ADDENDUM

VIEWPOINT

ADDRESSING MARKET LIQUIDITY:
A Broader Perspective on Today's Bond Markets

OCTOBER 2016 (UPDATED AND RE-ISSUED)

BLACKROCK®

We have recently become aware of a significant change in the Federal Reserve's Z.1 "Financial Accounts of the United States" data, which impacts some of the figures in our *ViewPoint* titled "Addressing Market Liquidity: A Broader Perspective on Today's Bond Markets", published in February 2016. Our publication referenced data published by the Federal Reserve in its December 2015 Z.1 "Financial Accounts of the United States" Statistical Release (December 2015 Fed Z.1 Release). As of June 2016, the Federal Reserve corrected its methodology for calculating the holdings of debt securities by open-end mutual funds. Specifically, the December 2015 Fed Z.1 Release did not account for bonds that had matured and, therefore, overstated debt holdings by mutual funds. The Fed Z.1 Data releases in June 2016 and September 2016 utilize a new methodology that takes into account matured bonds to more accurately reflect the value of bond holdings.* In addition to changing the data prospectively, the Federal Reserve restated historical data using the updated methodology in the June 2016 release and the subsequent release in September 2016.

The corrected data shows that holdings of corporate and foreign bonds by open-end mutual funds had previously been overstated. Further, the growth in the proportion of corporate and foreign bonds held by open-end mutual funds has been more muted than previously believed. Exhibit A.1 highlights some of the key differences in the data. For example**, the corrected data show that the share of corporate and foreign bonds held by open-end mutual funds has been *stable* at 17% since 2013**. This is in contrast to the original data, which showed that corporate and foreign bonds held by open-end mutual funds increased from 20% of the total included in the Z.1 Data in 2013 to 24% in 2015. While the proportion of corporate and foreign bonds held by open-end mutual funds is smaller than previously estimated, the total amount of corporate and foreign bonds included in the Fed Z.1 Data remains roughly unchanged. Offsetting the smaller holdings by open-end mutual funds are greater holdings by rest of world and households and nonprofit organizations.

While the changes to the data do not materially alter the observations and conclusions we included in the original publication of this *ViewPoint*, they do underscore the importance of understanding the entire financial market ecosystem, as open-end mutual funds represent an even smaller proportion of today's bond markets than previously believed. We commend the Federal Reserve for updating its methodology to improve the accuracy of its data. On the following page, we provide a comparison of relevant exhibits included in our original publication using the old and new datasets. We encourage policy makers to review previously held assumptions regarding the role of open-end mutual funds in today's bond markets and to update those assumptions, where necessary, according to the changes to the Federal Reserve's data.

Exhibit A.1: KEY CHANGES TO FEDERAL RESERVE Z.1 DATA ON BOND HOLDINGS OF OPEN-END MUTUAL FUNDS

	December 2015 Release *(Original)*	September 2016 Release *(Corrected)*
Corporate & Foreign Bond Holdings by Open-End Mutual Funds as of Sep. 2015	$2.6 trillion	$1.8 trillion
Total Corporate & Foreign Bonds Included in Fed Z.1 Data	$10.8 trillion	$10.7 trillion
% of Z.1 Corporate & Foreign Bonds Held by Open-End Mutual Funds	24%	17%
Growth in % of Z.1 Corporate & Foreign Bonds Held by Open-End Mutual Funds		
From Dec. 2013 to Sep. 2015	4% increase	0% change
From Dec. 2006 to Sep. 2015	14% increase	8% increase
From Dec. 2000 to Sep. 2015	17% increase	9% increase

Data excludes MBS and other ABS. For consistency with the original publication of this *ViewPoint*, all figures above are as of Sep. 30, 2015.

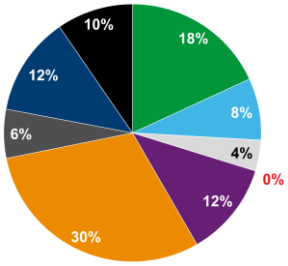
* Shelly Antoniewicz, ICI, Revised Fed Data Show Mutual Funds' Share of Corporate Bond Market Is Small and Stable (Aug. 26, 2016), available at https://www.ici.org/viewpoints/ci.view_16_corporate_bond_share.print.

