently features bespoke solutions for institutional market participants and bundled fund solutions for retail and advisory clients.

Survey participants cited evolution occurring in both spaces. How investment managers are innovating to deliver more targeted solutions to institutions will be discussed more fully in Section VII. Our discussion here will focus on retail solutions.

To better clarify the types of MACS products, we have developed a new framework that is presented in Chart 3.7. This framework categorizes MACS products across the breadth of product construction and by the degree of active portfolio management and decision making. As shown, this approach reveals three waves of evolution that can be seen as distinct types of MACS offerings.

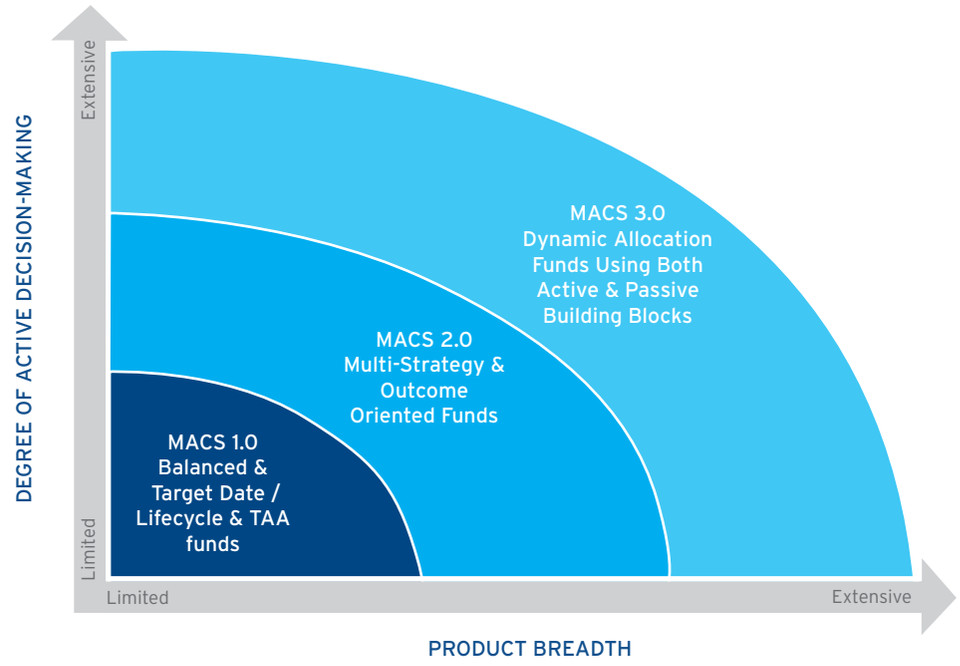
MACS 1.0 Product Offerings

MACS 1.0 product offerings emerged in the mid to late 1970s, making them the oldest type of multi-asset class offering and providing them an asset gathering edge that continues to dominate the MACS universe at $8.9 trillion in H1 2017(87%). They also continue to show sustained growth with a 5-year CAGR of 3.9%.

The original intent of MACS products was to deliver in a single fund solution the asset class diversification benefits linked to Modern Portfolio Theory. Early funds offered a fixed allocation between equities and bonds and were called "balanced" funds as a result. This mix most typically adhered to the 60% equities/40% bonds mix used utilized traditionally by many institutional participants. This product segment alone accounts for $5.9 trillion and 66% of the total MACS 1.0 category.[11]

The second MACS 1.0 sub-strategy is target date, lifecycle or target risk funds. Collectively these offerings

Chart 3.7: Evolution of Multi-Asset Class Solutions



Source: Citi Business Advisory Services

11 Based on proprietary Citi Business Advisory Services data subscription to Cerulli Associates.

account for one of the largest segments of MACS 1.0 with over $1.2 trillion in assets across the largest 15 providers according to Cerulli Associates.[12]

These funds use an age based methodology that targets the year when the individual is due to retire. The investment managers then offer a range of fixed asset class allocation funds that reflect the relative risk tolerance of individuals based on their generational positioning. A fund designed for a 20-year old will have a more aggressive risk budget than a fund designed for a 60-year in this approach whereas in balanced funds the mix would be the same for all buyers. Lifecycle funds offer a similar approach, but around major events such as a child being ready to start college.

Target date funds in particular have become prominent in many defined contribution plans, often as the default investment option for individual plan participants that opt not to allocate their retirement savings on their own. Many industry participants anticipate a strong pace of growth in the future based on this positioning. The third and final MACS 1.0 sub-strategy is comprised of tactical asset allocation (TAA) funds. These products tend to be slightly more dynamic vehicles that can adjust their mix of equities and bonds based on a firm's view of the opportunities in the current market regime. Some of the funds in this third category are even beginning to incorporate a broader asset class mix using products that offer alternatives exposure.

MACS 2.0 Products

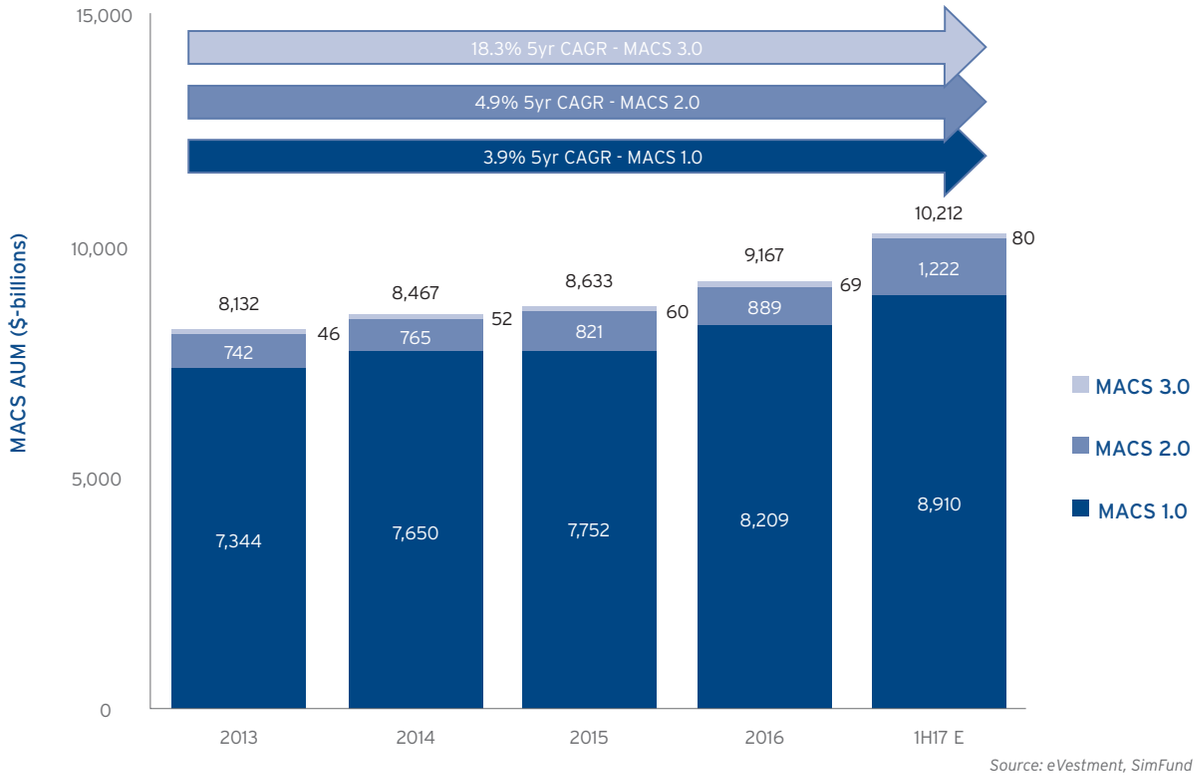
MACS 2.0 products employ multi-strategy and outcome oriented approaches. These funds require a greater degree of engineering to deliver their returns.

Rather than utilizing long only equity or bond building blocks, multi-strategy solutions focus on mixing return streams from various types of investment approaches such as sector-focused investing, market neutral trading or merger arbitrage. They will often use derivatives and hedging. The most widely recognized categories of funds in this sub-set are Global Absolute Return and Global Diversified Growth funds.

Outcome oriented solutions will also use derivatives and hedges but focus the use of these instruments to deliver a specific investment outcome for an investor based on either a time horizon (i.e., liability driven investment returns) or a personal objective (i.e., income growth).

Fees on these products tend to be somewhat higher than on the MACS 1.0 solutions as they rely on a more sophisticated set of investment skills and more sophisticated allocation models. AUM has been growing in these products, but they remain significantly smaller than the MACS 1.0 assets. As shown in Chart 3.8, AUM in MACS 2.0 products totaled just over $1.2 trillion in H1 2017, having realized a sustained 5 year CAGR of 4.9% since 2011.

Chart 3.8: Multi-Asset Class Solutions AUM 2013-2017



Source: eVestment, SimFund

12 Ibid.

"Multi-asset changes the dialogue to performance vs outcomes from performance vs benchmarks." Global Asset Manager >$1T AUM

"Multi-Asset is going to be a primary growth area for the asset management industry because it serves the needs of a lot of investor bases." NAM-based Asset Manager <$500B AUM

New Class of MAC 3.0 Solutions Combine Passive Exposures with Active Securities Management

MACS 3.0 solutions are an emerging category that to date has only attracted a minimal amount of AUM (~$80 billion). Nonetheless, this is where much of the new product innovation is occurring. Survey participants noted that many traditional and alternative focused firms are increasing their efforts to build these offerings.

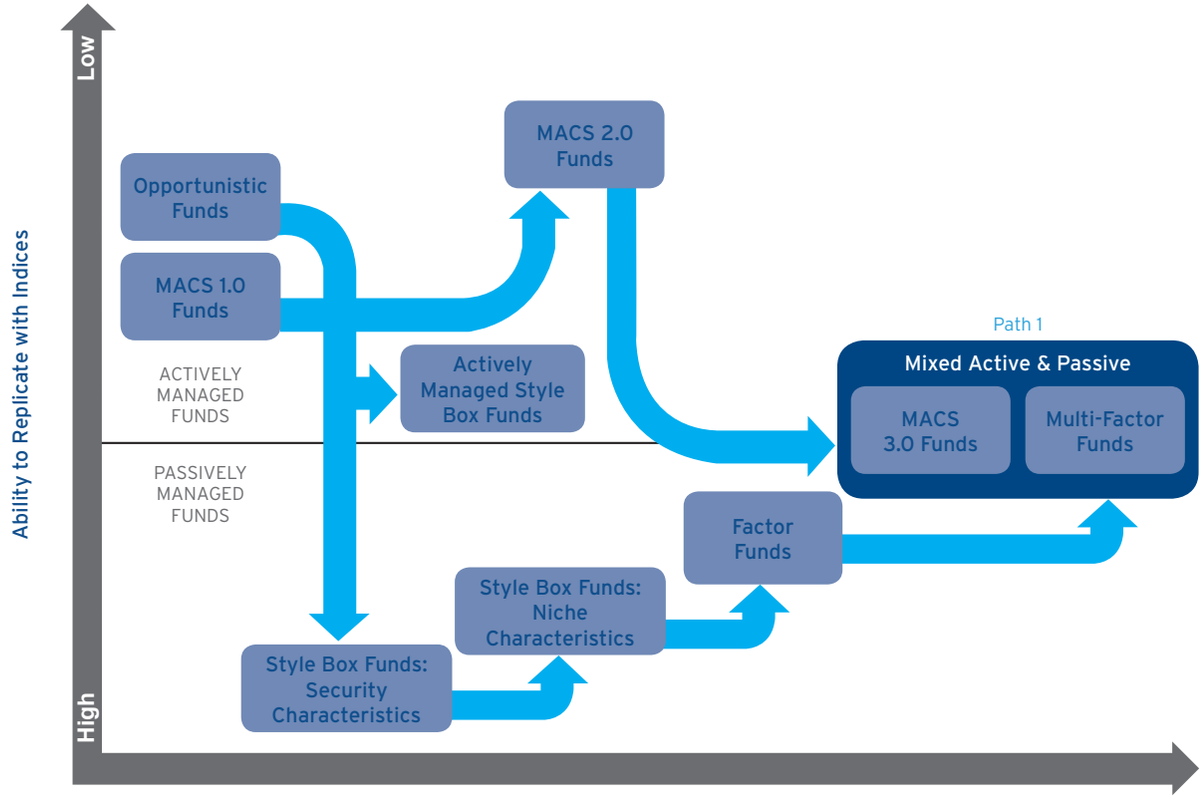
As with the multi-factor fund approach that mixes active management investment skills with passive building blocks, the new MACS 3.0 products also utilize passive building blocks, but toward a different goal.

These funds leverage a passive core exposure to help bring down the overall cost of managing the portfolio bundle. Layered on top of this passive core is an actively managed component that allows the active manager to showcase their specific expertise. These are thus funds that mimic the emerging bar-bell approach to portfolio construction that is expanding within the institutional investor community. The positioning of these MACS 3.0 products on the boundary of active and passive investing align to the multi-factor fund offerings detailed earlier. This is shown in Chart 3.9.

There are many iterations of the MACS 3.0 structure emerging. We have grouped them into categories and present them in Chart 3.10.

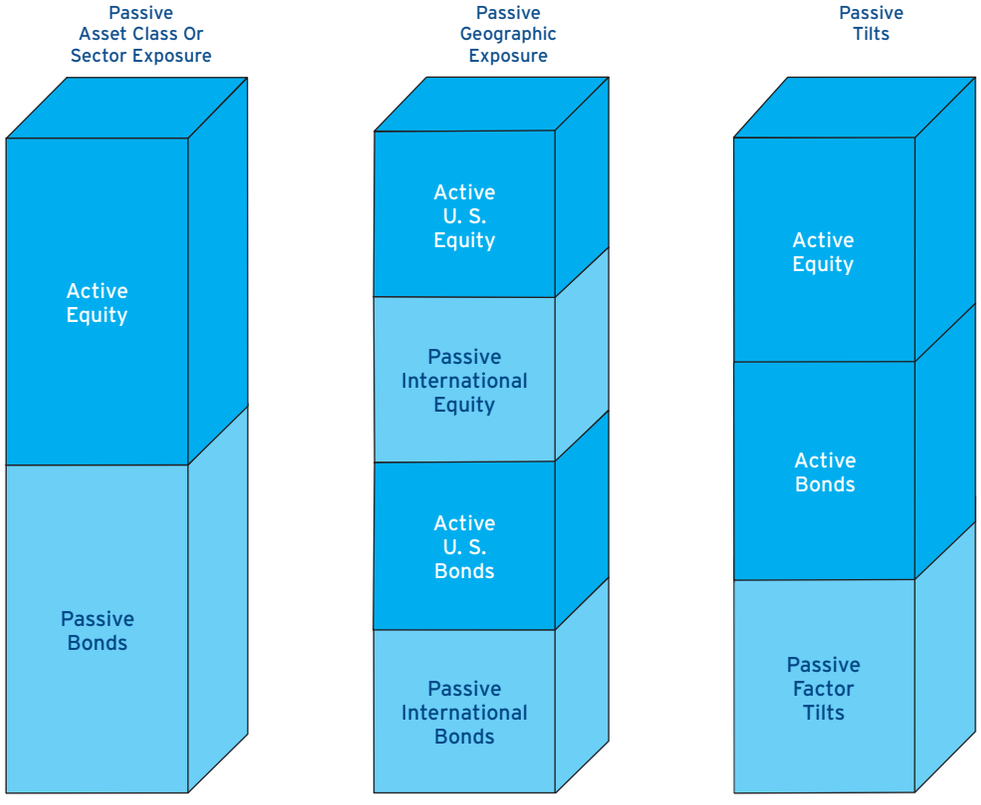
One type of MACS 3.0 product uses passive indexes to create a unique and specific asset class or sector

Chart 3.9: Investment Product Development Path 1: Focus on MACS 3.0



Source: Citi Business Advisory Services

Chart 3.10: Mixing of Active & Passive Building Blocks in MACS 3.0



Source: Citi Business Advisory Services

exposure and then actively trades across the remaining asset classes. For example, an active manager known for their expertise in credit management may choose to create a 60/40 fund by allocating 60% of their capital to passive equity indices to create the equity exposure in their portfolio and then actively manage the remaining 40% of the fixed income capital.

A second type of MACS 3.0 product will build specific geographic exposure using passive index components and then actively trade in the regional market where the portfolio manager has their core research and trading expertise. In these instances, passive elements may be present in both the equities and bond portions of the portfolio to create a more diversified set of exposures for the overall fund.

A third variation of MACS 3.0 may maintain both an active equity and an active bond exposure but choose to apply strategic tilts to that portfolio using single factor smart beta indices (i.e.,, momentum or volatility). This mimics the approach many large institutional traders are beginning to employ in order to neutralize or accentuate certain exposures based on their view of the current macro environment and regime cycle. These are but a few of the emerging types of active and passive fund mixing that survey participants observed in this year's report. Much more innovation on this boundary could well unfold in the future.

"Regarding MACS, the house view is that the industry is still not close to peak of cycle for 'outcome related' products. New MACS capabilities are emerging however, which are layering in Smart Beta and Factor Investing into next generation of solutions." NAM-based Asset Manager $500B-$1T AUM

"One of most successful funds of recent years has fully embraced what it means to be an active manager these days—it employs an Asset Allocation model that uses both active and passive building blocks." EMEA-based Asset Manager $500B-$1T AUM

Future MACS Growth May Blur the Boundaries Between Smart Beta, Risk Premia and Passive Funds

As these new solutions emerge, the MACS category as a whole could start to overlap with elements of the smart beta space and passive index space and blur the boundaries between these offerings. This is a factor to monitor in the future.

For now, we see that the comments from survey participants affirming the continued focus and interest in MACS overall could drive increased growth in the next 5 years. Projections are for MACS to end 2017 at $10.2 trillion which marks a +7.3% 5-year CAGR. We see that pace accelerating. In our forecast, we have increased that CAGR by 50% to +11.0%. If that higher estimate proves accurate, our forecast would be for total AUM in MACS products to reach $17.2 trillion by 2022—a figure only slightly smaller than our projections for the specialty and unconstrained long asset pool.

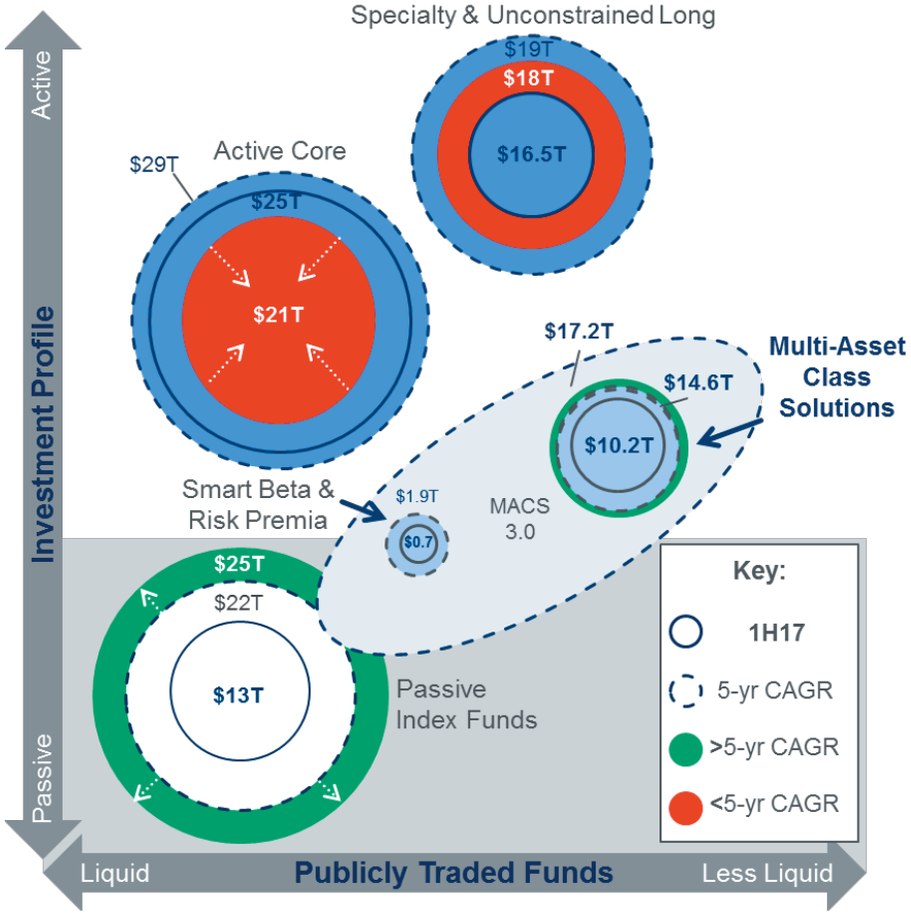
Indeed, of the traditional long only products, MACS should grow the most quickly. For every dollar in active core AUM as of H1 2017, there is $0.41 cents of AUM in MACS products. If the projections we show in Chart 3.11 prove accurate, that would increase to $0.82 for every dollar in 2022. Similarly, for every dollar in AUM in specialty and unconstrained long there is $0.66 in MACS AUM. By 2022, that could increase to $0.86 for every dollar.

The boundary between active and passive is not the only new opportunity space being explored by active managers. Survey participants pointed toward an uptick in interest in thematic funds and these products could be viewed as potential MACS 4.0 contenders in the near future.

"There is a small set of core risk factors (like DNA strands) and a few building blocks. These shouldn't overlap and should be able to explain the world on their own." Sell-Side Specialist

"Demand for single-asset class products is declining. Solutions and multi-asset mandates are increasing. The building blocks to meet those client needs are going to be the component capabilities we have, e. g. , quant and factors, fundamental long only, ETFs and more passive strategies. You need them all." EMEA-based Asset Manager $500B-$1T AUM

Chart 3.11: Current (H1 2017) & 5-Year (2022) AUM Projections



Source: Citi Business Advisory Services projections based on data from eVestment (proprietary subscirption); Investment Company Institute Yearbook (www.ici.org); Citi Research, SimFund (proprietary subscirption); Hedge Fund Research (proprietary subscirption)

Section IV: Managers Explore Thematic Trading and Impact Investing to Create Societal Alpha

As many survey participants see the role of active management shifting to enhance beta in bar-belled portfolios, there are signs that some active managers are returning to a more opportunistic style and away from investment strategies that can be easily benchmarked. Thematic trading was cited as one such source of potential alpha and uncorrelated returns since these portfolios unbind the manager from style boxes, sectors and factors. Section IV will explore the variety of new funds emerging under this broad thematic umbrella.

Large institutional allocators that have long-term investment horizons have helped drive this idea of thematic investing through their focus on companies that pursue good long-term governance and strong environmental, social and green policies (ESG). While the institutions are looking to invest in these companies because they believe that such practices will drive better long-term valuations, survey participants note an emerging trend within the high net worth and wealth advisory world to create funds that allow investors to actually go further and use their investment dollars to impact the causes that matter most to them.

The low return environment has affected many individual's ability to donate to their most important philanthropic charities and foundations. As such, there appears to be growing interest in using investment dollars in a way to help bridge that gap. Section IV will also explore this potentially transformative approach that shifts the role of the asset management industry from looking solely at investment returns and expands the dimensions on which individuals measure their portfolio around a new type of societal alpha.

Thematic Portfolios Move beyond Traditional Asset Class and Factor Construction

One consequence of the emergence of style box indices discussed in Section III was that active portfolio managers moved away from opportunistic funds to better align their investment expertise to the style box system. This supported more transparent benchmarking and allowed managers to be more clearly tagged to increasingly complex portfolio allocation models.

It also may have unintentionally encouraged managers to temper their trading to ensure a low tracking error to their benchmark. Taking the risks required to significantly outperform their benchmark could result in a miss which in turn might cause them to lose assets. In periods of strong returns, this relative alignment to the index may not have been problematic, but in the low return environment it has become a serious issue for the industry.

In an effort to find more uncorrelated investment opportunities, survey participants discussed a new set of investment funds that select their securities based on specific themes that transcend the sector, regional or factor approach that has come to dominate the landscape in recent years. Moving in this direction realigns the product to the industry's original opportunistic investment approach as shown in Chart 4.1.

At a time when the industry's drift has been toward identifying sources of outperformance and replicating them to become new types of beta return streams, thematic investing can be seen as a carve out from the alpha pool. This is highlighted in Chart 4.2.

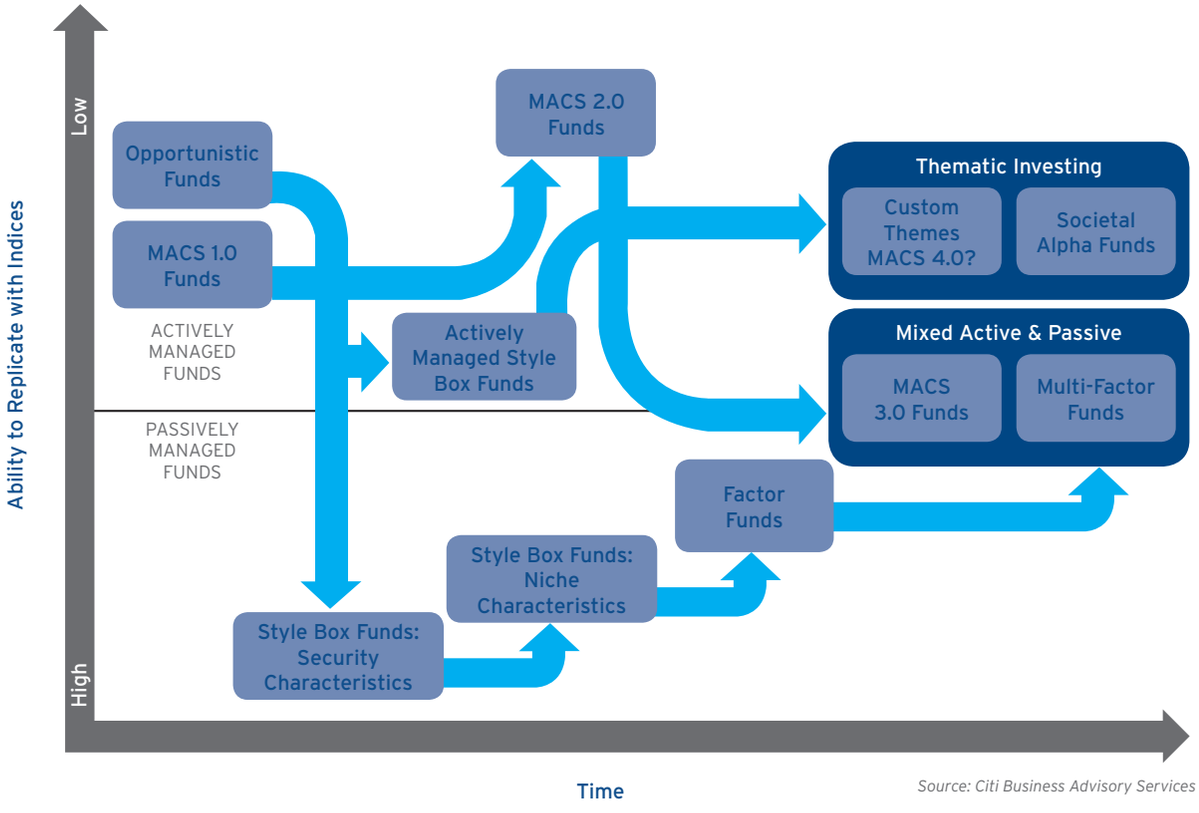
There is unlimited potential for the construction of unique thematic portfolios. This pursuit is open to an active manager's imagination and is not bound by the traditional avenues of investment expertise. This makes it more difficult to isolate, replicate or measure a thematic portfolio against traditional market indices.

Without a clear benchmark to gauge monthly or quarterly performance, thematic investing offers an opportunity for an active manager to pursue a longer-term trend. As one industry expert put it, "the big idea with thematic investing is isolating where fundamental tailwinds, lasting for years potentially, might exist."[1] This allows the investment manager to shift the investment approach from one that assesses which companies have produced value to which companies might produce value.

Different societal, demographic or technological influences can be drawn upon to fuel such examination. For example, demographic trends noted back in Section I indicate that the coming two decades will result in the largest pool of retirees in human history and prospects for them to live much longer lives. Thematic funds focused on an aging population might invest in a diverse set of companies that provide services from long term care facilities to geriatric medical research to elderly homecare products to independent living services like medical alert monitoring.

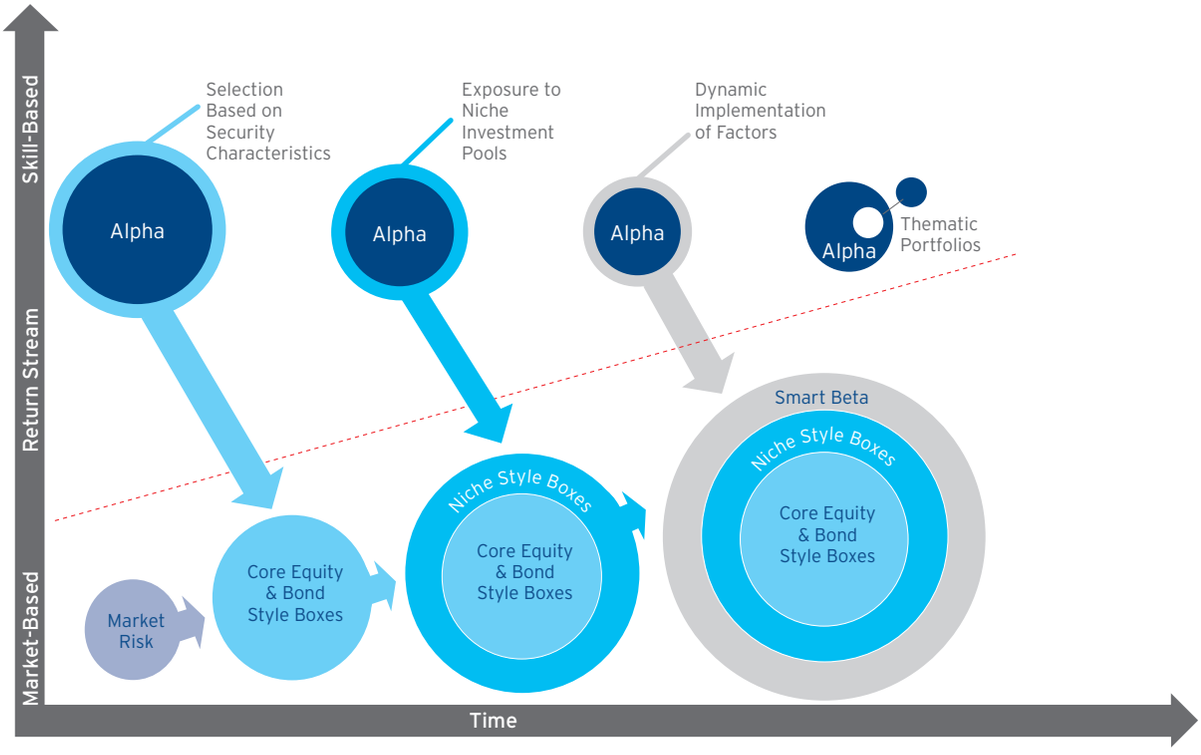
1 The Do's and Don'ts of Thematic Investing", Roger Nusbaum, May 1, 2017, Seeking Alpha, https://seekingalpha.com/article/4051009-dos-donts-thematic-investing

Chart 4.1: Investment Product Development Path 2: Focus on Thematic Investing



Source: Citi Business Advisory Services

Chart 4.2: Isolation of Alpha Opportunities from Core Beats: Thematic Portfolios



Source: Citi Business Advisory Services

Experimentation in how to build themes may move in unexpected directions. Motif Investing is an online broker that offers up thematic portfolios created by professional managers and allows individuals to build and offer their own thematic baskets. One of the best performing motifs through July 2017 was called the Online Gaming World. It described its theme as follows: "In dark basements everywhere, gamers are doing battle online and building a marketplace that's social, cheap and global."[2] That thematic basket was comprised of 11 stocks that had posted a year-to-date performance as of August 1, 2017 of +59.3% versus the S&P 500 return of +14.9%.[3]

"Why do / should investors ... care about liquidity if we're supposed to have long-term horizons?" Endowment / Foundation

"A well governed, responsible organization tends to perform better and if you are a long term investor you care about that." Pension Fund

Multi-Asset Thematic Portfolios Could Become MACS 4.0 Solutions Over Time

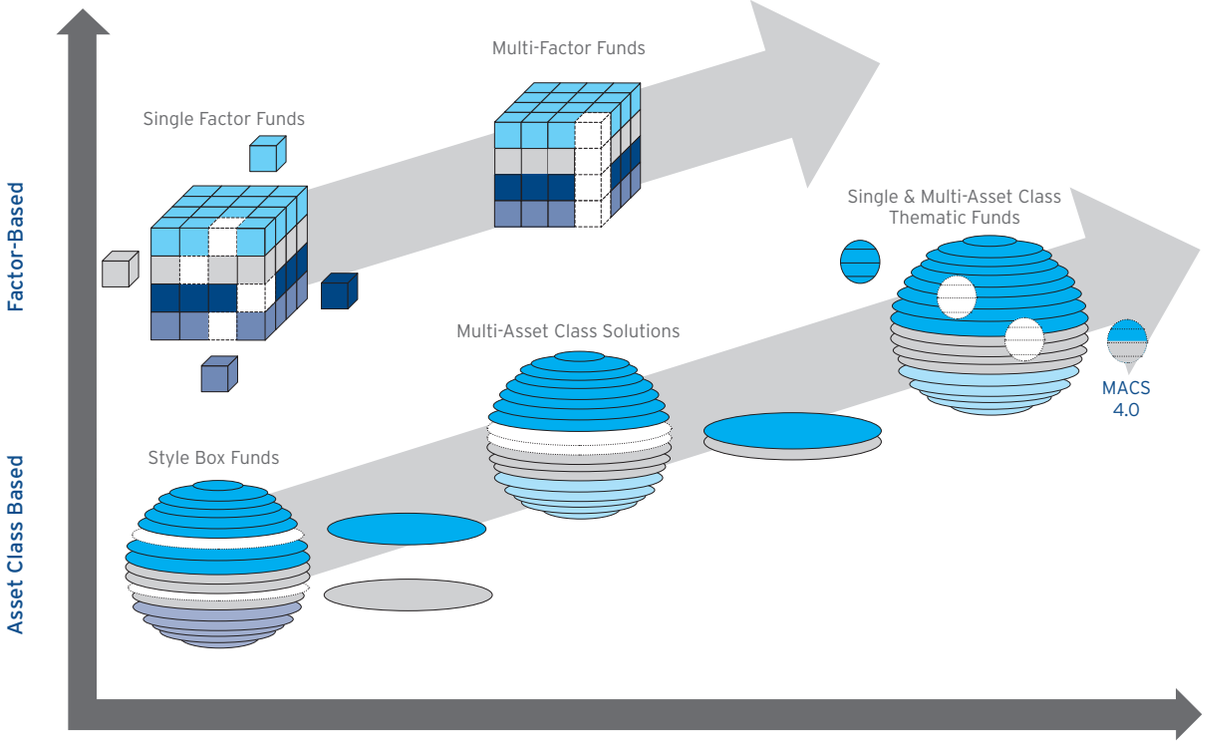
Themes today regularly cross sector and regional boundaries, but have yet to cross asset classes in a meaningful way. Almost all of the thematic funds to date focus on equity investing. Chart 4.3 shows the potential for these products to expand across asset classes and come to represent a new type of a multi-asset class fund, potentially MACS 4.0.

This chart summarizes how the approach to investment products has evolved. Though they moved on very different timelines, both asset class based product development and factor-based product development started with a specific style box or factor and then progressed to funds that combined several types of single exposures into a multi-exposure product.

Viewed in this way, the differences embodied by thematic fund investing are clear. Rather than relying on a single type of exposure, thematic funds cut across multiple single exposures, but in a targeted manner that is difficult to mimic.

Using the aging population example we laid out earlier, this would show that the fund is buying specific

Chart 4.3: Product Development: Emergence of Thematic Funds



Source: Citi Business Advisory Services

2 https://www.motifinvesting.com/search#selected=professional&order=desc&sort=oneyear.
3 Ibid.

company carve outs from the healthcare, consumer discretionary and technology sectors—not over or under-weighting all the securities in those sectors or even sub-sectors. Moreover, the fund may be buying companies in completely different regions. It is for this reason that we view these thematic funds as a return to an opportunistic investing approach.

It is also clear that there is no reason that equities should remain the only investment vehicle to capture these themes. Though we are not yet aware of multi-asset class thematic funds, these seem like a natural extrapolation of the trends already at work in the industry as noted by our survey participants.

While a newer way to look at fund opportunities for many investors, large pensions and sovereign wealth funds have been trailblazers in thinking about how a certain type of long-term themes – namely good corporate governance and sustainability—offer a signal about what companies might outperform over the long-term.

"Thematic funds are a different vehicle for delivering investment return and achieving product differentiation." Large Pension Fund

"I wouldn't be surprised to see a raft of thematic index products coming; factor-based solutions." Global Asset Manager >$1T AUM

Large Institutions Drive Charge to Focus on Long-Term Corporate Governance

Large global pension and sovereign wealth funds are using their influence and investment dollars to drive an increased focus on companies that are proactively taking steps to enhance their long-term corporate governance in a manner that may dampen potential regulatory issues and position them for long-term competitive advantage.

In 2016, a group of 6 of the world's largest pension and sovereign wealth funds announced that they were creating and launching a Long Term Value Creation index (LTVC) and committing $2.0 billion in capital to invest in companies that demonstrate strong balance sheets, good governance and clear long-term strategies.[4] The idea was "an offshoot from a forum of business and financial leaders concerned that corporations are sacrificing future growth and prosperity to please shareholders in the short-term."[5]

The formula underlying the construction of the index measures "fundamentals such as return on equity, leverage and accrual ratio (a measure of earnings quality) as well as the company's corporate governance policies." The methodology for constructing the index includes "a survey that askes companies to explain their long-term ambitions." These questions focus on topics such as "risk and crisis management, business ethics, innovation and supply-chain policies."[6]

One of the key drivers in the push to design the new long-term value index was to create a common framework against which to measure the characteristics of companies that demonstrate successful long-term governance. "The survey component was one of the key draws, as it encourages corporations to reflect on their behavior. The main goal is to get companies to be clear and to report to investors on the sources of long-term value creation."[7]

Institutional interest in sustainability initiatives has advanced because of the availability of clear measures that enable investors to benchmark companies on their efforts and a clear understanding of how these efforts help long term value creation. The flow of investment capital to those companies that score well on sustainability measures is seen as a draw that encourages other companies to follow suit.

Indeed, the manufacturer of the Long Term Value Creation Index (LTVC) noted that "generally there is an intersection between the sustainability topics and the sources of long-term value creation in many industries" and the sponsors of the index noted that their goal in creating LTVC was get companies to ask, "what do they need to achieve to become one of the 250 stocks in an index like this?"[8]

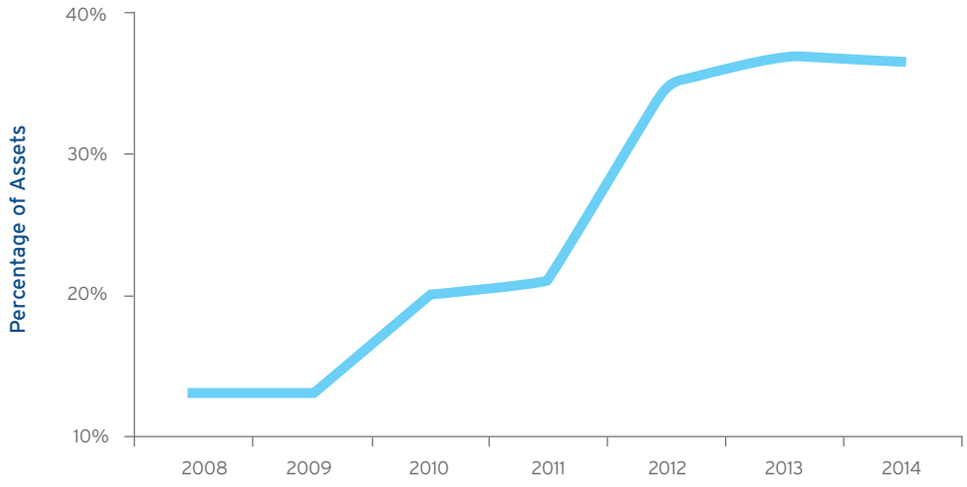
Interest from large institutions in both long-term value creation and sustainability mark a pushback against short termism that is being echoed by the broader institutional community. Chart 4.4 highlights a significant increase in the duration of holding periods by institutional investors since 2008.

Post GFC, on average, only about 13% of equity assets were held by institutional investors for longer than five years. By 2015 that total had nearly tripled to 38% according to data provided by NASDAQ OMX Advisory Services and Thomson One.

Institutional allocations to Environment, Social and Governance (ESG) are part of this shift in view and have worked to significantly expand AUM in those products.

4 "Canada's CPIBB Leads New Effort to Promote Long-Term Investing", Jess Delaney, April 16, 2016, Institutional Investor, http://www.institutionalinvestor.com/article/3545092/investors-sovereign-wealth-funds/canadas-cppib-leads-new-effort-to-promote-long-term-investing.html#.WaSiXk2osrw
5 Ibid.
6 Ibid.
7 Ibid.
8 Ibid.

Chart 4.4: Percentage of Equity Assets Managed by Institutional Investors with Average Portfolio Turnover >5 Years



Source: NASDAQ OMX Advisory Services, Thomson One

"You want to know that an investment still makes sense in 10, 20 years. If environmental policy affects the economics, or 51% of the market thinks it will, then I need to know about it." Pension Fund

"From an investor perspective it makes sense because it is helping you avoid blow-ups." Global Asset Manager >$1T AUM

Both Retail and Institutional Investors Boost Allocations to ESG Funds

The Environmental, Social and Governance (ESG) criteria is a "set of standards for a company's operations that socially conscious investors use to screen investments. "'Environmental' criteria looks at how a company performs as a steward of the natural environment. 'Social' criteria examine how a company manages relationships with its employees, suppliers, customers and the communities where it operates. 'Governance' deals with a company's leadership, executive pay, audits, internal controls and shareholder rights."[9]

Since 2008, institutional investor interest in ESG strategies has expanded by ~$300 billion, boosting total H1 2017 AUM from these participants to $346 billion in these products and shifting institutional ownership of funds in the ESG category from 33% to 59% in the corresponding period. Between 2011 and 2016, institutionally-owned ESG funds grew at a 5-year CAGR of +21%, more than double the pace of AUM growth from retail participants (+10%). This is detailed in Chart 4.5.

Institutions interviewed in this year's survey were quick to note that they are selecting these investments not to fulfill any ethical imperative, even in jurisdictions where civil pressures to do so are evident, but instead because of the value that companies that adhere to these principles should provide to the portfolio.

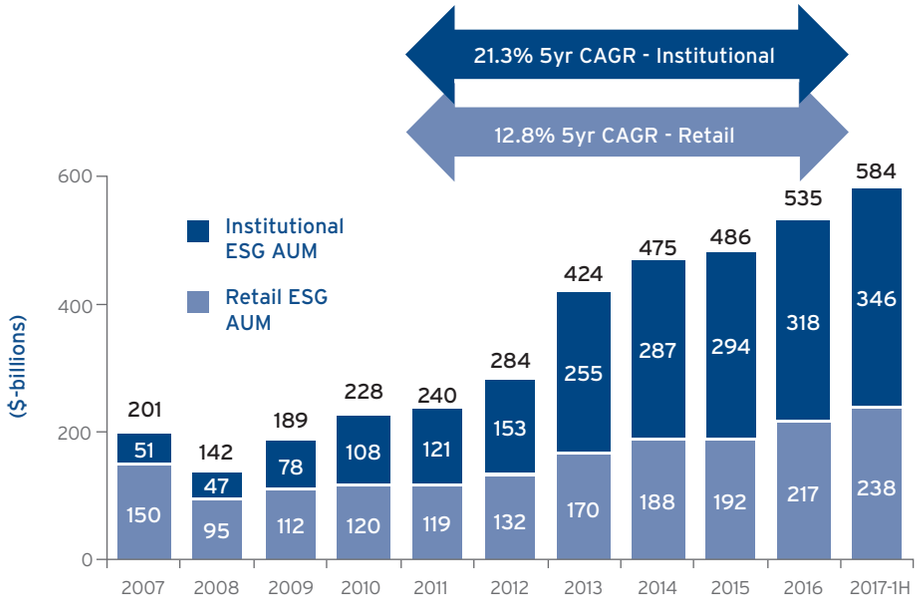
Considering ESG risks tends to fall outside the bounds of traditional financial models, however, and this has raised questions as to how these types of investments fit in fiduciary mandates.

In their report, *Investment Governance and the Integration of Environmental, Social and Governance Factors*, the OECD notes that "regulators have taken steps to clarify that regulatory frameworks do not prohibit ESG integration so long as it does not jeopardize portfolio performance."[10]

> The U.S., the Department of Labor confirmed that fiduciaries may legitimately consider ESG factors if they have a bearing on financial analysis provided that the overall decision-making process is in line with the existing standards.[11]
>
> The U.K., the Pensions Regulator published a new Defined Contribution Code and trustee guides in July 2016" that conclude that "there is no legal obstacle to taking ESG into account and they encourage trustees to take into account risks that affect the long-term stability of investments."[12]

9 http://www.investopedia.com/terms/e/environmental-social-and-governance-esg-criteria.asp
10 "Investment Governance and the Integration of ESG Factors", OECD, 2017, https://www.oecd.org/finance/Investment-Governance-Integration-ESG-Factors.pdf
11 Ibid.
12 Ibid.

Chart 4.5: Growth in ESG Investing



Source: eVestment, SimFund

The European Union in their Institutions for Occupational Retirement Provision (IORP) Directive which is expected to be passed by early 2019 went even further, explicitly referencing ESG within the discussion of prudential standards and stating that the prudent person rule "can take into account the potential long-term impact of their investments on ESG outcomes."[13]

These rulings and the general trend toward long-termism emerging in the institutional community are seen helping to continue to draw interest to these investments. Retail uptake of ESG products is also increasing sharply, but survey participants suggest that this is being driven by a somewhat different motivation.

Assets in ESG investment funds from retail participants more than doubled since 2011, reaching $238 billion in H1 2017 as highlighted in Chart 4.5. Survey participants suggested that this interest in part reflects a shift in attitude on how retail and wealth clients want to use their investment capital.

"Environmental, social and governance objectives help us achieve our aim of becoming longer term investors, and not being blown about by the short term gusts of fashion and fads." Large Pension Fund

"If the company has ESG principles built into their core governance, they'll likely be a stable and better investment than firms that don't embed these principles into their products. If a manager we are reviewing doesn't consider companies with strong ESG principles, it is a strike against them. It doesn't mean that we won't hire them. It is an important but not deterministic input." Endowment / Foundation

"The moral obligations we feel under now extend to any external manager in a way we haven't seen before. It hasn't yet been extended to our counterparties." Pension Fund

Low Return Environment & Political Developments Draw Individual Investors to Funds that also Benefit Society

Although the goals of investing and philanthropy are frequently misaligned, participants in this year's survey highlighted a shift in mindset and a shrinking divide across these pursuits. In part this narrowing gap is related to the low return environment.

12 Ibid.

While investments look to generate a return on capital and philanthropy or charitable giving looks to use capital to progress organizational or personal priorities, in periods of strong investment returns, philanthropic causes often benefit from a substantial trickle-down effect. In the recent low return environment, the availability of that trickle-down capital has been reduced.

Survey participants highlighted a desire by many high net worth, family office and even mass affluent and retail investors to use their investment dollars to not only achieve some type of investment return, but to also have some type of measurable impact on society. This is highlighted in Chart 4.6.

Analysis reveals that this is a bottoms-up push from investors. The conference on Sustainable, Responsible and Impact Investing (SRI) conducted a survey of 508 financial professionals and presented the following findings at their conference in October 2015. "According to SRI, 58% of U.S. advisors claimed the foremost reason they offered impact investing to their clients was in response to demand. Millennials, women and college-educated investors were among the top three investor profiles requesting impact strategies from their advisors, followed by high net worth individuals, Baby Boomers and senior investors."[14]

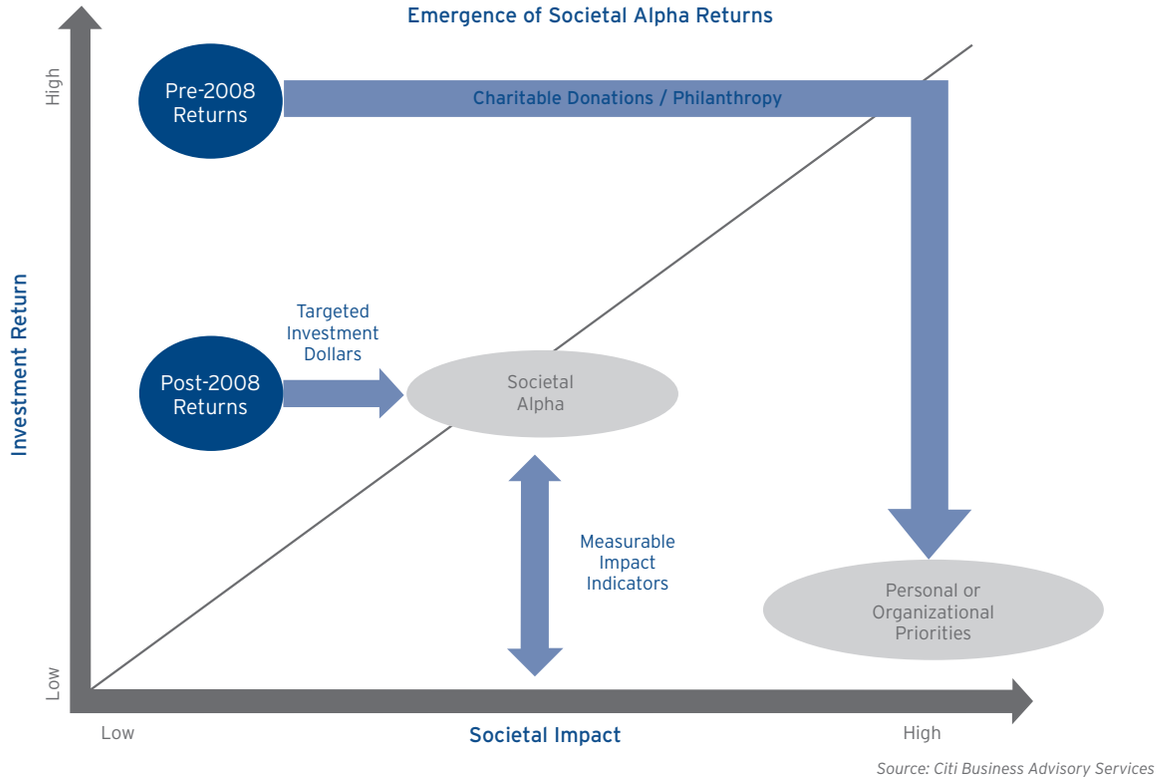
The Global Sustainable Investment Alliance reported that "the relative proportion of retail Socially Responsible Investments in Canada, Europe and the United States increased from 13% in 2014 to 26% at the start of 2016."[15] Political factors are seen as having accelerated that interest even more in the subsequent period.

Morningstar notes that "usage of their ESG data has quadrupled since Trump's January inauguration" and that "a dozen open-end funds or ETFs have been launched so far in 2017 in the U.S., including the first sustainable target-date fund for defined contribution retirement savings plans."[16]

How far along the spectrum of investment versus societal returns investors wish to proceed varies, but several survey participants highlighted the emergence of a whole variety of new investment funds that give investors options on how they'd like to optimize that mix.