The opinions expressed are as of October 2016 and may change as subsequent conditions vary.

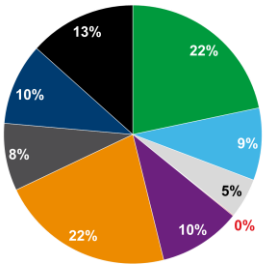
Exhibit A.2: COMPARISON OF EXHIBIT 8 USING CORRECTED AND ORIGINAL FED Z.1 DATA

CORRECTED DATA: CORPORATE AND FOREIGN BONDS

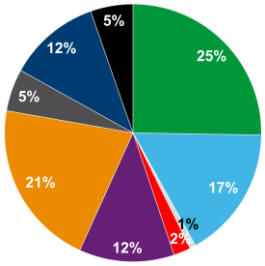
Breakdown of Corporate and Foreign Bond Holders in 2000 (total = $5T)



Breakdown of Corporate and Foreign Bond Holders in 2006 (total = $7T)

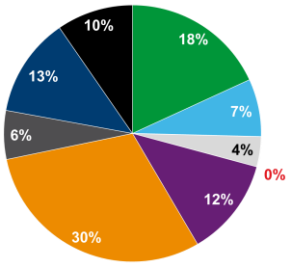


Breakdown of Corporate and Foreign Bond Holders in 2015 (total = $11T)

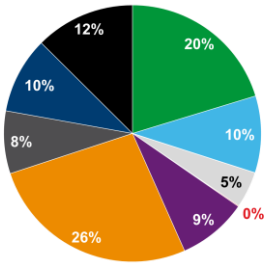


ORIGINAL DATA: CORPORATE AND FOREIGN BONDS

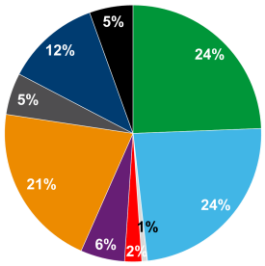
Breakdown of Corporate and Foreign Bond Holders in 2000 (total = $5T)



Breakdown of Corporate and Foreign Bond Holders in 2006 (total = $8T)

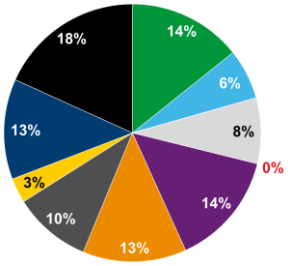


Breakdown of Corporate and Foreign Bond Holders in 2015 (total = $11T)

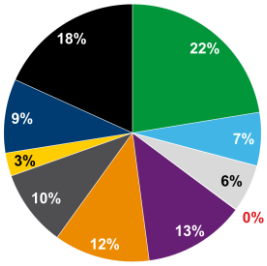


CORRECTED DATA: TOTAL DEBT SECURITIES

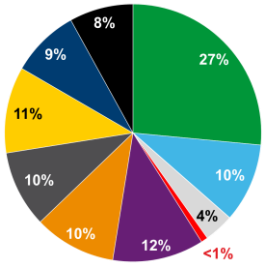
Breakdown of Total Debt Holders in 2000 (total = $16T)



Breakdown of Total Debt Holders in 2006 (total = $27T)

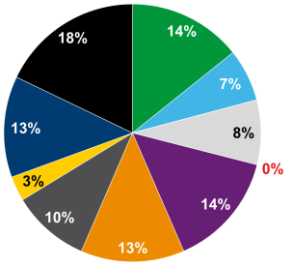


Breakdown of Total Debt Holders in 2015 (total = $39T)