"We are introducing a new type of active management; it's not traditional alpha, we are thinking about different types of factors over a long horizon. It's Social Alpha." Large Pension Fund

Chart : 4.6: Emergence of Societal Alpha Returns (Optimization Frontier)



Source: Citi Business Advisory Services

14 "Retail Investors: Rising Interest and Opportunity in Impact Investing", TriLinc Global, http://www.trilincglobal.com/trilinc-blog/trend-2-retail-investors-rising-interest-and-opportunity-in-impact-investing/

15 "Europe Accounts for Half of $22.89T SRI Assets", Dina Medland, March 17, 2017, Forbes.com, https://www.forbes.com/sites/dinamedland/2017/03/27/europe-accounts-for-over-half-of-22-89-tn-global-sri-assets-as-sustainable-investing-takes-off/#734d6e64f167

16 Ibid.

"ESG is becoming increasingly important as retail advisors are looking for funds that have a socially responsible component that their clients care about" NAM-based Asset Manager <$500B AUM

"We've moved on from the old negative screening [approach]. Millennials like it – they invest the way they live, and they are investing to build a future. And, increasingly regulators are imposing disclosure requirements on companies." Global Asset Manager >$1T AUM

Emerging Class of Investment Funds Look to Deliver a Blend of Investment and Societal Alpha

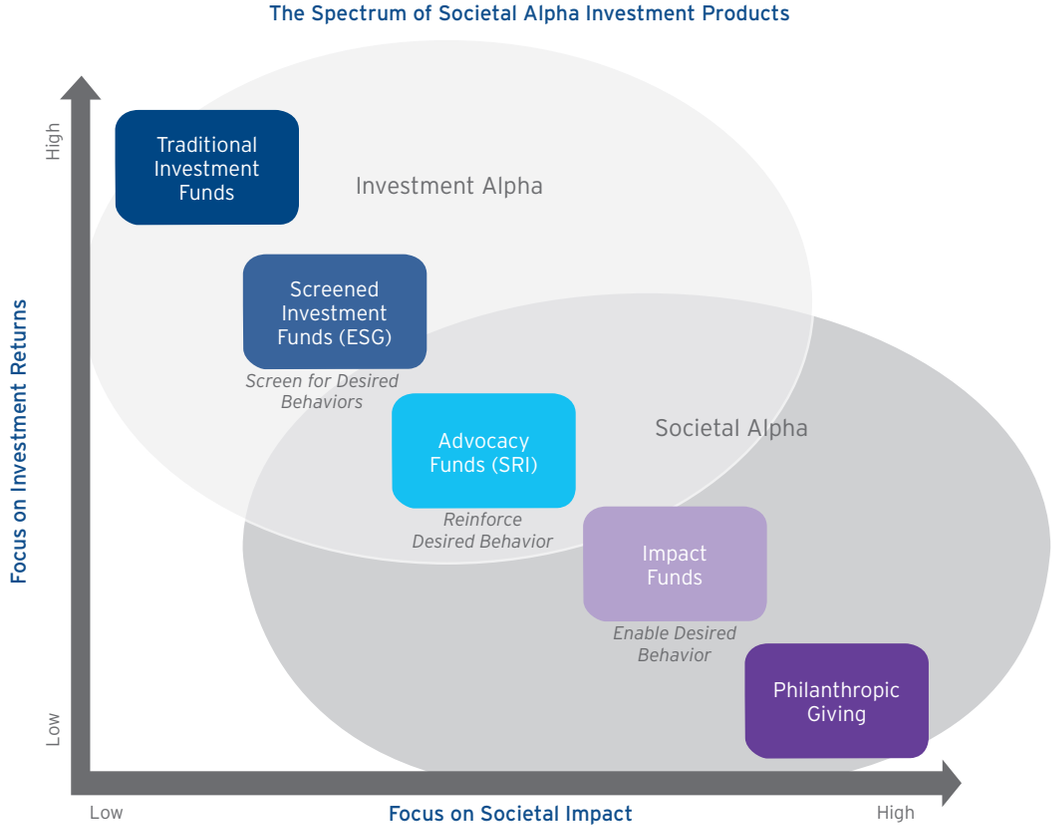
Chart 4.7 lays out the spectrum of societal alpha investment products.

As discussed earlier, ESG funds screen companies for adherence to specific criteria and use this screen as an adjunct to traditional financial analysis. As such these funds represent the first step away from solely considering the financial aspects of a company and beginning to consider a broader array of concerns. The goal of these funds is to direct investment dollars to companies based on their already exhibited behavior and how it will position them for their long-term profitability and survival. This objective remains firmly within the investment alpha domain.

Another step beyond screening for ESG is choosing to use one's investment capital as a way of reinforcing desirable action and changing future behavior through Socially Responsible Investing funds (SRI). These funds look to alter behaviors.

SRI can be divided into two types of funds. The first, faith-based advocacy, builds portfolios that align to an investor's religious values—primarily by looking to withhold capital from companies within given sectors that promote activity in violation of an investor's belief system. The second type of funds relate to issues-based advocacy. These funds allow investors' to use their ownership to encourage change via shareholder activism.

Chart 4.7: Emergence of Societal Alpha Investing



Source: Citi Business Advisory Services based on concepts presented in Saturna Capital's Sustainability Smile paper
https://www.saturna.com/sustainable/sustainability_smile

Such investments may have little to do with the financial strength of the underlying company and indeed, in some instances, may draw investors to hold positions that are sub-optimal from an investment return perspective. These funds thus move further from investment alpha toward societal alpha.

Impact investing can be viewed as a further iteration in social advocacy. These funds are dedicated to enabling future behavior by allocating "capital toward enterprises that can achieve measured results among the three P's—people, planet, profit."[17] These investments are chosen based on their ability to deliver measurable results around a social and/or environmental agenda and to some degree their ability to generate investment returns is less critical, particularly in the short-term.

Impact investing can be expressed via traditional debt and equity investments (i.e., green bonds where debt issuer proceeds are used to fund climate change mitigation projects) or extend into illiquid asset classes such as infrastructure and real estate (i.e., water purification treatment facilities in frontier markets). Most of these investments require a long-term lock up of capital and though the end result may generate investment alpha, this may not be realized for some time or be a by-product, not a goal, of the project funded by the investment. As such, these investments represent the most direct focus on societal alpha short of outright charitable giving.

Understanding the assets that are truly committed to impact investing is currently an art instead of a science. The Global Sustainable Investment Alliance places the total at $22.9 trillion that would present nearly 1/3 of all professionally managed assets which seems a stretch. Regardless of the total, survey participants definitely saw sustainable investing, a type of thematic approach, continuing to draw interest and adherents and wealth managers noted that they would be trying to find ways to measure and report on the societal returns that investments help to generate as part of their expanding suite of services in coming years.

"People don't realize how important ESG is becoming. This is where transparency is key. People like to know exactly where their money is going and exactly what it is funding." EMEA-based Asset Manager $500B-$1T AUM

"ESG isn't just about the negative side,i.e. liability reduction; it's also increasingly about the positive, socially constructive side. Social responsibility is another axis or dimension of alpha that managers should ignore at their peril." Large Pension Fund

"I think people in the future will invest with their hearts more than they do today." EMEA-based Asset Manager <$500B AUM

"Divestment of investments on the basis that they have negative net value to society may not be the best strategy. Being involved in the company may allow you to exert pressure on them to change what they do. That is different from investing in smoking where whatever you do the reality is that using the product kills people." Large Pension Fund

Having now explored products being created on the boundary of active and passive investing and products emerging that pursue thematic investing approaches, we will turn to the final innovation area cited by survey participants in this year's report, the increased focus of portfolio managers on the intersection of publicly traded and private markets.

17 "The Sustainability Smile: An Advisor's Guide to Sustainable Investing Strategies", https://www.saturna.com/sustainable/sustainability_smile

Section V: Emerging Innovation Products Path 3: Active Managers Mine the Intersection of Publicly Traded and Private Markets

The two product innovations examined thus far—combining active and passive elements and thematic/value-based investing—have one thing in common: they exist almost exclusively in the publicly traded fund space. But there is an important third area of product innovation emerging at the *intersection* of the public and private market domains.

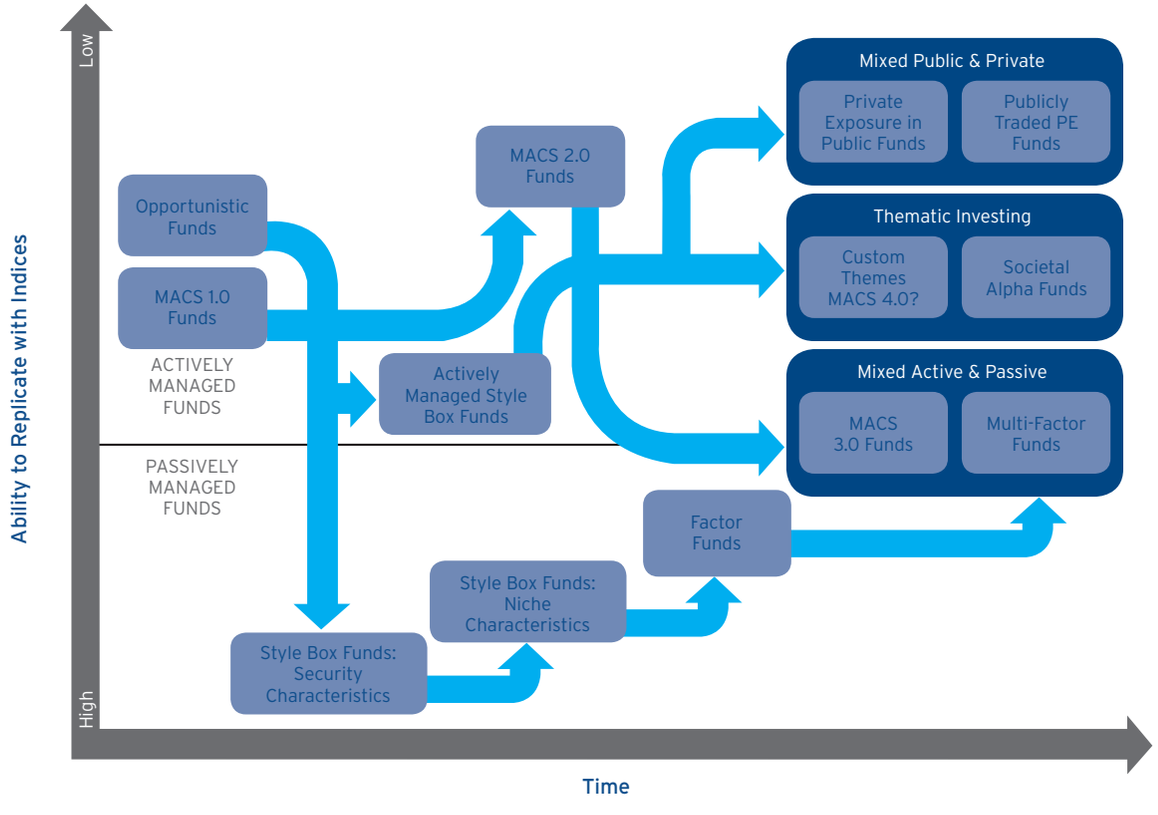
The scarcity of yield in publicly traded markets post GFC has driven an increasing number of investors down the liquidity spectrum and into real assets and privately traded companies and funds. Finding a path for more general investors to participate in this shift has been one area of innovation that survey participants highlighted in this year's report.

In parallel, the number of companies choosing to remain private has been growing and the number of initial public offerings (IPOs) is in decline. Many firms that choose to list are already in the mid- or large cap range by the time they do decide to go public. This is necessitating portfolio managers in the publicly traded markets to both include these private companies in their analysis, and in many instances, use their illiquid holdings optionality to include these companies in their portfolios.

Both paths-providing individual investors access to illiquid investments and including exposure to private companies in publicly traded funds-mark a new area of exploration for the industry at the intersection of the public and private market divide. This is highlighted in Chart 5.1.

This third path of innovation has considerable appeal for both managers and clients, with its high degree of

Chart 5.1: Investment Product Development Path 3: Intersection of Public & Private Markets



Source: Citi Business Advisory Services

resistance to replication by indices and longer investment horizon. Indeed, the stampede to obtain access to illiquid return streams has been one of the most under-reported aspects of financial market dynamics in recent years.

Alternative Fund Flows Significantly Exceed New Capital Being Directed to Passively Traded Funds

Global capital flows have been heavily skewed towards alternatives in recent years, as investors have moved into illiquid funds and private markets in their search for yield and diversification. In Section I we noted that flows into passively traded funds from 2014 to H1 2017 totaled $1.69 trillion, but alternative fund flows were +60% larger at $2.70 trillion in the corresponding period. Passive flows attract many headlines, but this shift to alternatives is an equally important dynamic for the industry. This is shown in Chart 5.2.

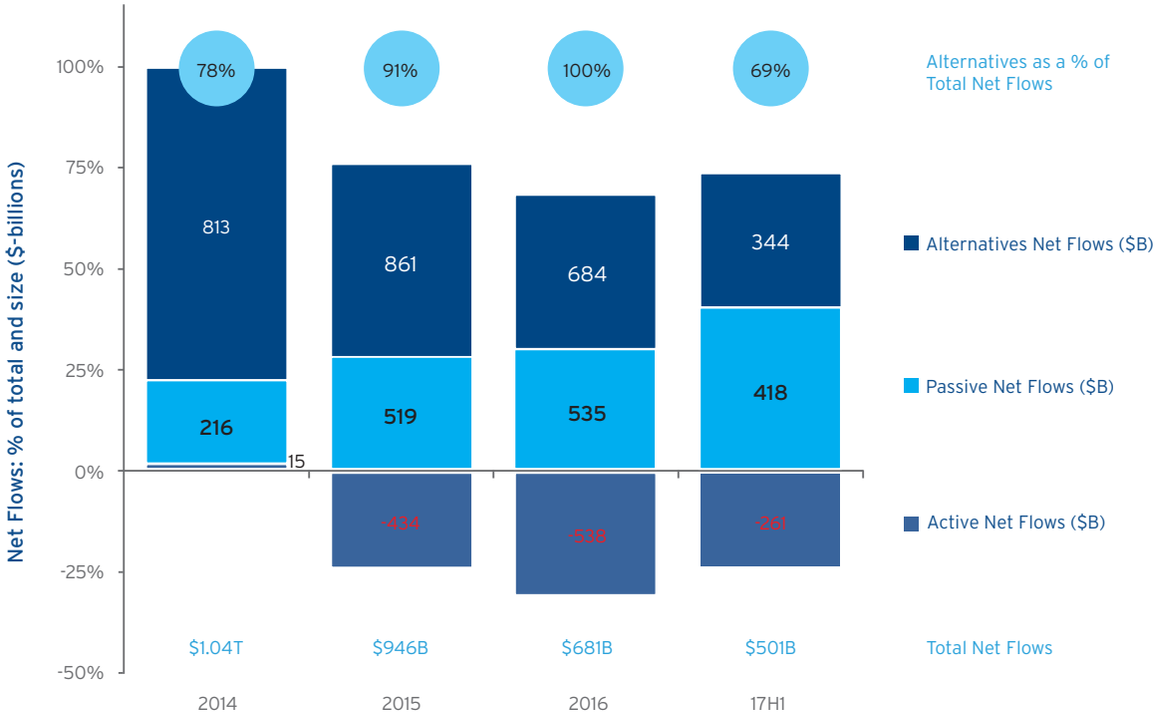
Digging deeper and breaking that $2.70 trillion in alternative flows down into its constituent parts shows that the flows have not just been directed to alternatives as a whole, but into the two most *illiquid* portions of the alternatives space. Private equity inflows totaled $1.17 trillion between 2014 and H1 2017 (43%) and real estate and infrastructure accounted for $958 billion (35%). This is shown in Chart 5.3.

In contrast, the most liquid alternative fund types accounted for just 10% of alternative inflows since 2014. There are two narratives that help to explain the significantly lower interest in these categories.

Inflows into liquid alternatives appear to be quite low at $209 billion between 2014 and H1 2017, but this is a relatively new product category. Total AUM in liquid alternatives at the start of 2014 was only $528 billion. Growth has actually been strong, particularly for alternative UCITS funds that have benefited from a redirection of institutional assets from privately traded vehicles to publicly traded funds that offer more transparency and more favorable treatment under Solvency II guidelines. Indeed, total liquid alternative AUM appears poised to break the $1.0 trillion barrier in 2017 with H1 2017 AUM listed at $965 billion, a new record.

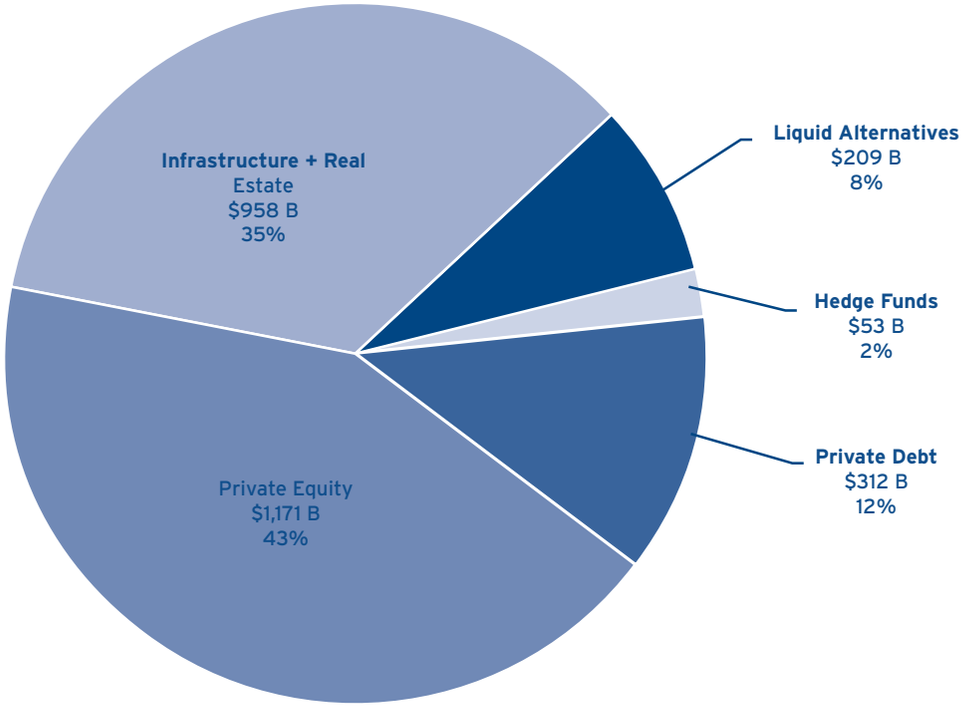
Hedge funds are perhaps tied with passive funds for the most press coverage in recent years, but stories on this segment were focused on how poor performance has been and on how investors have been withdrawing money. While the industry did experience net outflows for 6 quarters from Q4 2015 to Q1 2017, total withdrawals amounted to only -$77 billion. This compares to 15 straight quarters of inflows prior to Q4 2015 totaling +$220 billion.

Chart 5.2: Net Flows ($B) and Net Flows into Alternatives as a Percentage of Total Net Flows across Active, Passive and Alternatives (2014-17H1)



Source: Citi Business Advisory Services based on Morningstar, eVestment, Simfund, and Preqin

Chart 5.3: Breakdown of Alternative Inflows by Product (2014-17H1)



Source: Citi Business Advisory Services based on Morningstar, eVestment, Simfund, and Preqin

Flows returned to a net positive in Q2 2017 and the industry reached record AUM of $3.1 trillion according to HFR. Talk of a pullback has subsided and performance is improved with HFR reporting hedge funds on their longest winning streak since early 2004 in H1 2017. For a more comprehensive look into hedge fund industry dynamics we point reader to our recent paper *The New Hedge Fund Maturity Model: Understanding Hedge Fund Growth & Economics in the Institutional Era.*

Hedge fund flows as listed in Chart 5.3 may also be somewhat understated because a portion of the money they have drawn in recent years is being catalogued under a new alternatives grouping—private debt.

Private Debt reflects many new products being launched by both hedge funds and private equity firms from long-lock up credit to peer-to-peer lending to small and medium enterprise (SME) lending and more. Interest private debt has been strong, attracting inflows over a quarter of those directed to private equity despite private equity at $4.46 trillion AUM being 7.8x larger than private debt with $570 billion AUM as of H1 2017.

"We're looking at opportunities in not just credit, but direct lending, internal private equity to become a less liquid portfolio that has a higher rate of return." Large Pension Fund

"We've been increasingly moving money from public to private. We've been very active in private credit in the last 9-12 months." Pension Fund

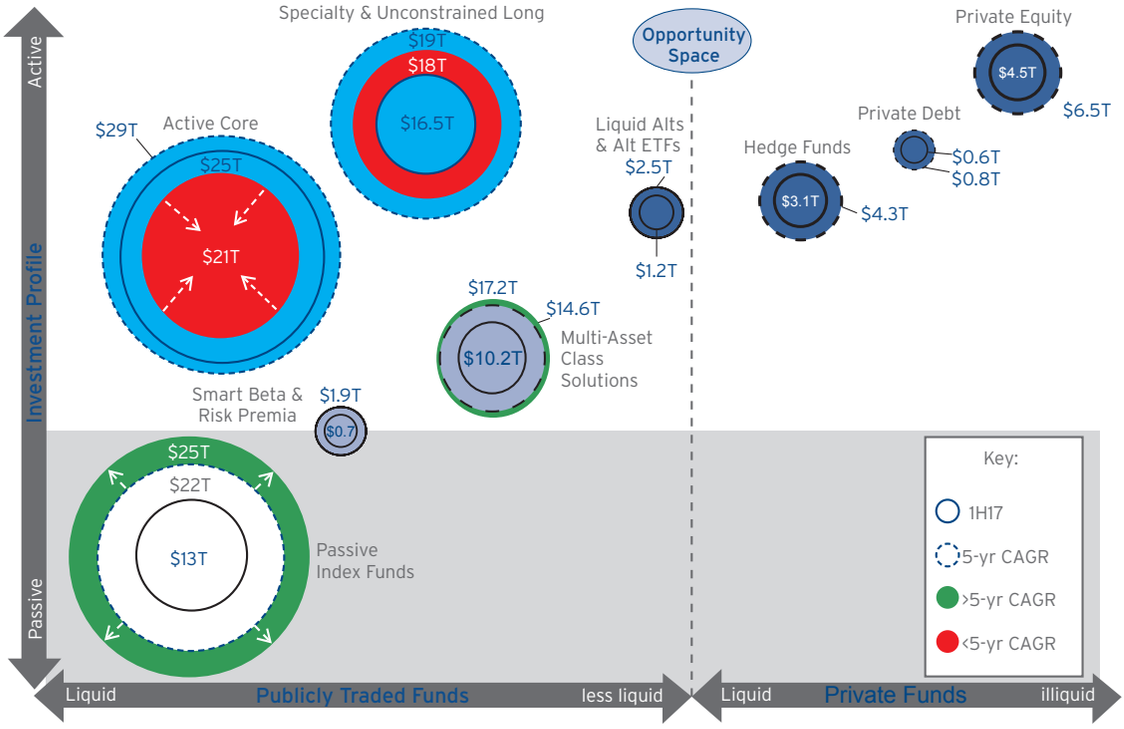
"On the alternative side we expect fees to remain insulated from passive pressure." EMEA-based Asset Manager $500B-$1T AUM

Extrapolated Alternative Asset Growth Shows AUM Potentially Up 52% by 2022

Collectively, AUM across all of the alternative categories reached $9.3 trillion as of H1 2017. Survey participants noted little to change for the growth trajectory in any of these asset pools. Even those that called for a slowdown in hedge fund growth in last year's report have conceded that the recent stabilization in performance may keep that industry on track.

Using a model that extrapolates the 5-year CAGRs in each individual pool, we arrive at a 2022 projection that shows total alternative category AUM reaching $14.1 trillion by 2022. If nothing unforeseen emerges and these forecasts prove accurate, this would mark +52% increase in overall assets. Chart 5.4 shows these figures broken out for each individual asset pool.

Chart 5.4: Current (H1 2017) & 5-Year (2022) AUM Projections



Source: Citi Business Advisory Services projections based on data from eVestment (proprietary subscription); Investment Company Institute Yearbook (www.ici.org); Citi Research, SimFund (proprietary subscription); Hedge Fund Research (proprietary subscription)

Viewing the layout of the alternative asset pools in Chart 5.4, it becomes clear that liquid alternatives sit in the publicly traded fund space and that all the other alternative categories sit in private fund access vehicles. No fund offerings sit on the line that divides these two types of investment products as of yet, but survey participants noted several developments that could lay the foundation for money to shift to funds that operate on that boundary.

If even 1.5% of the projected assets in active core and specialty long funds projected for 2022 ($38.8 trillion) shifts to new products that provide access to funds that mix publicly traded and private company access, that could create a new asset pool almost as large as the Smart Beta or Private Debt categories today.

"The role of both liquid and illiquid alternatives has changed quite dramatically. The underlying drivers are very common: the need to secure enhanced income, protection against future events, e.g., inflation, and trying to tap into growth. The way it has manifested itself is very interesting because when you look into private markets there is a difference between assets that can generate income today vs in the future." EMEA-based Asset Manager $500B-$1T AUM

"Boundaries are being blurred: active/passive, active/alternative. I think we're going to see a lot more of alternative strategies. That hasn't been fully appreciated by a lot of asset managers." APAC-based Asset Manager <$500B AUM

"Our focus is generating absolute return. In alternatives we find there are many more opportunities and variety of strategy to seek our asymmetric opportunities." APAC-based Asset Manager <$500B AUM

Understanding why this may not be such a far-fetched idea requires a step back to look at what has been happening to change the dynamics of company evolution and why those changes may provide opportunities in an entirely new type of fund offering.

Fewer Companies Follow Traditional Capital Lifecycle as Compared to Earlier Periods

Traditionally, companies have followed a fairly standard capital lifecycle. Nearly all companies begin as private enterprises with their angel and start up sources of capital being provided by a set of venture capitalists that specialize in investment around the formation and pre-launch phases.

As these companies grow, they move onto the radar of private equity firms that provide capital to help them advance from the launch through their early and late stage private growth to their mezzanine phase that typically precedes a move into the public markets via an Initial Public Offering (IPO).

Based on their growth and investor's level of interest in trading their shares, companies will then move up post-IPO through the various stages of market capitalization. This progression is shown in Chart 5.5.

This traditional path has been changing, however, and interest in taking companies public has waned in recent years. Survey participants cited a number of factors that help to explain this shift. These include increased regulatory responsibilities and overhead for public companies due to regulations like Sarbanes-Oxley in the US; increasing scrutiny of public companies and a desire to have more strategic freedom away from investor demands and perhaps most importantly, growing offers of capital from venture capital and private equity investors that are looking to deploy the inflows discussed earlier.

Together these have resulted in a significant slowdown in IPO activity which is highlighted in Chart 5.6.

This chart shows the number of IPOs in the U.S. and Europe having fallen by 50% since 2008[1]. Annual IPO activity in these regions has not reached even the more modest levels noted in 2004-2007. Indeed, for the last 9.5 years, IPO activity has been holding toward the same depressed range that the industry witnessed in the immediate aftermath of the Technology Bubble (2001-2003).

As survey participants noted, this slowdown in IPO interest reflects a deliberate decision by many companies to stay private for a more extended period of time (and for some possibly indefinitely).

"The other thing that makes it harder to make money is that there are fewer things to trade. Stocks have fallen by half. There is no IPO activity to speak of and there are M&A and buybacks going on. That means that there are fewer pitches to swing at." Family Office

"You don't need IPOs any more with crowdfunding, even though it is junior to every other share class." Investor

Investment Managers Show Increased Interest in Private Companies to Gain Early Insight

This shift in company behavior is forcing many public market portfolio managers to extend their coverage universe to focus on the private company landscape in their sector or region. Survey participants cited several drivers of this change.

Tracking private company growth gives portfolio managers advance insight into potential disruptions, future competition, and changing industry dynamics which can inform their public market investments;

Getting to know companies pre-IPO enables portfolio managers to effectively perform their due diligence in advance and be in a position to quickly make an informed decision about whether and when to get involved if a company does decide to IPO, a necessity as many companies today are having compressed roadshows when compared to past periods;

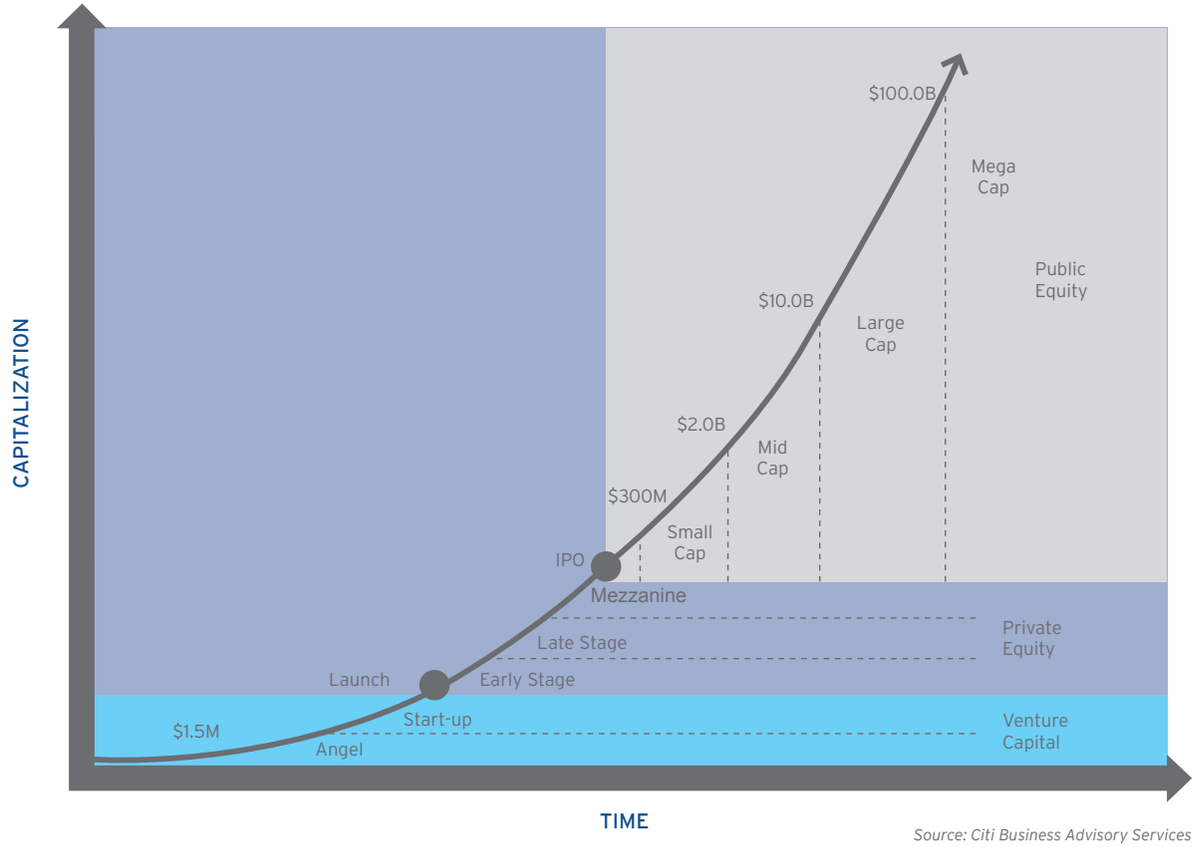
Working with private equity analysts to understand how they evaluate companies without the standard financial reporting gives public market analysts more insights and standards to assess when viewing their existing coverage universe;

Not understanding the private company landscape could provide a skewed view of investment options since the size of these deals is getting larger and these are the investment opportunities that might provide significant investment returns.

Data on venture capital financing confirms that the size of private company deals is growing as show in Chart 5.7.

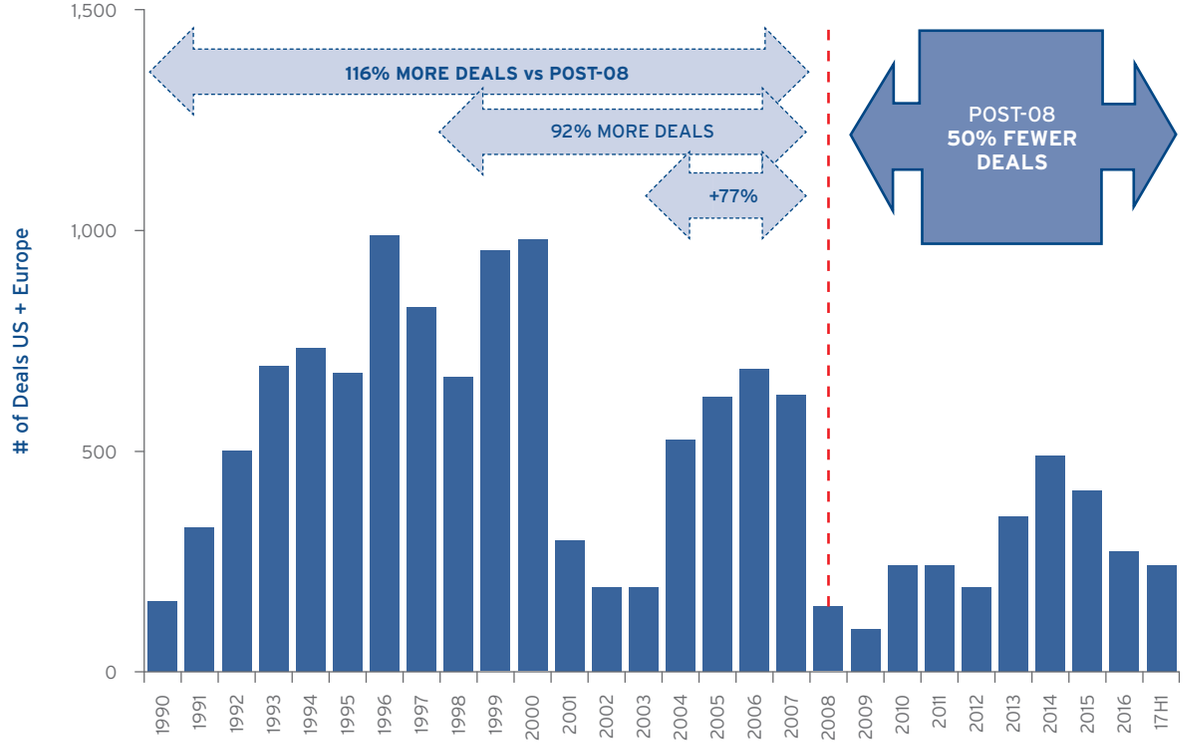
1 This slowdown does not appear to have affected IPO activity in Asia.

Chart 5.5: Company Lifecycle



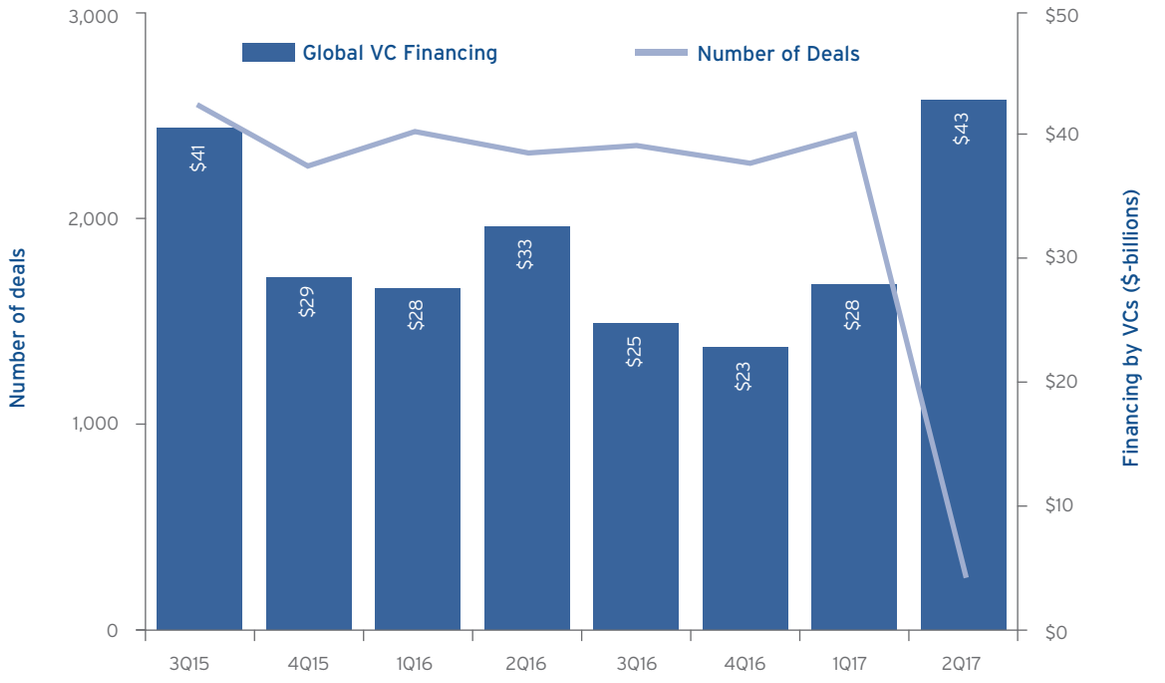
Source: Citi Business Advisory Services

Chart 5.6: Number of IPOs (US + Europe)



Source: Citi Business Advisory, Citi Research, Dealogic

Chart 5.7: Global VC Financing 3Q15 to 2Q17



Source: Citi Business Advisory based on CBInsights data

Venture capital financing jumped by 54% in Q2 2017, reaching $43.0 billion. As shown, that financing was being absorbed by a very small number of deals. Indeed, although financing totals were in line with the levels last seen in Q3 2015, the size of the deals in Q2 2017 were 10 times larger.

Another trend of note is the emergence of the Initial Coin Offering (ICO) market—a private domain that allows public access to private company capital. "ICOs are a way for start-ups to raise money from users, similar to crowdfunding, by allowing them to buy a stake. In return, the user will receive a token or digital currency, which is equivalent to shares in the firm. ICOs are popular among cryptocurrency and blockchain start-ups and have exploded in the past few months," surpassing the size of both angel and venture capital funding in the internet sector.[2]

"We're starting to see investors be much more thoughtful and looking across public and private markets in a much more holistic way. They are looking at private market investments to inform their public investments," EMEA-based Asset Manager $500B-$1T AUM

"Building a PE culture is ultimately very supportive of the active equity culture. There is a very healthy dialogue between private and public guys because they look at things very differently," EMEA-based Asset Manager <$500B AUM

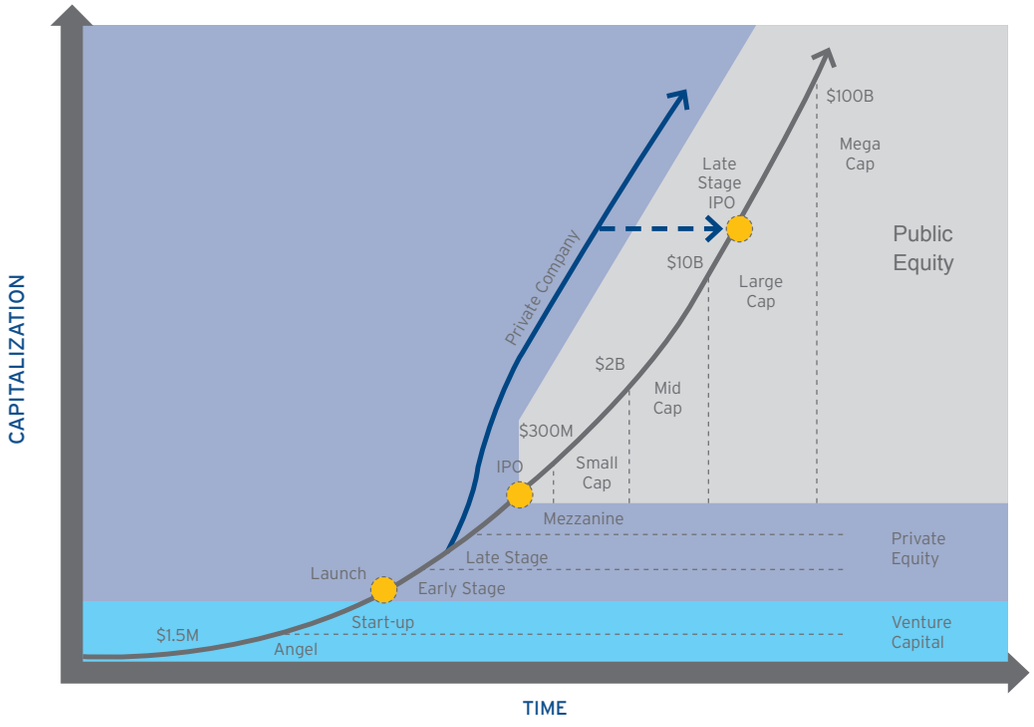
Late Stage IPOs Create Opportunity to Include Private Companies in Publicly Traded Fund Portfolios

Many of the companies choosing to grow in the private space are of a size that would put them firmly in mid or large cap territory if they were publicly traded. Three of the most extreme examples include Uber (valued at $69.0 billion earlier in 2017 and founded 2009), Didi Chuxing (valued at $44.0 billion and founded 2012)[3] and Airbnb (valued at $30.0 billion and founded in 2008).[4]

There are also numerous smaller examples of private companies that fit this profile. According to Crunchbase data[5], Lyft, Ola and Grab are widely known private companies in the $5.0 to $10.0 billion valuation range and Slack and BlaBlaCar are among options in the under $5.0 billion category.

2 "Initial Coin Offerings Now Surpass Early Stage VC Funding", Arjun Kharpal, August 9, 2017, CNBC.com, https://www.cnbc.com/2017/08/09/initial-coin-offerings-surpass-early-stage-venture-capital-funding.html
3 Alibaba, Tencent and Baidu are all investors.
4 https://www.crunchbase.com/app/search/companies
5 Ibid.

Chart 5.8: Company Lifecycle with Parallel Private Company Path



Source: Citi Business Advisory Services

Recent experience has affirmed this view about the strength of private mega-companies IPOs. Examples include Alibaba that went public in 2014 at $22.0 billion and is currently valued at $360 billion; Tencent that went public in 2005 at $11.0 billion and is currently listed at $300 billion and Snapchat that just registered its IPO in 2017 at $28.0 billion. To put these figures in perspective, Microsoft went public at $800 million in 1986.

As Chart 5.8 below shows, this represents a new, alternative route to growth for companies, whereby they remain private until they go public at a very late stage and/or large scale, or they bypass public markets altogether. Public markets are no longer the only gateway to growth. And that has important implications for the investment management industry.

Though not often reported upon, regulations do permit a small but significant proportion of mutual funds and UCITS to be invested in non-public assets. The 1940 Investment Company Act ('40 Act) regulations allow investment managers to hold up to 15% of their portfolio holdings in illiquid assets, subject to the overall redemption request limit of 7 days. Corresponding UCITS regulations allow unlisted holdings of up to 10% (but again with overall liquidity and concentration limits as well as some restrictions on direct investment in private equity).

Some investment managers are using the flexibility of these publically traded fund wrappers to take stakes in private companies, although typically in exposures far below those allowable limits. The motivation to include these assets is clear from a diversification, differentiation, and yield perspective. "Pre-IPO investments can amplify a fund's relative performance because they are not included in a comparison benchmark index and some have far outpaced the stock market."[6]

A Morningstar study from Q2 2016 found that there were 194 U.S. mutual funds that have invested a total of $11.5 billion in 133 private companies. These funds accounted for 3.6% of the 5,378 equity and allocation funds listed in Morningstar's database.[7]

While performance gains have been strong in many of these funds, concerns are starting to emerge about how these investments might impact portfolios. These include "lack of awareness among mutual-fund investors, lack of liquidity for mutual-fund shares, lack of venture-capital expertise among mutual-fund management, and lack of accountability over how funds value their ownership stakes in startups for purposes of calculating their net asset values, which creates an opportunity for management to manipulate such estimates."[8]

6 "These Mutual Funds Have Been Juicing their Returns with Unicorn Stakes", Reuters, August 11, 2016, http://fortune.com/2016/08/11/mutual-funds-returns-unicorns/
7 "Is Private Company Ownership a Risk for Mutual Funds?", Katie Rushkewicz Rheinhart, December 5 2016, Morningstar.com, http://www.morningstar.com/advisor/t/117667061/is-private-company-ownership-a-risk-for-mutual-funds.htm
8 "Start-Up Investing Can be Lucrative for Mutual Funds...And Problematic", Chana S. Schoenberger May 7, 2017, Wall Street Journal, https://www.wsj.com/articles/startup-investing-can-be-lucrative-for-mutual-funds-and-problematic-1494209520

Another concern relates to mutual fund stakes inflating the valuations of the private companies. According to PitchBook, a private equity, M&A and venture capital database, private companies that received financing from mutual fund investments "saw their valuations more than double over their previous funding round. In contrast, valuations of companies that raised cash without mutual fund investors grew only 1.5 times."[9]

While these considerations could limit the amount of capital being directed to pre-IPO investing, there are many factors that are likely to draw continued interest from an even broader set of mutual fund portfolio managers.

Beyond their potential to boost returns and allow active managers to more decisively beat their benchmark, the biggest driver may end up being the shift in the company growth model noted earlier. The size of these pre-IPO companies are sufficiently large that managers can reasonably argue that they would be in their portfolios if they were publicly traded. Without the IPO pipeline that existed in the past, selecting these private companies could become a core part of future portfolio construction.

As noted earlier, even as little as a 1.5% shift in capital out of traditional style-box driven active core and specialty long mutual funds to pre-IPO holdings could result in assets growing from current levels of ~$11.5 billion to potentially as much as $375 billion if our projections for 2022 pan out as expected.

This could significantly alter the dynamics of the capital markets: it would represent a significant reinforcement of the private growth route for companies and change the company lifecycle dynamic as fewer companies go public and many of the most successful ones make the choice of staying private for longer. This self-reinforcing evolution of the capital allocation mechanism could have far-reaching effects on markets and could significantly reshape asset management as it stands today.

"As the active manager role is changing, they need to look at where they add value and alpha. To me, it happens much more on the private equity side; however, they are restricted in how much they can allocate to these areas." Global Asset Manager >$1T AUM

"[We are] going to create more private market investment, from 25% today to 40% in the next couple of years - mostly taking funds from public markets, maybe 2 or 3% from our hedge funds' allocation." Endowment / Foundation

"There is less need and pressure for companies to come to the public markets." Investor

Some Managers Offer Access to Private Companies via Listed Funds

Whether to incorporate these holdings into open-end mutual fund or UCITS structures that focus primarily on publicly traded firms is still a debate in the industry, however. In the meanwhile, managers are also exploring other fund structures to try and find different routes to offer private equity access to a broader investing audience.

One product that has been in the market for some time is the listed private equity (LPE) fund structure. These are typically closed end funds or fund of funds that do an initial raise of capital and then recycle that capital across future investment deals. Investors get liquidity from the secondary market by being able to exchange shares while the manager gets the greater continuity of capital to more closely match the investment horizon of the underlying assets. The most common LPE vehicles include U.S. Business Development Companies (BDCs) and U.K. Venture Capital Trusts (VCTs).

With an LPE structure, the manager can participate in multiple deals over different periods, while the underlying pool of capital is not subject to the short term variations of redemptions. Despite their advantages, demand for these vehicles has not mirrored interest for private equity in general. One problem with these vehicles is that, as closed end funds, they still require accredited investor status, which excludes the pools of mass affluent and retail investors. A potential lack of liquidity for trading in the secondary market shares can also make these investments highly volatile.

An article in Private Equity Wire notes that "shareholder registers of LPE funds do not on average reflect the growing dominance of private client wealth managers and sophisticated retail investors in the investment company sector as a whole and as a result LPE funds have recently been trading at wide discounts to net asset value of more than 20%, even though underlying investment performance has been good over the last five years."[10]

9 Ibid.

10 "LPE Funds Trading at Wide Discounts Despite Strong Performance, Says Edison", September 23, 2016, http://www.privateequitywire.co.uk/2016/09/23/243978/lpe-funds-trading-wide-discounts-despite-recent-strong-performance-says-edison

A newer trend in this space is the emergence of open-ended funds that invest either in the stock of private equity firms or in an index that tracks private equity investment returns. Current examples include ALPS/ Red Rocks Listed Private Equity fund (LPEFX), Leland Thomson Reuters Private Equity Index Fund (LDPAX) and two ETF offerings - PowerShares Global Listed Private Equity Portfolio (PSP) and ProShares Global Listed Private Equity.[11]

While this approach does not provide direct access to the private equity funds that these firms manage, a report from Preqin, a large alternative asset research firm, notes that "the long-term returns of listed private equity shares mirror those of unlisted firms. Listed funds' portfolio returns have a 94 percent correlation to that of unlisted over the last decade, meaning that their returns are similar 94 percent of the time."[12]

Survey participants expressed optimism that more product innovation is also likely in this space as the draw of accessing illiquid assets and using those to create more diversified return streams in broad retail and mass affluent portfolios continues to stimulate experimentation at the intersection between public and private markets.

"We need to avoid having a siloed organization with real assets in one division and liquid assets in another. Clients don't care about our organization. What they want is a way to meet their investment and liquidity needs, combining very liquid and illiquid elements." Global Asset Manager >$1T AUM

"Private companies are a growing part of the capital structure, between Private Equity and IPO, in a "Private Holding" area." Large Pension Fund

Having now explored all three product opportunity spaces, the final two sections of this year's report will shift our focus to looking through the lens of managers' core processes of product manufacturing, packaging, and distribution, and how changes in each of those key activities are creating more flexibility to deal with a diversifying product landscape.

11 "Listed Funds Offer Access to Private Equity with Liquidity", John Waggoner, April 10, 2017, http://www.investmentnews.com/article/20170410/FREE/170419995/listed-funds-offer-access-to-private-equity-with-liquidity

12 Ibid.

Section VI: Industry Moving Toward a Period of Manufacturing Flexibility

Building flexibility into the manufacturing process is a key to enabling the emerging product innovation paths discussed in the preceding sections. Investment funds are not typically thought about in such supply chain terms, but if we break the industry down across manufacturing, packaging and distribution, we can start to see new innovations happening across the lifecycle.

How asset managers identify opportunities, decide on a trading strategy and manage their positions and portfolios can all be thought of as manufacturing activities. Just as other industries enhance their supply chain, asset managers too are looking at their research, trading, analytic and attribution capabilities to create new efficiencies or processes that deliver flexibility in these functions.

The impetus for asset managers to make these improvements is multi-pronged: fee pressures have intensified in the low return environment, forcing them to think more tightly about costs; the emergence of factor-based investing alongside asset class focused investing is forcing them to envision new frameworks; the explosion in data sources tied to the digital landscape, emergence of new analytic capabilities and the cheapening costs of processing power are facilitating new approaches.

Perhaps the most important driver of change, however, is the need to isolate and better deliver the benefits of active portfolio management. With the rapid growth of passive funds and ETFs, the standard active approach of simply looking to outperform on a relative basis to an index is no longer recognized as providing the same core value proposition that drove the industry in the past. Asset managers are expected to deliver more through their active investment and creating the types of flexibility discussed in this section are among the ways that they are pursuing that edge.

Transforming their research function is the starting point for many market leaders. Discussing research at a time when this topic is caught up in the uncertainty of MIFID II is a difficult proposition. How the engagement model between the sell-side and the buy-side evolves is a separate topic and not one that we will examine in this paper. Instead, we will focus solely on changes we see happening inside investment management firms with regards to their own approach to research.

Phase 1 "Quantamental Research" Levers Best Practices across Fundamental and Quantitative Teams

The foremost change we see in this regard is a shift toward a new type of "quantamental" research. There are several iterations of quantamental analysis emerging in the industry. We will look at each in turn to understand the opportunity and impact of this combined approach.

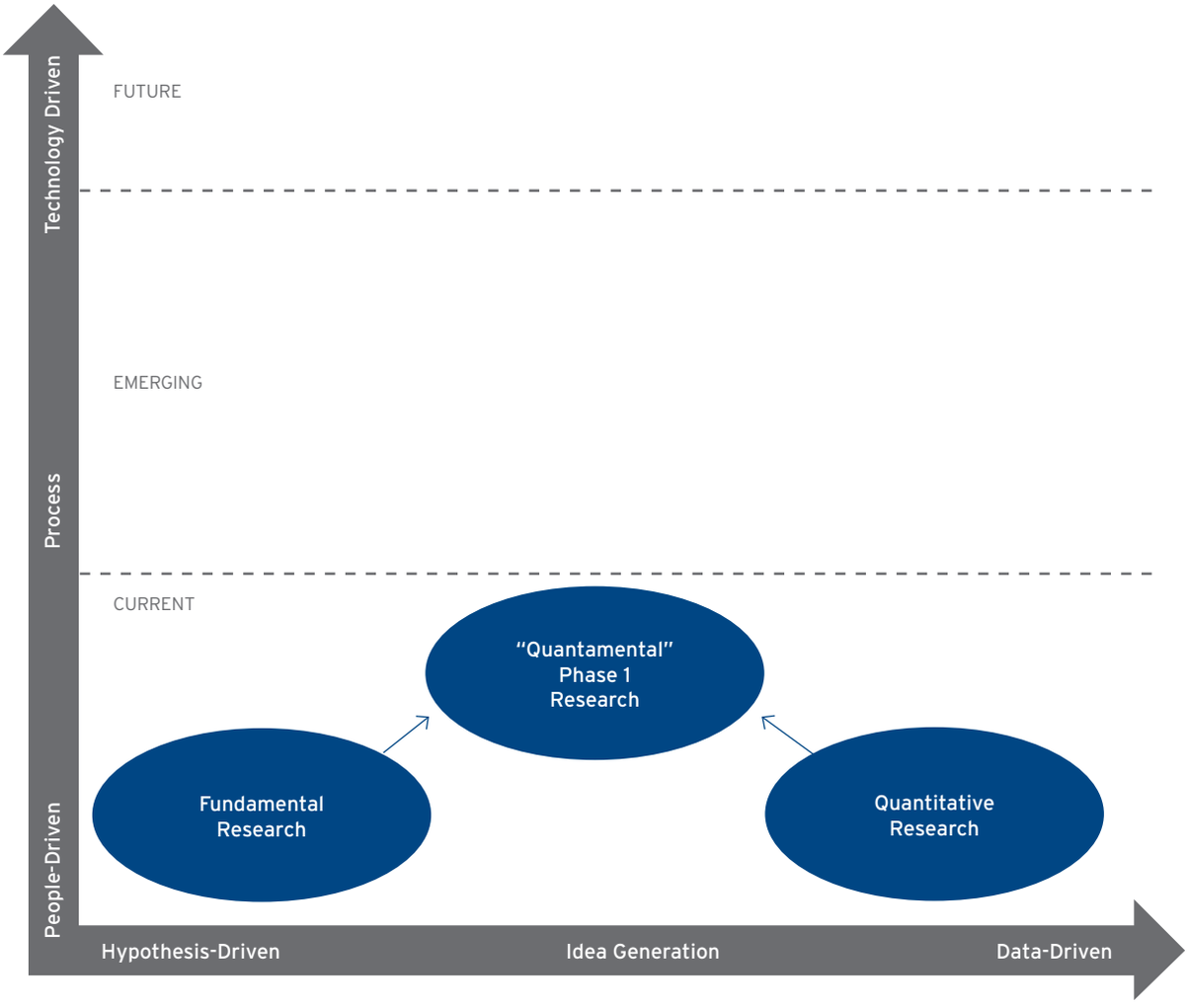
While the term "quantamental" invokes for many the promise of new technologies and data sources, the first iteration of this approach involves merging aspects of traditional fundamental and quantitative research methodologies. Investment research has historically split between these two approaches.

Fundamental research examines the financial statements produced by a company to determine its economic well-being, but at the same time also looks at qualitative factors such as the strength of the management team or a company's brand perception. Quantitative analysis looks at many of these same financial statement measures, but also looks at patterns around price, volume and other factors that reflect momentum, volatility and sensitivities around a security.

This first move toward a quantamental approach noted by survey participants is one that applies quantitative analytic techniques to the fundamental behaviors of specific companies and merges those findings with additional insights on price behavior and factor assessment. This is illustrated in Chart 6.1.

Phase 1 Quantamental analysis takes the hypothesis building skills of the fundamental analyst, uses the automated screening techniques and data analysis toolkit of the quantitative analyst to enhance the efficiency of the research effort, and layers on additional quantitative insights as a filter to strengthen trade selection. This type of quantamental research is almost entirely people-driven as opposed to being technology driven. The quantamental team may lever improved technologies to expand the scope of their data analysis and speed the findings of their results, but the technology in this instance is simply an enabler and not the source of the analytic differentiation.

Chart 6.1: Evolution of Buy-Side Investment Research: Quantamental Phase 1



Source: Citi Business Advisory Services

The benefits of combining quantitative techniques with traditional fundamental analysis can be seen in terms of efficiency, effectiveness and speed. These benefits emerge across the entire research lifecycle as illustrated in Chart 6.2.

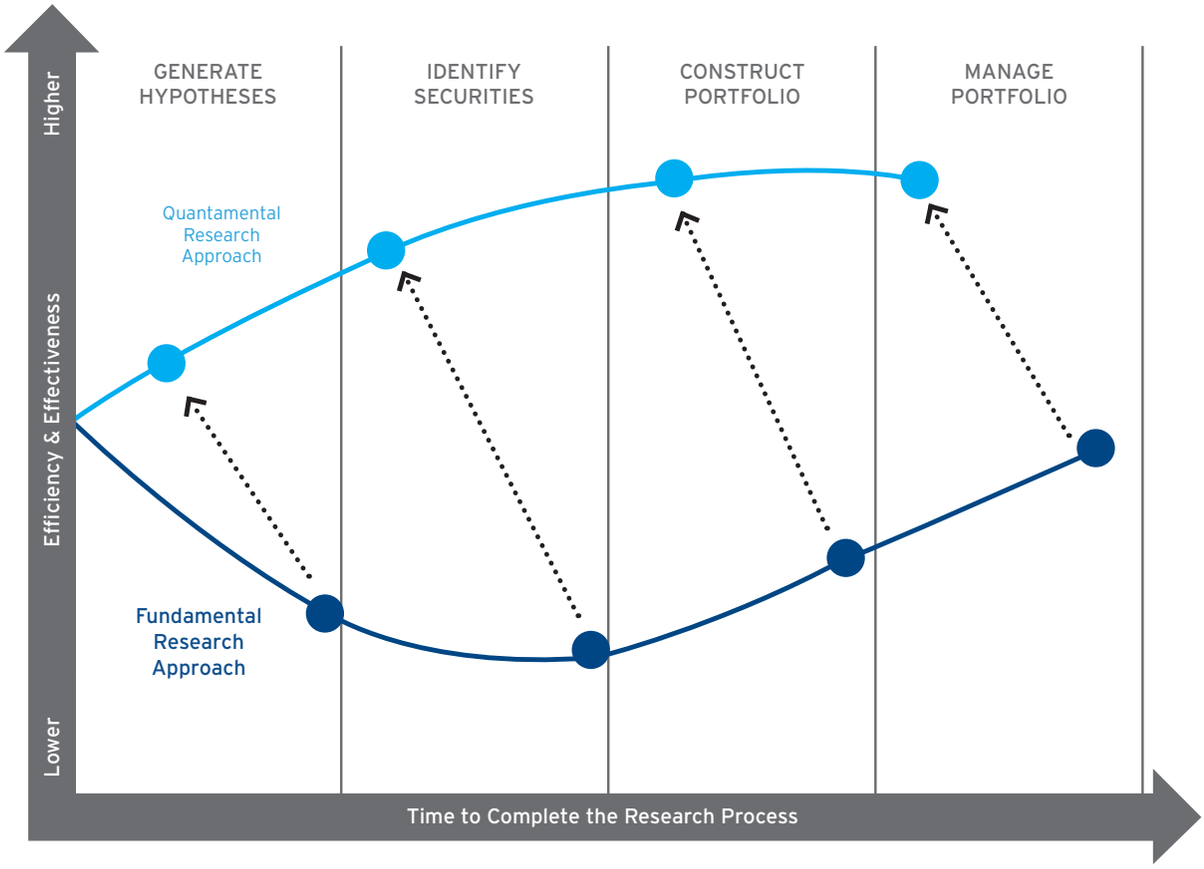
There are multiple stages to how a research idea is identified, executed and incorporated into a portfolio. The first involves generating a hypothesis.

Hypothesis Generation: The goal of hypothesis building is to find a set of circumstances where tradable opportunities might exist and then determine the securities that will be most impacted. Investment hypotheses can relate to how certain types of securities behave in similar sets of market conditions or in shifting market conditions, particularly securities in the same or complimentary sectors. Hypotheses can relate to changes in sales behavior or revenue collections for target sectors or groupings of securities related to news, events or macro trends. There are endless variations in the types of hypotheses that can be explored to identify an investment idea.

Fundamental analysts seek to identify potential situations, understand their relevance and identify securities through data-gathering, testing and model-building. Most of this work is done individually with analysts collecting and entering their inputs, many times manually into spreadsheets. This can be time consuming as much of their work is done through personal investigation and individual downloads.

Quantitative analysts often have access to data sets that could aid the fundamental analyst and may have developed automated scripts to systematically evaluate many similar types of inquiries. For other data sets, quantitative skills in automating the collection, staging, loading and execution of models can be leveraged to improve the speed and efficiency of the fundamental analyst's approach. Moreover, the quantitative analysts' insight into how price and

Chart 6.2: Phase 1 Quantamental Research Benefits



Source: Citi Business Advisory Services

factor behavior apply in parallel circumstances can strengthen the effectiveness of the fundamental analyst's hypothesis.

Idea Selection: The next stage of research is to identify which of the set of securities identified offer the best opportunity to realize investment gains. Both fundamental and quantitative analysts evaluate the relative strengths and weaknesses of the universe of securities across multiple measures—some linked to the balance sheet and income statement and others linked to the business environment or news affecting the company or other factors. The exercise too might be made more efficient by fundamental and quantitative analysts sharing data sets, building automated screens and enhancing models by considering new types of filters that might have been used in only one approach and not the other. Combining multiple evaluation lenses in this way could result in a more effective outcome.

Implementation: The next phases of the research process shift from how to identify an investment idea to the placement of that idea in the portfolio and ways to optimize trading to fully harvest the benefits of that idea in subsequent market activity.

Portfolio construction requires decisions about the share of the portfolio's capital to devote to the idea, the actual size of the position to create, how much risk the position should pose to the fund and how to avoid excessive market impact whilst placing the position in the market. Fundamentally driven portfolio managers often pursue these decisions based on their experience and gut instinct or rely on their trading team to make such decisions. A recent trend uncovered during survey discussions was that more firms are beginning to use quantitative analysis to create algorithms or models to help answer these portfolio construction questions, even in purely fundamentally driven portfolios.

These programs extend into helping the portfolio and trading teams with the management of the portfolio. Adjusting the sizing of positions to be better able to weather 'risk on'–'risk off' market swings and using technical and other indicators to determine entry and exit points for scaling the core portfolio position are two such areas that are benefitting from a more quantitative approach. Such insights provide fundamental teams a more effective lens to build and maintain the portfolio. Summarizing the efficacy

of these actions across teams of portfolio managers offers the CIO better insights into the strengths of their teams and control of the portfolio.

While Phase 1 Quantamental analysis focuses on optimizing traditional analytic insights and levering the tools and viewpoints across traditional research teams, Phase 2 Quantamental analysis offers a departure from traditional techniques and analytic approaches.

"To me, the "quantamental" question will really be more about process. How will the fundamental team be using quant tools? Combining security selection with portfolio construction will become more of the fundamental world. This will require them to leverage a more quantitative approach than these fundamental teams use today. This will be especially true in Equities." Global Asset Manager >$1T AUM

"We're asking what the best way is to couple man and machine—when should we use quant models and when should we use discretionary management." EMEA-based Asset Manager <$500B AUM

"There will be more PMs with quantitative backgrounds in the future, more data scientists… We will see fewer process-oriented staff. Technology and better tools will allow us to leverage capabilities but without increasing the cost." APAC-based Asset Manager <$500B AUM

Phase 2 Quantamental Approach Shifts Analytic Framework to Be More Forward Looking

An emerging type of "quantamental" analysis incorporates alternative data streams that allow the research team to shift the examination window for securities analysis. Rather than looking back at the company's balance sheet and income statement from last quarter and relying on the company's guidance and public news headlines to adjust forecasts, this approach looks to identify key indicators that measure whether the commonly held views on the company are aligning to or diverging from the anticipated course. This evolution in the research approach is highlighted in Chart 6.3. Technology plays a much more important role as a driver and not just an enabler of Phase 2 Quantamental analysis. In recent years, a whole new infrastructure has evolved to allow for the collection and examination of unstructured data using distributed processing, file-based databases, machine learning and predictive analytics. Inspired by a Google blueprint published in 2003, the entire field of Big Data analysis has transformed many industries with financial investing coming late to the trend compared with other sectors.

These new technologies are completely apart from the underpinnings of traditional investment research. The vast majority of today's systematic and quantitative models rely on structured data stored in data warehouses and built to run on servers where processing capabilities are limited to the size of the platform. As we noted in our December 2015 whitepaper, *Big Data and Investment Management: The Potential to Quantify Previously Qualitative Factors*, new technology and data offerings deliver the opportunity to vastly expand not only the scope, scale and speed of research, but the focus of the analytic framework itself.[1]

For many decades, investment research has worked off a set of backward looking data inputs. Income statements and balance sheets from companies show last quarter's activity. Macroeconomic data sets show last week's, last month's or last quarter's measures. Market analysis shows the last session's, minute's or second's price performance. Technical analysis shows how momentum, volatility and other measures have performed up until this moment in time. The only real forward-looking input available to the market is company guidance released by the management team itself to set expectations and any news headlines that emerge.

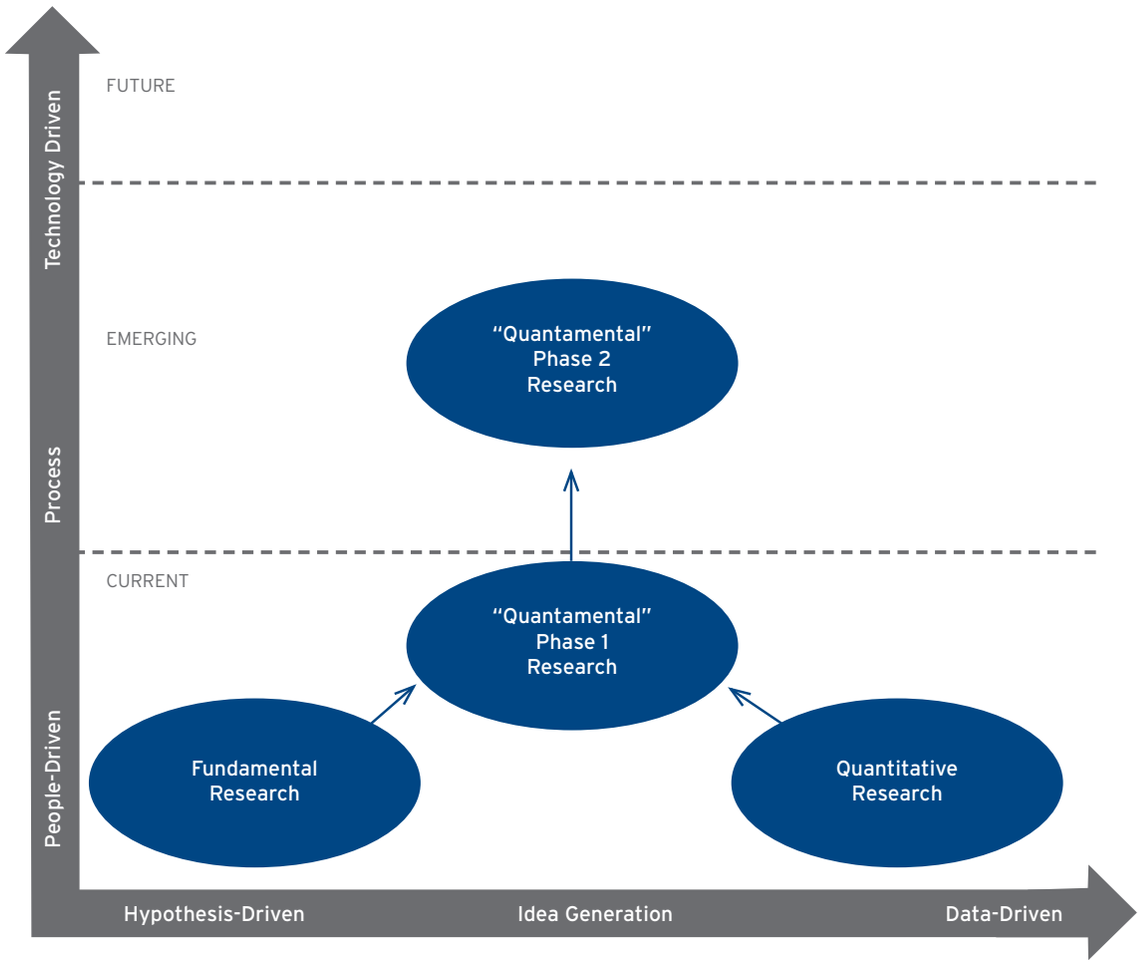
As we noted in our Big Data white paper, the biggest shift that new technologies enable is the use of real-time data inputs that allow participants to model a future event. Because of this shift in time horizon, many participants now utilize this ability to build models that examine a company's upstream fundamentals. This is illustrated in Chart 6.4.

Upstream fundamentals refer to the forces that shape a company's performance prior to the company announcing their results. These forces relate to the supply chain firms and/or resources that a company relies on for manufacturing its product or service; economic, geopolitical or social media influences that affect the labor markets, logistics, distribution channels and/or demand from the company's consumers or clients; and unexpected news, weather or events that could impact any of these factors.

Nearly all companies, including private companies, conduct their business in the public domain regardless of their sector, focus or region. Phase 2 Quantamental analysis looks to use both structured and unstructured data and real-time analytic capabilities to feed upstream fundamental models and generate signals about whether a specific company is meeting, exceeding or falling behind expectations.

1 "Big Data & Investment Management: The Potential to Quantify Previously Qualitative Factors", Citi Business Advisory Services, December 2015, Business.Advisory@Citi.com. https://www.citivelocity.com/t/eppublic/18KJv

Chart 6.3: Evolution of Buy-Side Investment Research: Quantamental Phase 2



Source: Citi Business Advisory Services

Upstream fundamental models vary by industry, but for the most part they incorporate many alternative data sources including social media content, satellite imagery, internet of things utilization data and other new categories of data that are emerging all around us. They also mine huge datasets using distributed processing that allows for near real-time assessment of vast reams of information such as the Twitter hose, credit card transactions, or internet search data.

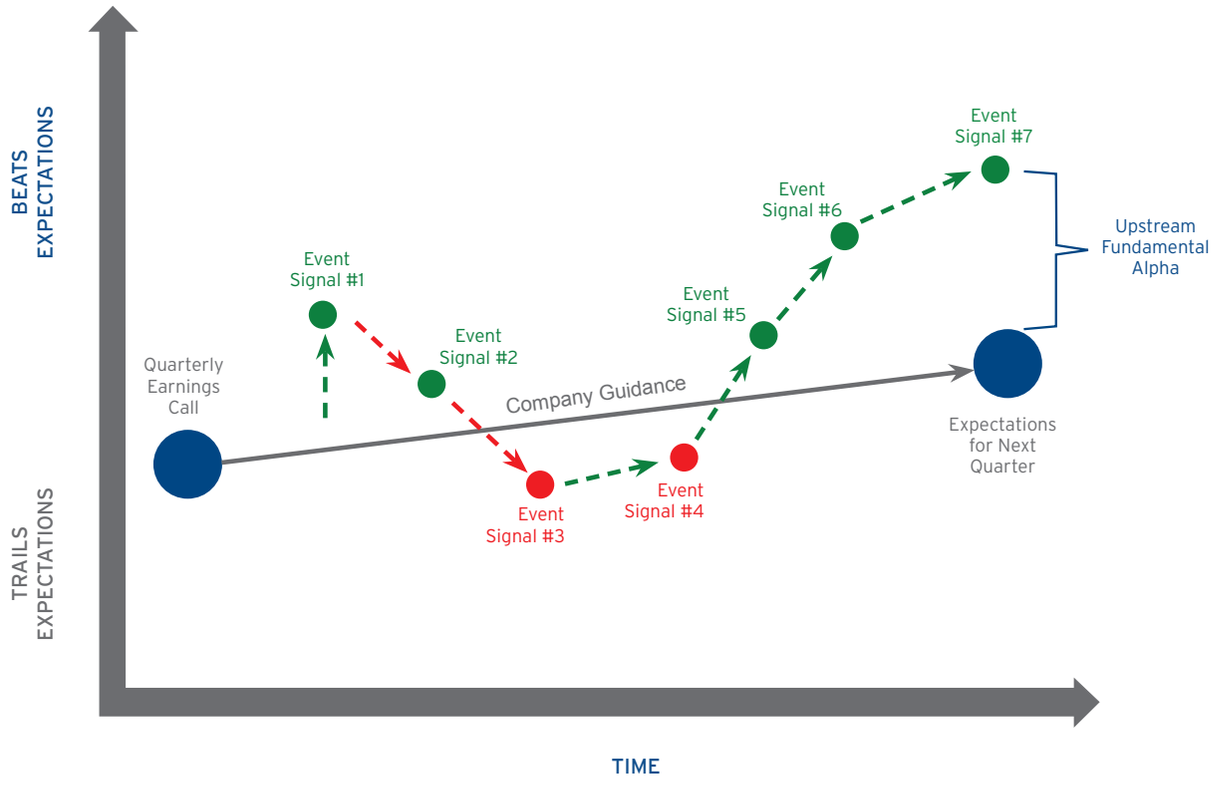
The volume and velocity required to consider these huge datasets remains beyond the capacity of most fundamental and quantitative investment research teams. Only high frequency and algorithmic traders have been able to achieve the data processing feats required to incorporate real-time inputs from vast quantities of data and these participants only examine prices, not a broad variety of data, using special built analytic platforms.

The goal of upstream fundamental analysis is to identify a series of "events" that provide insight about the company's business as that business is taking place in real-time. Analysts use insights from the events to signal whether the company is likely to achieve its current quarterly guidance or if there is a more foundational change in expectations occurring. Since this is a new field, there is a lot of innovative thinking going into the creation of upstream fundamental models and identification of real-time performance "signals".

Any differential between the company's guidance and market expectations that can be locked in ahead of the release of company news or quarterly earnings announcement can be considered upstream fundamental alpha.

Right now, the majority of firms engaged in this type of Phase 2 Quantamental analysis are building models that look at this in a quarterly or intermediate timeframe. Over time, there is potential for this new way of looking at companies to extend into longer-term models that recast the methodology of how analysts perform fundamental analysis.

Chart 6.4: Illustration of Upstream Fundamental Analysis



Source: Citi Business Advisory Services

Ongoing technological advances may set the stage for this expansion. Much has been discussed about the data revolution underpinning the emergence of Phase 2 Quantamental approaches, but there is a parallel set of technology advances occurring that could have far more disruptive impact.

"Quant is changing dramatically with new datasets, new sources of insight. There's a ton of data out there, but we aren't good at capturing it. Then it's a whole other ordeal to sift through, evaluate, and turn it into something that can add value. 80% of the job is a cleaning exercise." Sell-side Specialist

"As datasets become more available and the ways to manipulate it increase, everyone will use them. Data becomes an arms race. It raises the cost of running the business. You have to do it to stay in the game..." Family Office

Phase 3 Quantamental Research Could See Autonomous AI-Driven Trading Funds

Advances in machine learning, predictive analytics and cognitive computing could soon result in a new type of Phase 3 Quantamental approach that is almost wholly technologically, rather than people-driven. This is shown in Chart 6.5.

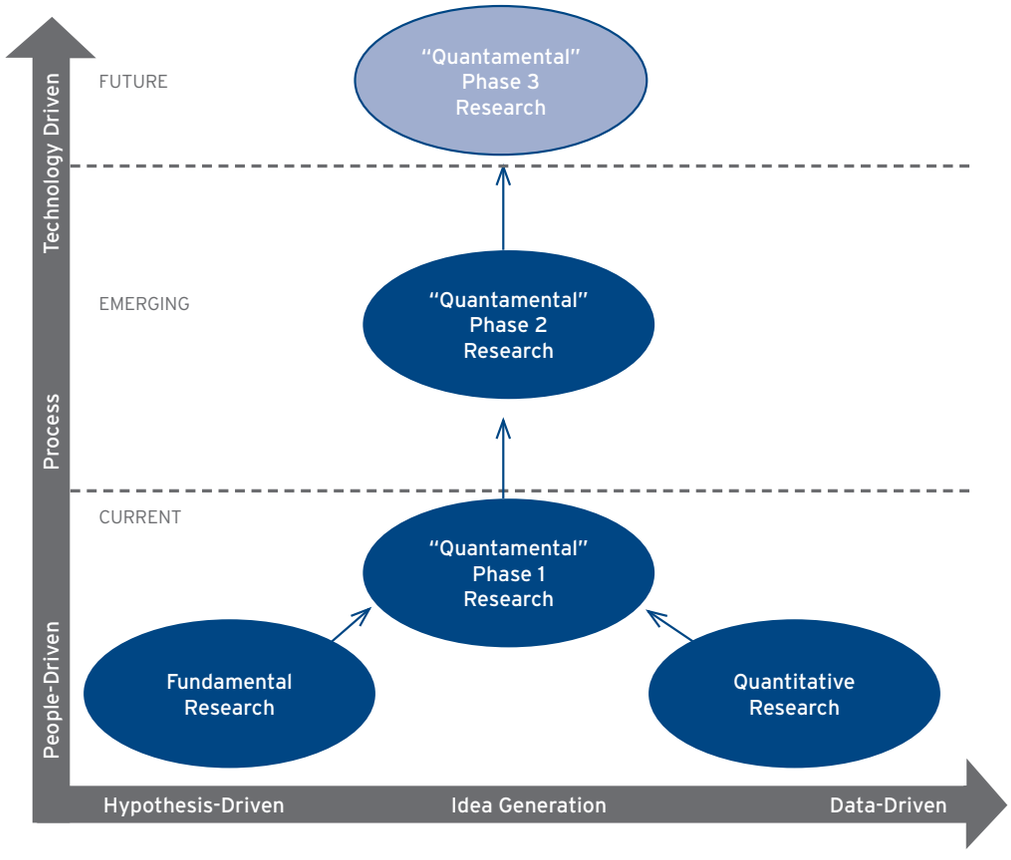
Each of these components represents a significant advancement in the field of artificial intelligence (AI). Understanding how they differ and how they might work together will become a core knowledge set in coming years.

Machine learning algorithms "go through data to look for consistent patterns that defy a known logic or are irregular and only become obvious when you look at lots of data in concert rather than just a sample."[2]

A machine learning system must be trained in the basics of a data-driven process. This training provides a foundational "if-then" approach that shows the linkage between the data and the subsequent activity or interpretation. Once the training is complete, the machine learning algorithms begin to autonomously perform their target procedures. Over time, the algorithms can begin to add to the body of knowledge by

2 "Machine Learning, Machine Intelligence and Cognitive Computing: What Does All of this Have to Do with Big Data?" Adnan Khaleel, May 26, 2016, CIO.com, http://www.cio.com/article/3075753/data-center/machine-learning-machine-intelligence-and-cognitive-computing-what-does-all-of-this-have-to-do-with.html

Chart 6.5: Evolution of Buy-Side Investment Research: Quantamental Phase 3



Source: Citi Business Advisory Services

applying its pattern recognition capabilities, extending the original "if-then" set-up to new relationships that may not have been previously evident. This is why they are considered smart algorithms.

The following example from Stanford University illustrates the strength of machine learning. Oncologists trained their newly developed machine learning system on what markers to look for in lung cancer patients using over 2,000 biopsy slides. They identified a few hundred signifiers to monitor. Once trained, the algorithm came to identify over 10,000 individual traits that collectively contribute to a correct diagnosis. Indeed, when the algorithm was "left to notice visual characteristics of cancer on its own, without any bias inserted by the researchers, it identified a number that were previously unknown, and could actually help humans identify cancers in the future."[3]

Predictive analytics "apply the predictors discovered by the machine learning algorithms to a future situation based on the simple premise that if something has happened consistently in the past, then it will most likely occur again in the future when the right set of surrounding circumstances present themselves."[4] This too is a type of "if-then" approach, but looking to extrapolate known relationships into the future.

This combination of machine learning and predictive analytics provides the core skills to identify the future events and signals discussed in our presentation of Phase 2 Quantamental analysis. These remain tools, however, to better examine and forecast based on what human analysts already perceive to be important. While they may determine new relationships, they only do so in regards to the specific tasks for which they were scripted to learn.

Cognitive computing takes these concepts further beyond "smart" capabilities to true intelligence, looking to simulate human thought processes. As such, this approach "covers several disciplines, including machine learning, natural language processing, vision and human-computer interactions. Cognitive computing uses technology and algorithms to

3 "AI Beats Doctors at Visual Diagnosis; Observes Many Times More Lung Cancer Signals", Graham Templeton, August 16, 2016, ExtremeTech.com, https://www.extremetech.com/extreme/233746-ai-beats-doctors-at-visual-diagnosis-observes-many-times-more-lung-cancer-signals

4 Machine Learning, Machine Intelligence and Cognitive Computing: What Does All of this Have to Do with Big Data?" Adnan Khaleel, May 26, 2016, CIO.com, http://www.cio.com/article/3075753/data-center/machine-learning-machine-intelligence-and-cognitive-computing-what-does-all-of-this-have-to-do-with.html

automatically extract concepts and relationships from data, understand their meaning and learn independently from data patterns and prior experience – extending what people or machines could do on their own."[5]

Cognitive computing machines such as IBM's Watson, Google's DeepMind or Apple's Siri must be taught not through scripts like in machine learning, but through a holistic program of learning, much like a child goes through in school. IBM describes it in the following way:

"Watson mirrors key cognitive elements of human expertise - but at a much higher speed, accuracy and scale. When working in a particular field, Watson learns the language, jargon and mode of thought of that specific domain. Guided by human experts, it builds a corpus of knowledge required to gain literacy in any field. Humans assist in this process by loading relevant information into Watson and culling and discarding data that's outdated, poorly regarded or immaterial to the domain.

"Next comes the 'ingestion' process: Watson preprocesses the information, building indices and other metadata that make the content more efficient to work with. It may also create a knowledge graph to represent and leverage key concepts and relationships within a domain.

"Once ingestion is complete, human experts train Watson to interpret the information. Using machine learning techniques, an expert will upload training data in the form of question/answer pairs to teach Watson the linguistic patterns of meaning in the domain. Watson continues to learn through ongoing interaction with users. Experts periodically review this activity and feed relevant and new information back into the system. At this stage, Watson is ready to provide a range of evidence-backed responses and recommendations to highly complex questions, and to quickly identify insights and patterns locked away in data."[6]

In this sense, Watson and other cognitive computing platforms are more than tools, they are 'experts' in their given fields that can converse, initiate activity and interpret situations away from specific scripts. Gartner predicts that by 2018, 30% of interactions with technology will be through "conversations" with AI and that by 2020 AI will be a top 5 investment priority for more than 30% of worldwide CIOs.[7]

For investment research and trading, there are already firms at work building AI-driven funds that will autonomously identify, initiate and manage trades. One such firm is Sentient Technologies, co-founded by one of the data scientists that helped lay the groundwork for Apple's Siri. Sentient "spent nearly a decade—largely in secret—training an AI system that can scour billions of pieces of data, spot trends, adapt as it learns and make money trading stocks. The team of technology-industry vets is betting that software responsible for teaching computers to drive cars, beat the world's best poker players and translate languages will give their hedge fund an edge on Wall Street pros."[8] The firm, staffed by veterans of Amazon, Apple, Google and Microsoft, has only been trading its own money thus far, but plans to begin soliciting investor capital later in 2017.[9]

Other firms that also rely on AI-driven investing are also likely to emerge and many traditional hedge funds and investment managers are likely working on their own versions of such programs. Using traditional fundamental and quantitative analysis together to create quantamental approaches is just one way that the investment management manufacturing process is evolving. There are also new models emerging that have nothing to do with combining these disciplines.

"Over the next 5 years, investment management firms who don›t have an AI capability will be left out to dry and out of business." NAM-based Asset Manager <$500B AUM

"Data and quantitative tools will become more important. Access to relevant data and speed of processing of it into actionable insights will separate the winners from the losers." EMEA-based Asset Manager $500B-$1T AUM

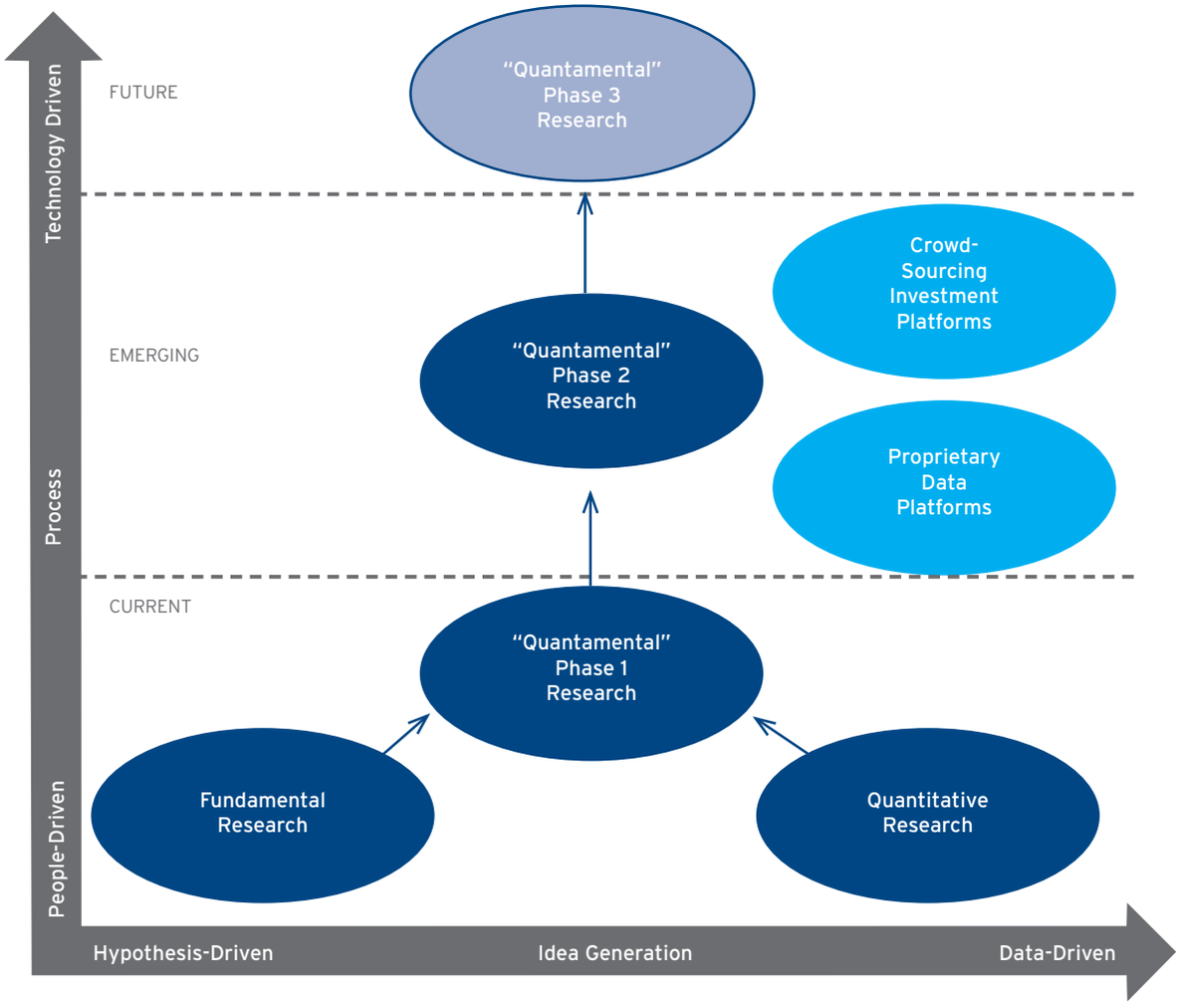
New Models with Unique Research Sourcing Emerge to Challenge the Traditional Buy-Side Approach

New types of firms that have unique approaches to how they source their investment research are also emerging, fed in part by the explosion in data sources and the emergence of enhanced data analytic platforms, machine learning and predictive analytics. Two distinct models of new competitors have surfaced in recent years as highlighted in Chart 6.6.

Firms that have created their own upstream fundamental models using proprietary data sources are emerging and winning mandates from both technology and industry gurus as well as from large institutional investors.

5 "Primer: Make Sense of Cognitive Computing", Bob Violino, June 5, 2017, Infoworld.com, http://www.infoworld.com/article/3198633/artificial-intelligence/primer-make-sense-of-cognitive-computing.html
6 "How Watson Learns Using Cognitive Computing", IBM Think Marketing, Trips Reddy, September 20, 2016, https://www.ibm.com/think/marketing/how-watson-learns/
7 "Primer: Make Sense of Cognitive Computing", Bob Violino, June 5, 2017, Infoworld.com, http://www.infoworld.com/article/3198633/artificial-intelligence/primer-make-sense-of-cognitive-computing.html
8 "Silicon Valley Hedge Fund Takes on Wall Street with AI Trader", Adam Satariano, February 6, 2017, Bloomberg.com, https://www.bloomberg.com/news/articles/2017-02-06/silicon-valley-hedge-fund-takes-on-wall-street-with-ai-trader
9 Ibid.

Chart 6.6: Evolution of Buy-Side Investment Research: Emerging Models



Source: Citi Business Advisory Services

Originally set up to provide shipping data to commodities traders, CargoMetrics has morphed into a start-up investment firm that "links satellite signals, historical shipping data and proprietary analytics for its own trading in commodities, currencies and equity index futures.[10] Founder Steve Borgerson notes that he is building a "learning machine" that "will be able to automatically profit from spotting any publicly traded security that is mispriced" by mapping "historically and in real-time what's really going on in economic supply and demand across the planet."[11] Investors into CargoMetrics include Google's Eric Schmidt and Paul Tudor Jones.[12]

Another firm in the model of CargoMetrics is OpalCrest, a Singapore-based company backed by both venture capital and one of the largest sovereign wealth funds in the region. This firm owns their own satellites and uses inputs from that proprietary data source to feed purpose-built machines for the commodities industry to help with price prediction, the timing of investments and risk management.[13]

A second model of emerging firm relies on crowd-sourcing to obtain their investment ideas. The foremost example of this approach is Quantopian.

10 "CargoMetrics Cracks the Code on Shipping Data", Fred R. Bleakley, Institutional Investor, February 4, 2016, http://www.institutionalinvestor.com/article/3526270/asset-management-hedge-funds-and-alternatives/cargometrics-cracks-the-code-on-shipping-data.html
11 Ibid.
12 "Billionaires Back New Shipping Quant Fund", Robin Wigglesworth, Financial Times, June 5, 2016, https://www.ft.com/content/2d7580ee-29d2-11e6-8b18-91555f2f4fde and "Tudor's Jones Said to Back AI Hedge Funds CargoMetrics, Numerai", Simone Foxman, May 22, 2017, Bloomberg.com, https://www.bloomberg.com/news/articles/2017-05-22/tudor-s-jones-said-to-back-ai-hedge-funds-cargometrics-numerai
13 http://www.opalcrest.com/company.html

Founded in 2011, Quantopian offers access to capital, along with data and programming tools to allow its members to test their algorithms and earn income based on the quality of those algorithms. Currently, the community consists of over 120,000 members, many of whom are accomplished PhDs, algorithmic traders or mathematicians who have found algorithms that generate outsized returns for investors.[14]

"In order to entice participation in the platform, Quantopian offers:

> Access to its hosted IPython environment which allows for access to not only coding programs but also data sets, including corporate fundamentals, historical stock price information and other relevant data.
>
> Algorithms that help users to run their newly designed algorithms through back-testing systems to determine the quality of their strategy and refine as needed.
>
> Incentive payouts that allow designers of top algorithms to earn a share of the net profits from their code.
>
> Monetary prizes and incentives to further increase usage of the platform.
>
> Online forums to discuss specific algorithm or programming challenges.
>
> In-Person workshops to introduce members to new concepts and allow for greater sharing of information."[15]

In 2016, Quantopian announced that it would begin trading money for outside investors. One such investor was Point 72's Steve Cohen who in 2016 invested $2 million of his personal money into the fund and pledged $250 million of capital to allocate to the best algorithmic trading programs identified by the platform. Through April 2017, 15 algorithms had been chosen to receive this money with the recipients of this capital all originating from outside the financial services industry.[16] This underscores the potential to find divergent thinkers with a crowd-sourced model.

Another crowd-sourced platform is Numerai that launched in 2016 and describes itself as an open access hedge fund that allows users to remain anonymous and offers to pay them in new cryptocurrencies delivered via the blockchain.

Like Quantopian, Numerai provides the data and programming toolkit to allow independent programmers to create algorithms and they choose the best of these submissions for trading in their fund, paying the developers for their ideas. During its first year of operations, Numerai indicated that they had 7,500 data scientists creating algorithms on their platform.[17] After having initially paid their users in bitcoin, the firm announced in February 2017 that they were creating their own coin on the Ethereum blockchain called Numeraire to pay programmers.[18] In May 2017, Paul Tudor Jones also announced an investment into Numerai as part of his broader AI-driven investment portfolio.[19]

Not only new entrants, but existing firms as well are looking to experiment with the crowd-sourced model. "Citadel is offering $25,000 prizes to students to compete in 18 'datathons' aimed at uncovering the best student quants and Two Sigma partnered with data science platform Kaggle, offering $100,000 for the best machine learning algorithms."[20]

These new investment models are poised to bring potentially disruptive change into the industry depending on their performance and how much traction they gain. Meanwhile, the traditional asset management industry is also looking to upgrade their understanding and use of attribution analysis to improve their trading outcomes.

"Quant is changing dramatically with new datasets, new sources of insight. There's a ton of data out there, but we aren't good at capturing it." Sell-Side Specialist

"I really like the idea of contests as a way to drive cost efficient innovation." Family Office

" 'Statistics' is what it was called before 'Big Data' came along." NAM-based Asset Manager $500B-$1T AUM

14 "Quantopian—Crowd Sourcing Investment Algorithms" Dan Sawyer, March 20, 2017, Harvard Business School Digital Knowledge Center, https://digit.hbs.org/submission/quantopian-crowdsourcing-investment-algorithms/

15 Ibid.

16 "The 120,000 Quants Competing for Steve Cohen's Money Still Don't Want to Work at a Hedge Fund", Paul Clarke, April 28, 2017, eFinancialCareers.com; http://news.efinancialcareers.com/uk-en/281916/the-120000-quants-competing-for-steve-cohens-money-still-dont-want-to-work-for-a-hedge-fund

17 "Numerai is a Crowdsourced Hedge Fund for Machine Learning Experts", Katie Roof, December 12, 2016, TechCrunch.com, https://techcrunch.com/2016/12/12/numer-ai-is-a-crowdsourced-hedge-fund-for-machine-learning-experts/

18 "An AI Hedge Fund Goes Live on Ethereum", https://medium.com/numerai/an-ai-hedge-fund-goes-live-on-ethereum-a80470c6b681

19 "Tudor's Jones Said to Back AI Hedge Funds CargoMetrics, Numerai", Simone Foxman, May 22, 2017, Bloomberg.com, https://www.bloomberg.com/news/articles/2017-05-22/tudor-s-jones-said-to-back-ai-hedge-funds-cargometrics-numerai

20 "The 120,000 Quants Competing for Steve Cohen's Money Still Don't Want to Work at a Hedge Fund", Paul Clarke, April 28, 2017, eFinancialCareers.com; http://news.efinancialcareers.com/uk-en/281916/the-120000-quants-competing-for-steve-cohens-money-still-dont-want-to-work-for-a-hedge-fund

Asset Managers Increase their Understanding and Ability to Leverage Factor Insights

Manufacturing enhancements discussed thus far relate to the research process and on how to better establish and manage positions within the portfolio. Another area where survey participants noted innovation among market leaders was around the type of attribution analysis they are performing.

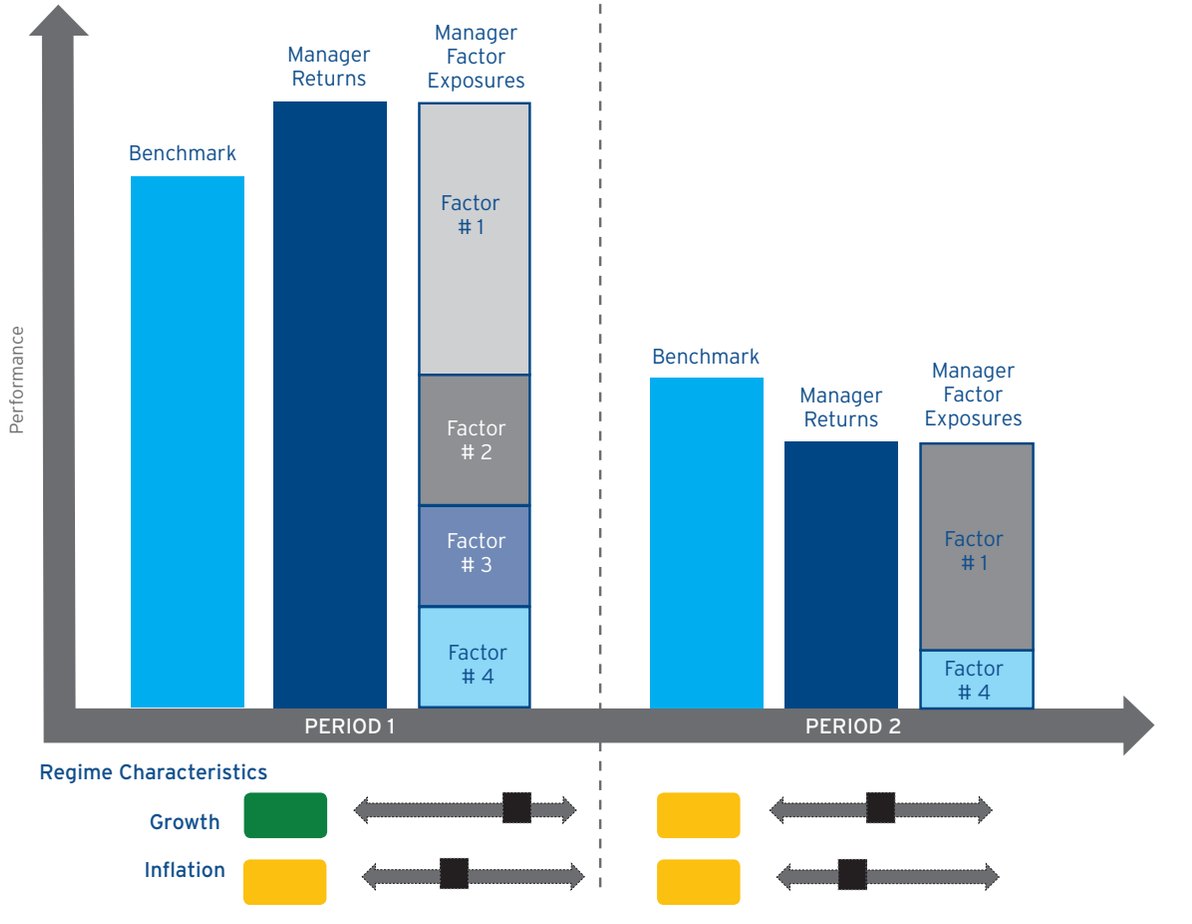
Attribution analysis helps investors, firms and portfolio managers themselves understand the source of their actual returns. Traditionally, attribution analysis focused on the relative success of the portfolio manager's stock-picking, investment strategy or market timing. A new type of attribution analysis is emerging, however, that focuses on factor exposures.

Last year's industry evolution paper, *From Diversified Asset Classes to Factor-Driven Index Portfolios & the Re-Packaging of Active Investment Skills*, focused extensively on how more democratized access to risk frameworks that were previously only available to top tier investment management firms was allowing sophisticated institutional investors to rethink their portfolios. Several institutions have begun to advocate having a diversified set of factor exposures which they argued could generate better returns than the traditional portfolio construction approach that relies on diversified asset class exposures.

Understanding and interest in using factors was perceived as moving more quickly at the institutional investor level as compared to the traditional active long only asset manager community. Long seen as a quantitative trading skill set, survey participants noted that most fundamentally driven long only managers had little to no understanding of the factors they had exposure to in their portfolio, much less how those exposures varied over time through differing economic regimes.

Efforts to remedy that situation are now beginning to emerge in large asset management firms. The approach used in shown in concept in Chart 6.7.

Chart 6.7: Factor Attribution Analysis of Historical Performance



Source: Citi Business Advisory Services

This type of factor attribution analysis seeks to recast a manager's past performance in terms of the factor exposures that their portfolio demonstrated in specific windows. The time periods used for the review are typically matched to specific economic or market regimes to help the manager understand how their factor exposures varied over time.

The goals of such analysis are threefold.

First, the insights are designed to help traditional asset managers speak more fluently in the factor language increasingly being used by their institutional investor base. Explaining what factors a manager uses to realize their performance helps the manager position their product not just for asset class constructed portfolios, but also for factor based portfolios.

Second, by providing a new lens to the portfolio manager, the hope is that these learnings can be incorporated into their thinking and model construction to enhance their idea selection, sizing and trading approach.

Third, the increased understanding and sensitivity to factors and how they perform in certain economic regimes can be applied to hedge the portfolio if necessary or to tilt the portfolio more deliberately to enhance returns.

There is also an organizational benefit to be realized in terms of identifying which fundamental portfolio managers show an openness and aptitude for incorporating factor trading. As discussed in Section III and IV, there are many new products being constructed that actively utilize factors as a foundation of their investment thesis and many of these products will sit on the dividing line between active and passive—a fertile landscape for the quantamental approaches discussed earlier.

Broadening the understanding of factors and how they apply to traditional actively managed portfolios is in its early stages. Progress on this front is only happening across a subset of market leaders. Survey participants nonetheless anticipate that over time, this type of thinking and analysis will become more embedded. Indeed, factor trading may become increasingly important as a tool for asset managers looking to forge more direct links with their institutional clients as will be discussed in Section VII.

Just as innovations in manufacturing are emerging to enhance research, trading, portfolio management and attribution all of which are intended to build more flexibility into these processes, there are additional innovations occurring in packaging and distribution that are also fulfilling this mandate and positioning the industry for an era of mass customization.

"Factors will continue to become commoditized then they will become extremely cheap." Global Asset Manager >$1T AUM

"People keep factor discussions close to their chest, but there's a prominence of AI and Machine Learning across all strategies." Pension Fund

"There are at least 3 or 4 different schools of thought on what the factor model should look like. There is no right and wrong but there are some choices you have to make. We have had a strong focus on the factors being tradeable, observable in the market, and easy to communicate to the board and externally." Pension Fund

Section VII: Investment Industry Packaging and Distribution Evolve to Better Align Interests and Deliver Mass Customization

To continue our supply chain analogy begun in Section VI, we will now turn our focus from the manufacturing of investment ideas and portfolios to the packaging and distribution of those ideas.

For many, this concept of viewing investment manufacturing as a distinct function from packaging is an odd formulation. Portfolio managers have traditionally delivered their expertise via funds. The entire asset management organization was built around this idea. At most, there might have been a set of separately managed accounts (SMAs) that mimicked the trading of that fund, but these would be pari passu vehicles. However, this view of investments being inextricably linked to the fund is beginning to change.

Survey participants have started to talk about investing as being "wrapper agnostic". The emergence of ETFs has touched off debate around whether this construct is superior to the traditional mutual or collective fund. Technology innovation is opening up the possibility of SMAs becoming available to a broader set of not only high net worth, but also mass affluent and individual investors. Yet, the biggest driver by far of this view that investment expertise can be sold and that the wrapper is irrelevant is the emergence of the solutions mindset that we began to explore back in our 2015 industry evolution survey.

Solutions align the interests of the investor with the packaging and distribution capabilities of the investment manager. This alignment can be through bespoke institutional solutions or through more flexible or targeted retail solutions. Evolution is occurring in both spaces.

New factor platforms that deliver tailored institutional trades and portfolio management are transforming the engagement between asset managers and their core clients. New fee models are being explored in both the hedge fund and traditional asset management world. New single ticker portfolio funds are being built around profile-based models that can feed directly into a growing set of robo-advisory led investment platforms.

Meanwhile, the whole lifecycle of investment advisory itself is undergoing a foundational change that is altering the nature of distribution. Early moves to create robo-advisory platforms discussed in last year's report are now being supplemented by significant advances in risk, sales and marketing technologies that are resulting in a new digital advisor toolkit.

The focus of these advancements is to be able to use the flexibility that managers are building into their investment processes to formulate multiple paths to market that meet the demands of varying segments and can be optimized to meet individual needs. It is for this reason that we continue to use supply chain terms and cite these changes as enabling mass customization.

New Platforms Deliver Specific Risk Premia Trades to Institutional Portfolios

As noted back in Section III, there is a split in how smart beta and risk premia funds are being used. Single factor offerings are typically utilized by institutional investors to neutralize or accentuate specific exposures or characteristics in their portfolios whereas multi-factor funds provide investment solutions targeted at a more retail and mass affluent audience. The retail solutions were highlighted back in the earlier section, but there is also innovation occurring in how single factor exposures are being delivered to institutions.

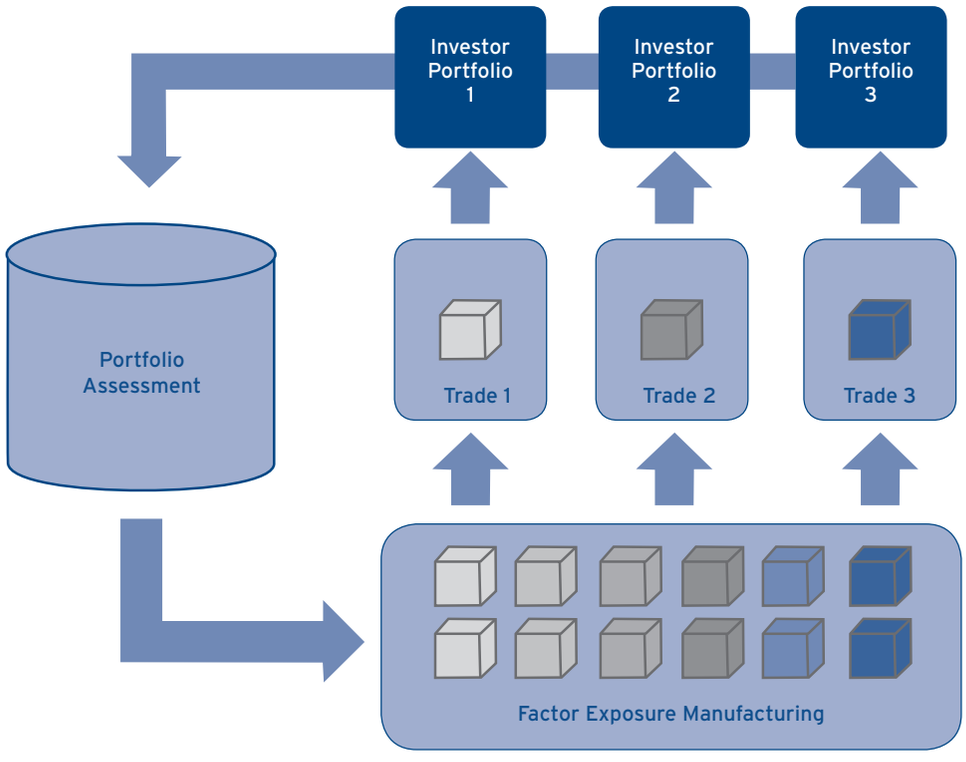
While there are a broad set of single factor funds available for institutions to purchase, a more solutions-oriented approach to delivering these exposures is emerging across large investment managers.

These managers have identified an opportunity to provide bespoke services to institutional investors around their use of specific factors or risk premia. Rather than leaving the institution to make their own decision about whether to hedge or tilt the portfolio and with what factor or risk premia, these managers are creating entire businesses around a new type of platform that is shown in Chart 7.1.

These platforms follow a 3-stage process to engage with their institutional clients.

First, the manager offering the platform will work with the institution to understand their current portfolio and their return-stream or hedging need. This is an advisory role that is increasingly being filled by current or former portfolio managers able to engage the client in a peer discussion. These individuals often have analysts and quantitative experts on the team to model the portfolio and help formulate the specific trade idea for the client and demonstrate how it is expected to impact their overall portfolio's holdings.

Chart 7.1: Factor or Risk Premia Trade Platform



Source: Citi Business Advisory Services

The second step involves designing a bespoke exposure that directly delivers the specific factor or risk premia. This is a trade level rather than a fund level approach. Instead of the investor buying or selling an entire fund in the secondary markets, this allows the investor to have complete transparency and control over the desired exposure and it allows them to have flexibility in how they structure the delivery of that exposure into their portfolio. This can range from a swap arrangement to a structured trade to a custom basket of securities.

The third stage involves initiating and managing the trade that provides the targeted exposures. This includes running reports for the investor that highlight the portfolio impact that adding the exposure to the portfolio has enabled.

In a sense, by offering this service, investment managers are setting themselves up to compete with some of their broker-dealer counterparts that also offer similar platforms. However, the majority of these bank-owned platforms require the institutional client to have a swap arrangement or other trade documentation in place with the broker-dealer and the size thresholds they mandate for qualifying institutions may prove too large for many small and mid-sized institutions.

This is the target audience for many of the asset manager owned platforms emerging in this space.

"We're solutions/outcome-focused, not product-focused and our core messaging is that we are "wrapper agnostic"." NAM-based Asset Manager <$500B AUM

"Clients are already using both active and passive in their portfolios but lots of managers focus too much on the vehicle and not enough on the underlying investments. We try to be wrapper and product agnostic when solving our clients' problems. ETFs and our platforms allow us to have those conversations with a variety of clients. If you are fixated on the wrapper and trying to sell a product you are having the wrong conversation." EMEA-based Asset Manager $500B-$1T AUM

Broader Factor Platforms Allow Managers to Reconstitute Institutional Portfolios to Deliver More Targeted Return Streams

Whereas the model just discussed is being used to craft an exposure to a specific factor or risk premia as part of a trading plan, there is a broader platform model

that only a few of the most advanced players have been able to offer thus far. This platform takes in an investor's entire portfolio or a significant slice of their portfolio and decomposes all the exposures across the set of holdings.

The platform owner then separates out those portions of the exposure that represent the various betas and looks to replace those exposures with less expensive, and if necessary, more diversified set of positions. They then apply their own tilts to move the portfolio into alignment with the investor's desired return goals. This is illustrated in Chart 7.2.

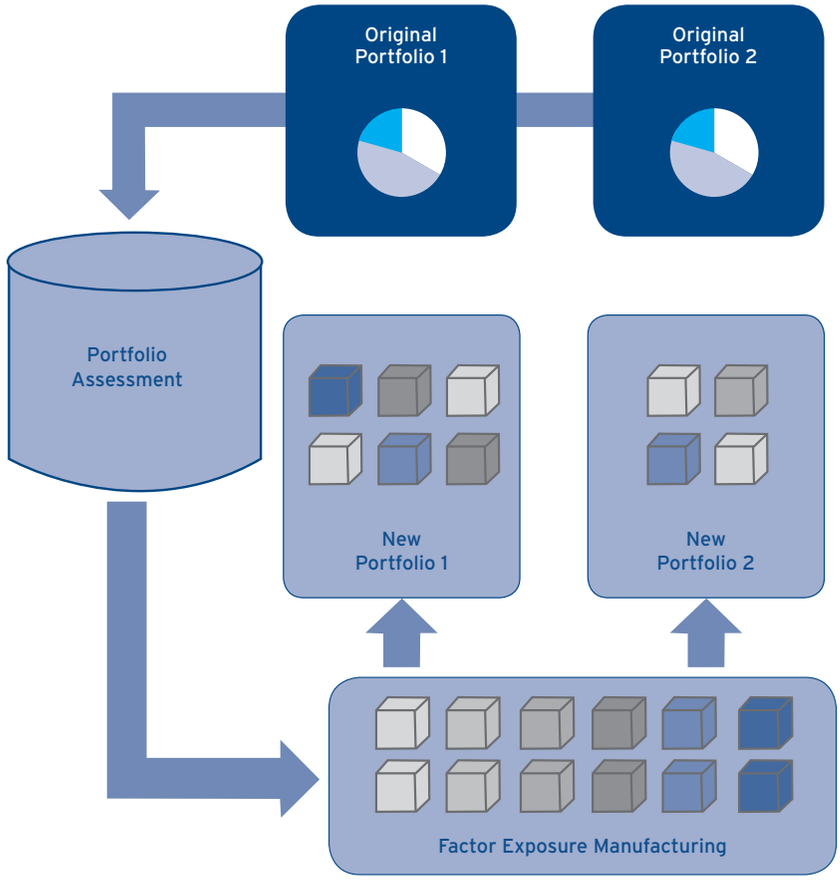
Because this approach looks to operate at the portfolio level, this is much more of an outsourced CIO model (OCIO) than an investment management approach. It moves the investment manager into more of a fiduciary role and puts them into direct competition with many of the industry consultants that seek to offer similar services to the institutional audience.

New views on how factor exposures may offer a superior approach to asset class diversification, the shift to a low cost beta core comprised of index funds that replicate the major style box indices used by the vast majority of industry consultants and the active asset management industry's prolonged struggle to outperform indices in a low yield environment are all encouraging institutions to consider new entrants in the space over their traditional consulting relationships.

The firms offering these services are acknowledged experts in this type of quantitatively driven factor investing, a skill set that few, if any, industry consultants can claim as a core competency. The new entrants look to leverage their unique technology platforms that were custom-built to service the asset manager's own trading. This includes their risk management and reporting platforms and portfolio modeling tools. The teams offering the advisory often report to the same CIO that oversees the firm's own funds.

As in the previous example, the idea of outsourcing entire or partial portfolios in this manner is not likely to draw many adherents for institutions above a certain size as many of these firms are internalizing professional investment talent to help formulate and/or manage their portfolio holdings. Yet, the growing complexity of portfolio construction, reputation of managers active in this space and impact on returns demonstrated through back-testing are all proving interesting draws.

Chart 7.2: Portfolio Re-composition Factor Platform



Source: Citi Business Advisory Services

These two models of factor platforms demonstrate the progress asset managers have made in the past couple years since highlighting their desire to design bespoke investment solutions for institutions. This model of delivering their investment expertise is one way in which the packaging of investment ideas is progressing.

Beyond wrappers and delivery platforms, however, there is a broader trend toward better alignment of interests that is happening between investors and the managers looking to service the institutional audience.

"We win things because of our ability to customize. We measure against an object or theme, not against a benchmark. Delivering on the customized side is where we see the future." Global Asset Manager >$1T AUM

"Many want to know whether you can customize your product to express their themes." Global Asset Manager >$1T AUM

Hedge Fund Industry Examines New Fee Approach to Better Align Incentives

In both the hedge fund and the asset manager industries, there is an evolving discussion on fees that seeks to better align the interests of investors and active investment managers.

Section I detailed how in response to the low return environment, investors are pressuring traditional asset managers on fees as their active long only funds are losing assets to low cost passive substitutes. These same pressures are surfacing in the hedge fund industry, but beyond liquid alternative offerings that often do not offer the same depth of trading expertise, there is no substitute product for investors to readily switch to in order to realize fee savings. Instead, they have been forced to think about other solutions to better align to their investor needs.

Hedge fund returns in recent periods underscore the importance of the issue. Annual hedge fund returns, based on the Barclays Hedge Fund Index averaged 13% annually between 1998 and 2007. Sharp declines during 2008 due to the Global Financial Crisis were reversed in 2009 for an average 2008-2009 performance of +1%. Between 2010 and 2016, however, annual hedge fund returns have averaged only 5%.[1]

Despite falling returns, there has not been any wholesale restructuring of the industry's 2% management fee and 20% incentive fee structure. Commonly known as 2-and-20, this payment regime remains the de facto standard and though many firms now offer lower fee options on founder's share classes or special institutional share classes for extremely large tickets, those are typically only provided in special circumstances.

In late 2016, however, hedge fund industry consultant Albourne Partners teamed with the Teachers Retirement System of Texas, a large pension with a significant hedge fund portfolio, to publicly endorse a new approach to calculating hedge fund fees. This proposal is commonly referred to as 1-or-30.

"The objective of the fee formula is to ensure that the investor consistently retains 70% of the gross alpha returns of the hedge funds in its portfolio. The investor will always pay a 1% management fee to the hedge fund, regardless of performance, but will never pay more than 30% of the gross alpha provided annually by the hedge fund. If a hedge fund's alpha generation is higher than the management fee during a given time period, the manager must deduct the one percentage point management fee from the 30% (of gross alpha) performance fee."[2] The two fee models are shown in Chart 7.3.

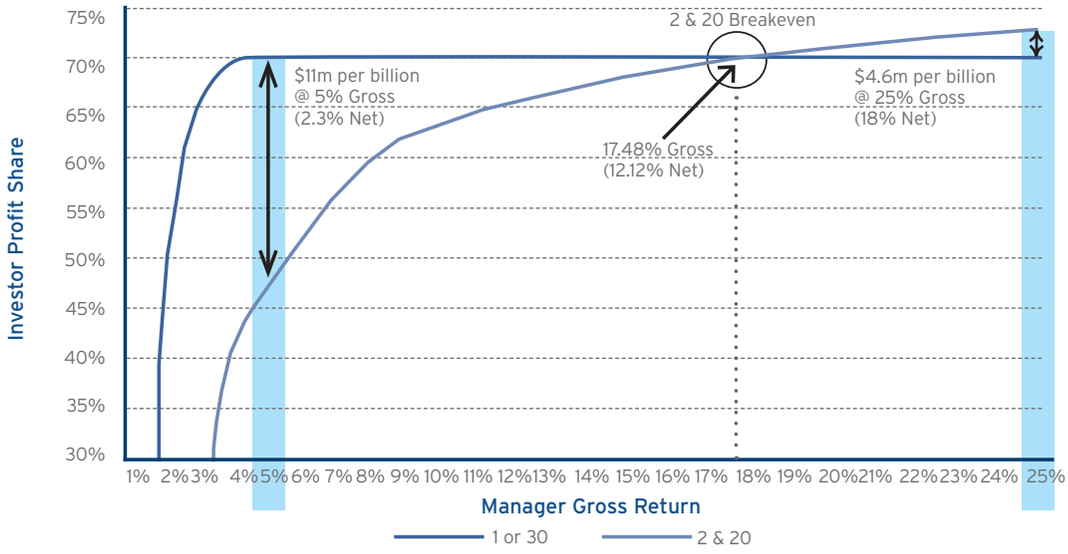
The impact for investors is significant. If a hedge fund registers a gross return of 5%, under the new 1-or-30 model, the investor would save $11 million in fees per $1.0 billion AUM as compared to the 2-and-20 approach. Breakeven between the two fee models would be at 17.48% gross return (12.12% net return). If the manager achieves returns of 25%, investors using the 1-or-30 model would actually pay $4.6 million more in fees to the manager per $1.0 billion AUM, illustrating how this approach better aligns incentives to returns.[3]

Uptake of the new fee model is progressing. As of mid-February, at least 16 multi-billion-dollar hedge funds worldwide were either in the process of implementing or have implemented the 1-or-30 fee structure according to Albourne Partners.[4] Our own survey interviews and hedge fund discussions have similarly unearthed a fairly resigned view that the industry may move in this direction.

"We never thought the '2 & 20' fee model was appropriate, and wanted better alignment of interest – which we're starting to see now." Pension Fund

1 Barclay Hedge https://www.barclayhedge.com/research/indices/ghs/Hedge_Fund_Index.html
2 "Texas Pension Fund Taking Bold Step on Fees", Christine Williamson, December 26, 2016, Pensions & Investments, http://www.pionline.com/article/20161226/PRINT/312269978/texas-pension-fund-taking-bold-step-on-fees
3 "Case Study: 2-and-20 vs. 1-or-30 (No Hurdles)", Jonathan Koerner, Lowell Milken Institute, February 2017, https://lowellmilkeninstitute.law.ucla.edu/wp-content/uploads/2017/01/MILKEN-1-OR-30-Slides.pdf
4 "Meet the 1-or-30 Fees as Asset Managers Change Cost Structures", Jackie Cameron, February 22, 2017, BizNews.com, http://www.biznews.com/asset-management/2017/02/22/asset-managers-cost-structures/

Chart 7.3: Comparison of 2-and-20 versus 1-or-30 Fee Structures



Source: Lowell Milken Institute, Albourne Partners, Case Study: 2-and-20 vs. 1-or-30 (No Hurdle), Jonathan Koerner, https://lowellmilkeninstitute.law.ucla.edu/wp-content/uploads/01/2017/MILKEN-1-OR-30-Slides.pdf

"The Albourne, '1 or 30' model, makes a lot of sense. I think people have less of an issue sharing the upside, but don›t want to do so 50/50. When returns are lower, managers are eating up a larger portion and if you throw in carry, it becomes too disproportionate between investor and manager." Pension Fund

"We'll probably witness the end of the '2 and 20' model as a concept. I'm not sure if 1 or 30 takes over, but something in that direction will take over as the norm." Family Office

Active Long Only Managers Struggle As Incentives Prioritize AUM over Performance

Asset managers are also trying to find options apart from lowering fees to better align their interests with their investors. The majority of those that pursue actively managed fundamental growth and/or value strategies are caught in a system, however, that rewards them to build assets as opposed to outperform.

Chart 7.4 shows the rate of position turnover and the target investment horizon in several developed ma kets equity and credit investment strategies.

When viewed in this way, it becomes evident that many equity strategies that have developed in the last 15 years register extremely high position turnover within very short investment horizons. This reflects the profound impact that improved technologies, electronic trading and revamped order handling rules have had on the markets. Even the new Phase 2 Quantamental approaches that focus on upstream fundamentals primarily look at investment horizons of 3 months or less.

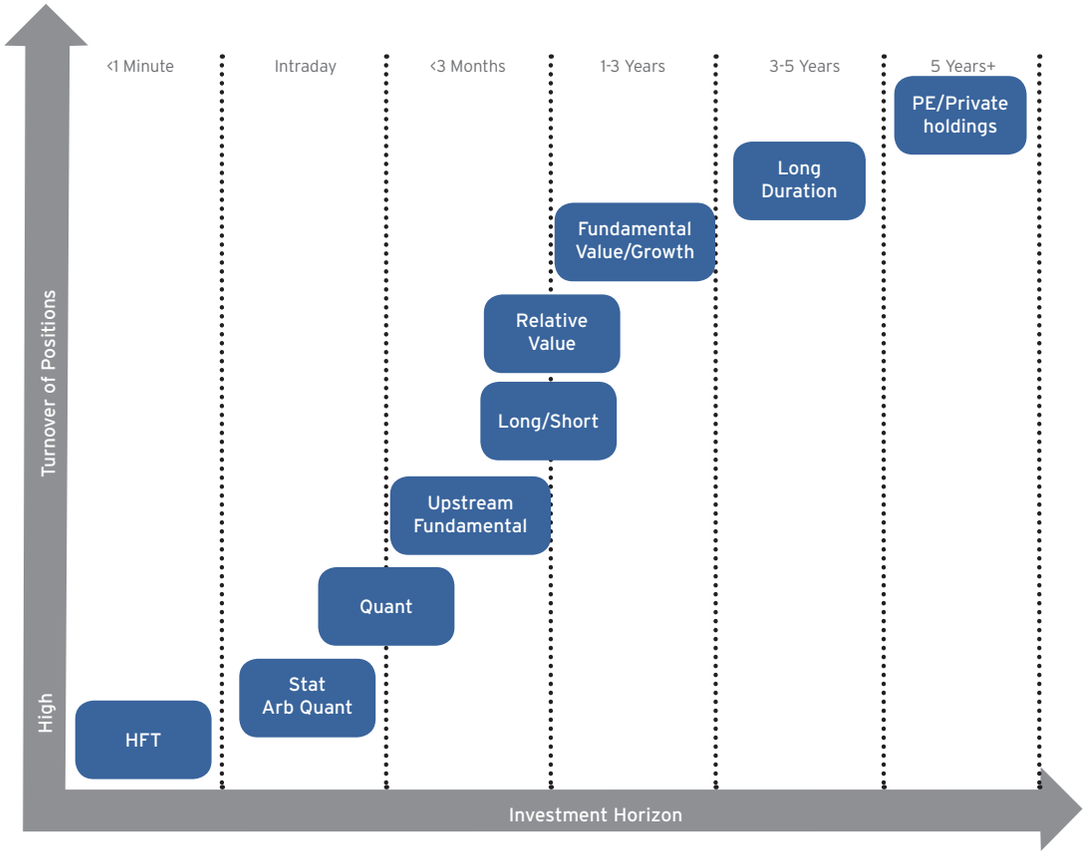
There do continue to be strategies, however, that look at much longer term investment horizons and that trade less frequently. Certain relative value and long/short strategies focus on trades in the 1-3 year horizon, fundamental growth and value strategies typically target longer term investment goals and certainly long duration and private holdings only trade infrequently and require multi-year windows to realize their returns.

The majority of these low turnover/longer investment horizon strategies trade in structures that clearly align the interests of the investor to the interest of the investment manager by rewarding those managers for performance via incentive fees. That is not the case for the majority of fundamental value and growth strategies, however.

While there are some hedge funds that trade long only funds in structures that award them incentive fees over a certain performance hurdle, AUM in these strategies is only about $300 billion. That compares to multi-trillion dollar allocations to active long only growth and value fundamental strategies being delivered via mutual funds that charge a flat management fee regardless of performance.

Increasingly asset managers worry that this misalignment is driving the wrong behavior in the industry. If the only way to get paid more is by increasing the size of the assets in the fund, the portfolio manager is incented to minimize any negative tracking error to their benchmark to prevent outflows.

Chart 7.4: Developed Markets Equity & Credit Trading Strategies



Source: Citi Business Advisory Services

The unintended consequence of such caution is often a tendency to also minimize outperformance relative to the benchmark.

Chart 7.5 presents the percent of U.S. equity mutual funds that were able to outperform their relative benchmark by >2% annualized over a 3-year period. As shown, this total has declined precipitously. In 2002 over 50% of U.S. equity funds examined in our sample were able to generate >2% annualized alpha over their benchmark during the preceding 3-year period. That total nearly halved in the following 5-year and 10-year periods (27.8% and 27.1%). Through the 1st half of 2017, the figure halved again to only 13.1% of the funds.

Meanwhile, the size of the average U.S. equity mutual fund increased dramatically in that same period. In 2002, the average U.S. equity mutual fund had $558 million AUM. That figure jumped to $1.35 billion in 2007 and remained nearly flat at $1.32 billion in 2012. By H1 2017, the average U.S. equity mutual fund had risen to $1.99 billion, a 51% jump in just 4.5 years. Thus, even though there was a 74% drop in the percentage of funds able to post >2% alpha in the preceding 3-year period between 2002 and H1 2017, the average sized U.S. equity mutual fund receiving a 50 basis point management fee would have gone from earning $2.79 million in fees to $9.95 million in that same period.

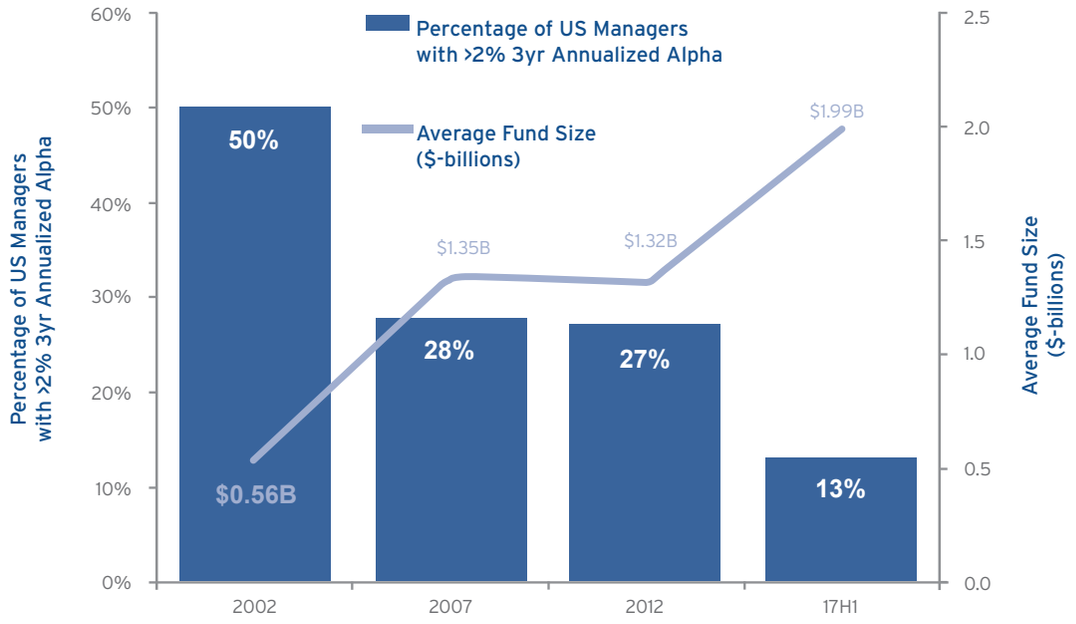
This is a powerful example of misalignment. Some survey participants have begun to question whether true fundamental growth and value investing belongs in a structure more akin to the other long investment horizon investment strategies that charge an incentive fee for performance to align investor and manager interests.

"In the short term salespeople are incentivized to sell fast moving product but in the long run that creates the wrong result. It is hard to change." EMEA-based Asset Manager $500B-$1T AUM

New Experimental Fee Model Looks to More Closely Tie Long Only Fees to Fund Performance

A working paper entitled "Mutual Fund Investment Horizon and Performance" written by researchers in conjunction with the Centre for Financial Research at the University of Cologne concludes that "stocks that

Chart 7.5: US Equity Managers with 3yr Average Annualized Alpha >2%: Proportion of Managers and Average Mutual Fund Size



Source: Citi Business Advisory Services analysis. Percent of managers that posted >2% 3-year annualized alpha based on proprietary data subscription to eVestment. Sample sizes: 2002: 230 out of 458 funds; 2007: 203 out of 730 funds; 2012: 252 out of 931 funds; H1 2017: 140 out of 1,066 funds. Average size of U.S. Equity Mutual fund derived from Investment Company Institute data, 2017 Fact Book plus H1 2017 Monthly Bulletin, www.ICI.org

are largely held by long-term funds outperform stocks that are largely held by short-term funds by roughly 3% per year over the following 5-year period. This superior performance of fund managers with long investment horizons stems from their ability to identify superior long-term firm fundamentals. In contrast, short-term funds predict short-term earnings or use simple mechanical strategies such as momentum to select stocks."[5]

This dichotomy is one that asset managers are starting to explore. In December 2016, AllianceBernstein filed with the SEC to launch a new mutual fund series with a performance fee element. These funds charge a base management fee competitive with low cost passive products. That management fee incrementally increases based on performance and after a certain point, the fund can charge incremental incentive fee increases up to a designated cap. The large cap growth version of this proposed fee structure is illustrated in Chart 7.6.

As shown, the entry management fee is 5 bps. If in a 12 month period the fund does not outperform its reference benchmark (in this case the Russell 1000 Growth Index) then the investor will end up paying only the 5 bps fee for the year. For every 0.2% of outperformance up to 1.4%, the fund will charge an additional 7 bps until it hits its full management fee of 55 bps. From that point forward, the fund would charge an incremental incentive fee of 0.7 bps for every 0.2% of outperformance up to the cap of 105 bps that would be realized if the fund outperformed the reference index by 2.8%. Any performance gains beyond 2.8% would not draw additional fees.

This differs from a fulcrum fee approach which is more of a penalty-fee approach where the manager bets on their ability to outperform or they accept a reduced fee. The AllianceBernstein approach rewards incremental outperformance and should be open to all investors whereas fulcrum fee funds are only available to Accredited Investors, not the general populace.

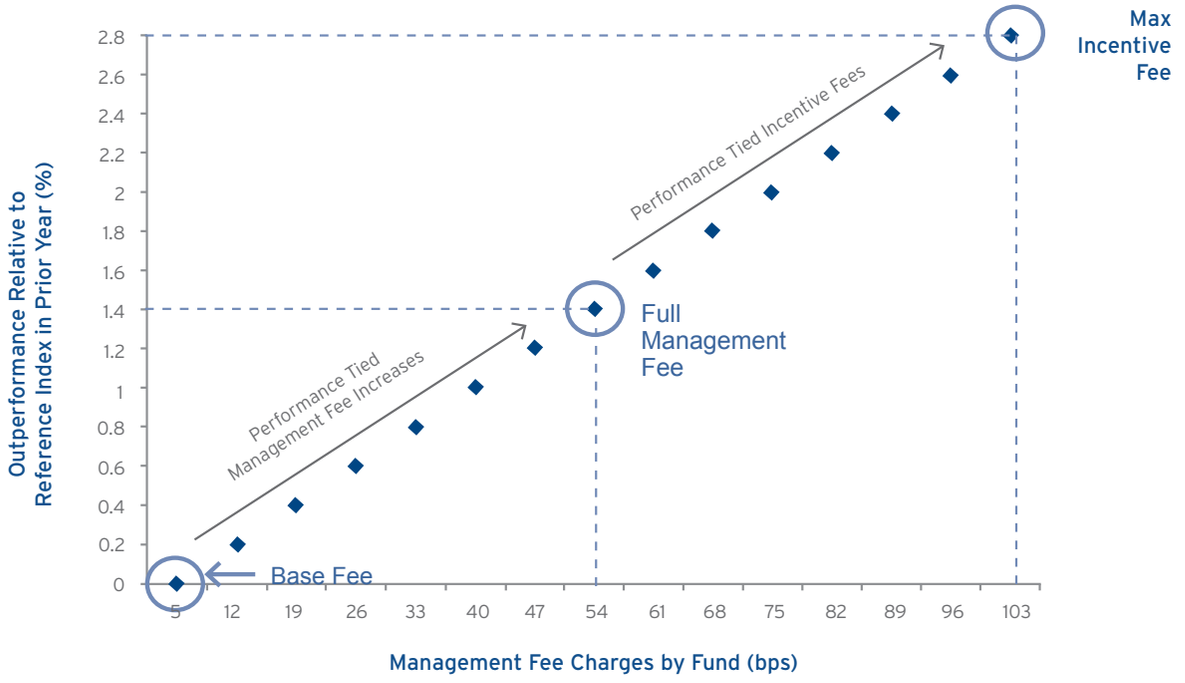
It is also important to note that AllianceBernstein is not the only firm using incentive fees. According to a review by Barron's, "Vanguard has 31 stock and balanced funds with incentive or penalty-based fees, though most are just a couple of basis points or fractions of a percentage point and Fidelity has 76 stock funds that adjust fees by 0.2 percentage points based on 3-year returns."[6]

It remains to be seen whether this approach to tie mutual fund fees more closely to performance gains advocates. Yet, there was a broad consensus across

5 "Mutual Fund Investment Horizon and Performance", CFR Working Paper, No. 15-06, Chunhua Lan, Fabio Moneta, Russ Wermers, https://www.econstor.eu/bitstream/10419/113656/1/833265369.pdf

6 "AllianceBernstein Fires the Latest Shot in the Fee Wars", Reshma Kapadia, March 18, 2017, Barrons, http://www.barrons.com/articles/alliancebernstein-fires-the-latest-shot-in-the-fee-wars-1489814493

Chart 7.6: Alliance Bernstein Large Cap Growth Performance Fee Funds



Source: Citi Business Advisory Services based on data presented in "Alliance Bernstein Fires the Latest Shot in the Fee Wars, Reshma Kapadia, March 18, 2017, Barrons, http://www.barrons.com/articles/alliancebernstein-fires-the-latest-shot-in-the-fee-wars-1489814493

survey participants that industry trends are pushing asset managers in this direction where more of their own financial success is tied to the performance they generate in excess of broadly available market beta. More experimentation and innovation is likely if the pressures to shift the incentives in the industry build further and the drift from actively-managed to passively-managed funds continues.

Beyond making their current funds more aligned to their existing investors, many asset managers with wealth businesses are also thinking about how to package their funds for more seamless uptake by emerging robo-advisory platforms.

"We like the managers to make money when then the investors make money. We don't like it when managers find a way to make money when the investors don't make money. Misalignment of incentives is a major problem across the industry." Large Pension Fund

"Performance fees are simply about alignment of interest." EMEA-based Asset Manager $500B-$1T AUM

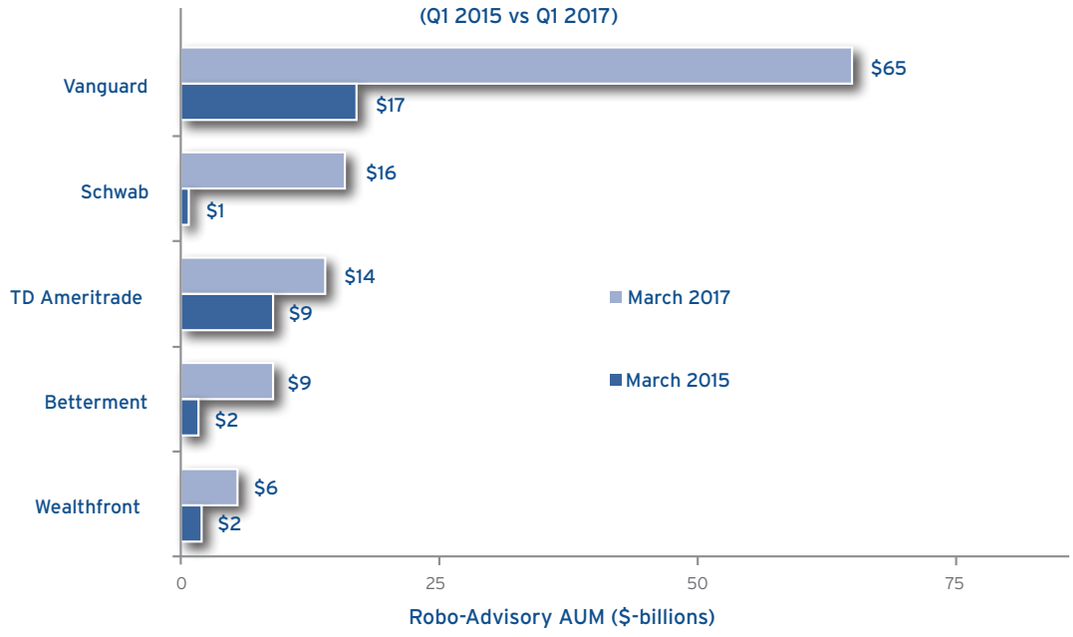
"We want as low of a management fee as possible and are happy to pay a performance fee." Pension Fund

Manufacturers Promote Model Portfolios and Lower Cost Bundles for Consumption by Robo-Advisory Platforms

In last year's survey, we delved deeply into the emergence of robo-advisory platforms and laid out a set of models for how they deliver their services. These were 1) a fully automated direct to consumer model, 2) a service where automated investing is augmented with human advisory and 3) a relationship-driven approach where only the advisor and not the client has access and uses the robo-advisory capabilities as a toolkit. We noted that Vanguard, through their Personal Advisor Services, and Schwab, through their Intelligent Portfolios, both adopted the augmented model and were far outpacing their peers in terms of building assets.

This continues to be the case. Chart 7.7 shows that growth in AUM of robo-advisory platforms remains strong with the top 5 platforms highlighted having increased their collective AUM from $30.6 billion in Q1 2015 to $109.4 billion in Q1 2017—a jump of 258%. Vanguard and Schwab alone accounted for the vast majority of that growth having risen from a combined $17.8 billion AUM in Q1 2015 to $81.0 billion in Q1 2017.

Chart 7.7: Growth in Select Robo-Advisory Platforms



Source: Citi Business Advisory Services analysis based on the following data presented in "Vanguard's RIA Leaps to $5 Billion in Assets Per Month in 2017", Ramsey Flynn, May 9, 2017, RIABiz.com, http://riabiz.com/a/2017/5/9/vanguard-rias-growth-leaps-to-5b-of-assets-per-month-in-2017-as-schwabs-ria-robo-jumps-to-monthly-13b and: "Top 5 robo-avisorys by AUM", February 25, 2016, Investment News, www.investmentnews.com

As these assets build, there are some interesting developments to track in this space.

> The largest platforms seem to be drawing new clients. Originally, the platforms tended to cannibalize existing accounts, but Schwab recently announced that 33% of its assets in Intelligent Portfolios now represent new assets.[7]
>
> Advisors hired to work in conjunction with the robo-advisory platform are increasing. Vanguard announced that they had added 100 new advisors to their Personal Advisor Services platform between August 2016 and March 2017–a gain of 25%.[8]
>
> Early innovators that started with direct-to-consumer platforms are evolving. Betterment has split its company into 3 divisions: Betterment, the original platform focused on retail customers; Betterment for Advisors (B4A) that focuses on RIAs and investment advisors; and Betterment for Business (B4B), a platform that offers 401(K) retirement plans for independent businesses with the group having signed on Uber as a launch client.[9]

As part of the launch of Betterment for Advisors, the firm announced partnerships with Goldman Sachs Asset Management (GSAM) and Vanguard to list model portfolios from both organizations on their platform.

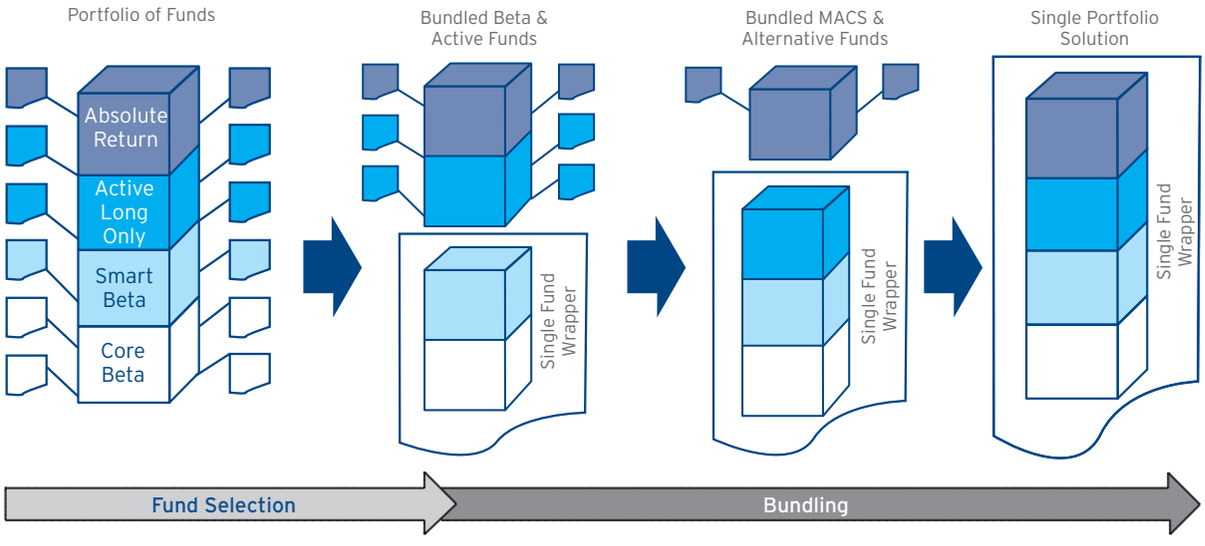
According to Betterment, "GSAM's ETF asset allocation portfolios provide exposure to core stocks and bonds as well as diversifiers, such as emerging markets and REITS, using low-cost, liquid ETFs. These portfolios use an established, factor-based approach designed to balance risk across multiple sources of return. Vanguard's ETF strategic model portfolios are derived from global market cap weights. They include exposure to U.S. and international equities and global investment-grade bonds, encompassing more than 19,000 global stocks and bonds, using low cost index-tracking exchange-traded index funds."[10]

Many in the industry took this shift to be a sign that robo-advisors are cementing their role as ETF distributors. To facilitate their uptake of ETF products, we see an ongoing move to build single ticker funds that align to the model portfolios being offered on their platforms. This marks a departure from traditional advisors' historical approach to portfolio construction as illustrated in Chart 7.8.

Advisors traditionally constructed portfolios for their clients using a mix of various funds that each match a portion of the firm's recomended model portfolio

7 "Vanguard's RIA Leaps to $5 Billion in Assets Per Month in 2017", Ramsey Flynn, May 9, 2017, RIABiz.com, https://riabiz.com/a/2017/5/9/vanguard-rias-growth-leaps-to-5b-of-assets-per-month-in-2017-as-schwabs-ria-robo-jumps-to-monthly-13b
8 Ibid.
9 Betterment for Advisors.com, https://www.bettermentforadvisors.com/resources/product-news/announcing-betterment-for-advisors/
10 Ibid.

Chart 7.8: Evolution of Retail Portfolio Fund Solutions



Source: Citi Business Advisory Services

allocation. This worked well in a world where fund complexes ruled and tended to have dedicated investor bases.

What is different about these products being constructed for the robo-advisory platforms is that they are wrapping an entire portfolio in a single ticker and offering all the exposures that would be required to achieve the client's desired level of diversification within that one investment product. This is the flexible packaging that underlies the MACS 3.0 products discussed back in Section III.

This new "assembly" approach described by Betterment thus far covers core beta index funds and smart beta or risk premia type factor exposures. Other robo-platforms such as Vanguard's and Schwab's (and many of the traditional asset managers launching their own robo-advisor platforms such as Fidelity) are looking to mix those passive portfolio components with actively managed strategies as part of that same bundle. Over time, many survey participants expressed a view that these bundles will also incorporate absolute return products and thus end up being a totally diversified portfolio solution.

The key to these emerging offerings is the ability to use the profiling element of their platform to download the client's risk tolerances and investment objectives and then to match those goals to one of their library of model portfolios and matching product bundles. This approach holds true whether the investor is using an automated, augmented or relationship-driven robo-advisory offering.

The impact of this shift in the engagement model on the traditional wealth advisory industry is profound.

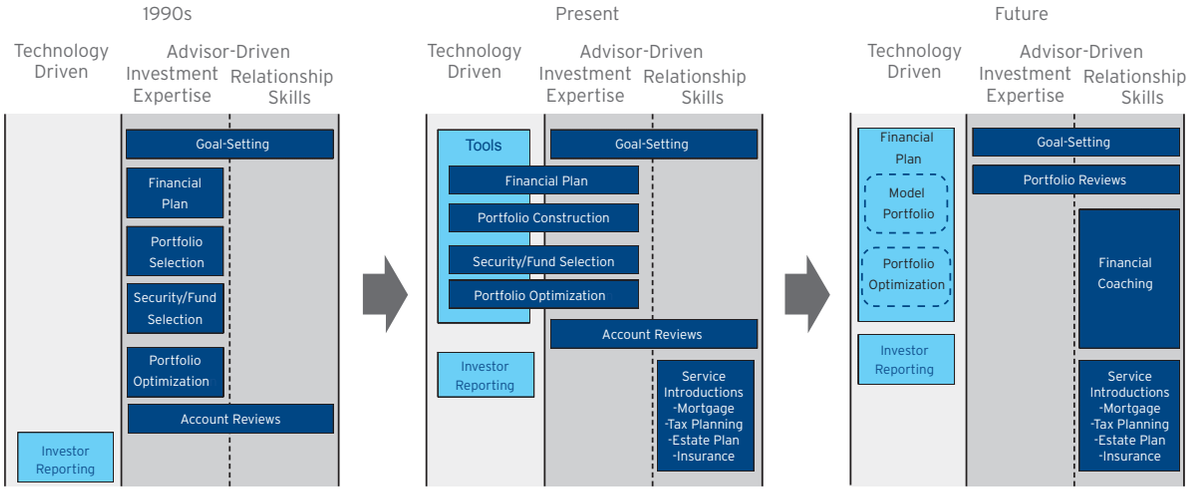
To illustrate this, we are re-introducing a model we first used in last year's report to show the impact of this emerging set of digital capabilities. This is shown in Chart 7.9.

From an industry dominated by individuals with deep financial expertise and ability to construct and manage investment portfolios, the industry is moving increasingly toward one where the advisor becomes more and more an investing "coach" that works on the behavioral aspects of investing such as getting clients not to abandon their plan while technology takes over the role of creating, executing and managing that plan more and more. Our final section in this year's report examines this extension of this digital toolkit to help automate even more of the wealth advisor's platform beyond the core portfolio functions.

"I think one of the things with respect to Robo Advisors, clients go to where you get good advice from people you trust. I think a lot of models right now are not advice driven—you put in a model and get a computation, the advice is pretty rudimentary." NAM-based Asset Manager <$500B AUM

"Very quickly people have realized that pure Robo (i.e. just an algorithm) is not sufficient for the Retail market and the service needs to be augmented with a call-center and human advice… Only 20% of the Retail market is advised, but that is 70% of the AUM. The un-advised 80% have

Chart 7.9: Service Model Impacts on Wealth Advisory Market



Source: Citi Business Advisory Services

become material balances and this will seek some type of low-cost digital advice platform. Technology will help people self-direct." Investor

Expansion of Digital Platforms Enhance the Targeting & Efficiency of Wealth Advisors

Whereas the bulk of our survey interviews in the prior two years focused on the emergence and growing interest in robo-advisory, the majority of this year's interviews focused on a new aspect of change in the wealth advisor community—the extension of the digital platform to incorporate new sales and marketing tools.

The rationale behind these new tools is that the majority of financial buyers today research potential offerings on their own given the wealth of information available on the Web and they do not contact an actual advisor until late in the sales process when their intent is fairly well determined. This is a significant change from the past when the financial advisor was seen as the expert.

When a client does engage, they want information tailored to them that speaks to their specific needs and situation. They are not looking for a generic sales pitch. As such, these tools are speeding up the move to a more relationship driven as opposed to an expertise driven model as discussed above.

The inclusion of these new offerings and how they expand the digital wealth advisor platform are highlighted in Chart 7.10.

Marketing automation platforms (MAPS) are being used to better track, attract and convert inquiries into sales opportunities. There are several components to these platforms.

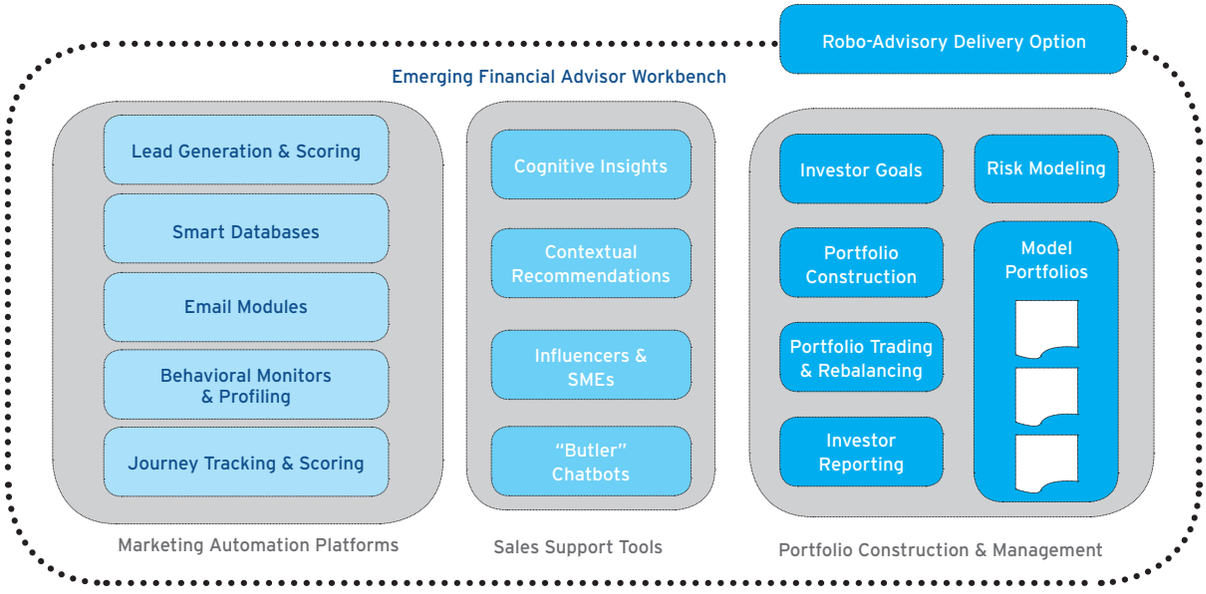
Lead generation and scoring is an activity that relies on users offering up increasingly more personal information to get at content that the advisory firm "gates" behind data collection screens. These are typically downloadable documents including white papers, primers, and product overviews. Once a visitor to the firm's website fills in any information, they are entered into a smart database that then begins to release more targeted communications to the individual via emails (one of the first data items collected) that direct them back to the marketing pages.

These marketing pages have behavioral monitors built into the page scripts to collect information on where the user clicks, how long they spend on each type of content and how they navigate through the information. All of this information feeds into pre-defined profiles of how to more precisely target the delivery of information to that type of client based on how similar clients have responded in the past. Each progressive step that the visitor takes in consumption of the marketing is viewed as upping their "score".

This progression of marketing contacts is measured as if it is a "journey" from an interested outsider to a potential client. The final stage of the journey is shifting from electronic to human engagement. This means that the advisor is not brought into the process until the visitor's behaviors have demonstrated enough interest as to provide a high level of certainty that they are ready to transition to a sales relationship.

Sales support tools take the information gathered by the digital marketing tools and enrich that data for the financial advisor. All of the profile information

Chart 7.10: Emerging Financial Advisor Workbench



Source: Citi Business Advisory Services

gathered during the marketing phase is synthesized for the advisor so that they know what information the individual was most interested in and this profile is then supplemented by cognitive insights, a type of advanced analytics that "add intelligence to data by reasoning, predicting and providing recommendations."[11]

The goal of this cognitive analysis is to prompt the advisor with the right information at the right time to suit that particular client. These insights help the advisor enter the discussion knowing what worked successfully with clients that appear to have similar behaviors and as such, allow for flexibility in the relationship.

Some clients are ready to act based on their own pre-work, whereas others respond well to expert advice and this would prompt the advisor to bring in product or service experts or other influencers that can shape the client's views and spur their interest. Other clients prefer to make their own decisions and in those cases the sales support tools will offer up electronic "butlers" or chatbots to engage with the client as if they were an advisor. The goal of the entire toolkit is improve the advisors' likelihood of getting the client to buy their products and services as well as promote more cross-selling or up-selling.

More so than any of the other innovations discussed in this section, this emerging approach to sales and marketing is the strongest signal yet that the industry is moving toward a period of mass customization.

"The degree to which firms can offer a lower-cost, more standardised, more scalable solution to mass retail/affluent will be a key element. Some robo-like capabilities are a critical component because the cost of servicing that segment in traditional ways is too high." Global Asset Manager >$1T AUM

"Outside of performance, what will set managers apart will be the service model: the ability to customize as much as possible to the client rather than the channel. This is where digital comes into it. You already see this in other industries where you choose when and where you have your Amazon package delivered for instance." EMEA-based Asset Manager $500B-$1T AUM

"For now a D2C robo business is not going to work for us and would create a lot of friction with our distribution partners. We are working on a B2B model working on applications for our advisors to support them on dealing with their clients. I think a substantial part of our business will be generated like this in the future." EMEA-based Asset Manager $500B-$1T AUM

11 "Evolving Customer Acquisition: How Cognitive Insights Help Shape Marketing Campaigns and Target Leads", IBM Decoding Cognitive Business Series, https://www.ibm.com/watson/advantage-reports/cognitive-business-lessons/customer-acquisition.html

Conclusion

Playbacks of last year's report were marked by a sense of frustration and disappointment from many traditional long only active investment managers. The tipping point on flows out of actively-traded and into passively-traded funds that occurred back in 2015 was starting to feel like more than just a cyclical response to the low return environment. The thesis we laid out about investors looking for a low cost, passive core for their portfolio around which they would use active management to augment their performance was seen as a threat for many firms that had built their franchise around a relative performance approach to investment management.

Signs of a slightly more promising investment landscape in recent months helped to revive some hopes that active fund management could rebound strongly. While there has indeed been some improvement in returns, the overall trajectory of flows out of active and into passive has not yet reversed or even slowed. Net new flows into passive are on track for a record year and if current trends continue could top $800 billion in 2017 and outflows from actively managed funds look to be on track for their 3rd year straight of $400 billion plus declines.

The penetration and growth of passive products, particularly ETFs, is not occurring evenly across the globe, however, and there are still many markets where the opportunities offered by active management are in high demand.

Moreover, some caution is beginning to emerge as investors worry about the potential of ETFs to play an outsized role in a major market correction or liquidity event. While we do not anticipate more than temporary dislocations linked to order backlogs that could delay normal arbitrage activities, there could be more focus on this to dampen interest in the coming months as concerns about a potential event across survey participants was high.

Yet, instead of focusing this year's report on those firms that are hoping for a return to the more traditional asset management landscape of the past, we instead have focused on those that are rising to the challenge and re-thinking their approach to active management for the future. These firms are creating new types of products that fulfill the role of augmenting a low cost, passive core.

Some of these products operate on the boundary of the active-passive divide or incorporate elements of both active and passive. Some of these products look to mix asset class or factor exposures in new ways across multi-asset class solutions. Some shift the investment framework to focus on themes or expanded returns such as societal alpha and some look to incorporate insights or exposure to private companies as IPO interest is down and more firms are choosing to stay private longer. The common thread of all these efforts is a willingness to be flexible and re-think what active management can become.

To enable that flexibility, we highlighted the changes in the manufacturing, packaging and distribution landscape that are occurring. New technologies are transforming this entire lifecycle and those firms that are adapting are finding new opportunities and approaches. Change is afoot across the entire industry and through this annual industry evolution series we hope to help our clients think about their own options and paths forward.

As we do each year, we would like to close by thanking those that participated in our interviews and shared their insights that make this overview of the industry possible. We on the Citi Business Advisory Services team look forward to working with you and discussing these findings. For those with questions about the report or who would like to use any of our data or models in your own work, please reach out to your Citi relationship manager, salesperson or contact us directly at Business.Advisory@citi.com.