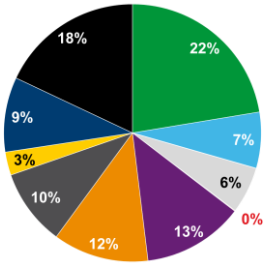


ORIGINAL DATA: TOTAL DEBT SECURITIES

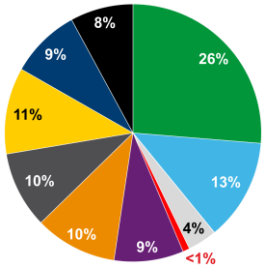
Breakdown of Total Debt Holders in 2000 (total = $16T)



Breakdown of Total Debt Holders in 2006 (total = $27T)



Breakdown of Total Debt Holders in 2015 (total = $39T)



- Rest of World[b]
- US Monetary Authority[c]
- Insurers[d]
- Money Market Funds
- Open-End Mutual Funds[e]
- Private Depository Institutions[f]
- Households & Nonprofit Organizations[g]
- Private and Public Pension Funds[h]
- Other[i]
- ETFs

See notes on page 8. Totals may not equal exactly 100% due to rounding. Source: Fed Z.1 Data. As of Sep. 30, 2015. Available at http://www.federalreserve.gov/releases/z1/Current/z1.pdf.

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A Broader Perspective on Today's Bond Markets

FEBRUARY 2016

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Over the past few years, much has been written about bond market liquidity.[1] Most of the reports cite some combination of various sets of data, including: (i) the decline in broker-dealer inventories, (ii) the decline in turnover by comparing the amount of bonds outstanding to bond trading volumes from FINRA's Trade Reporting and Compliance Engine (TRACE) in the US, (iii) the increase in corporate bond issuance, and (iv) the growth of open-end bond mutual funds. Often these reports express concern regarding what might happen when market sentiment changes. **While the data cited are factually accurate and reflect structural changes occurring in the bond markets, these discussions do not present a complete picture of bond market participants or innovations that are supplementing traditional means of obtaining market liquidity**. In particular, there is seldom any discussion around the myriad of unrelated investment objectives and constraints that drive bond holder behavior in disparate ways, making market participants unlikely to react to changing market conditions in the same way. Further, the dialogue has not fully acknowledged the growing role of bond exchange-traded funds (ETFs) as a source of bond market liquidity.

This *ViewPoint* is a continuation of previous publications addressing market liquidity and the ownership of the world's financial assets.[2] Building on these reports, this paper integrates data we have known about for a long time (e.g., bond ownership by pensions and insurers) with newer data that highlights structural changes to bond market liquidity. The purpose of this paper is not to suggest that market liquidity challenges should be ignored; to the contrary, it is imperative that market participants adapt to the changing market dynamics. That said, appropriate conclusions about systemic risks that could arise from changes to market liquidity cannot be drawn without a more complete picture of the current ecosystem. Synthesizing the new data with the old data provides a more comprehensive foundation for this discussion.

In this *ViewPoint*

KEY OBSERVATIONS

The data shows that bond markets are undergoing a structural change to liquidity…

1. Broker-dealer inventories have declined as dealers reduce balance sheet risk.
2. Bond turnover (trading volume as currently measured divided by outstanding debt) has declined.
3. Record corporate bond issuance reflects cheap money.

However, this is only a partial picture of the current fixed income ecosystem...

1. Many asset owners have unrelated objectives and constraints that drive their behavior in disparate ways, suggesting that market participants are unlikely to react to changes in market conditions in the same way.
2. While bond ownership by open-end mutual funds and ETFs has grown, the majority of fixed income assets are owned by other types of asset owners such as pensions, insurers, and official institutions.
3. Liquidity is not "free": the cost of liquidity can increase when immediacy is needed or when market liquidity is scarce. While increased liquidity costs reduce investment returns, this represents market risk not systemic risk.
4. Market participants are adapting to changes in market liquidity and regulators are addressing liquidity risk management.
5. Bond turnover data omits critical elements of today's bond market structure. The growth of bond ETFs and secondary market trading of bond ETF shares are important new developments.

A more complete understanding of the fixed income ecosystem, its participants, and its ongoing evolution is needed.

Prevailing Dialogue

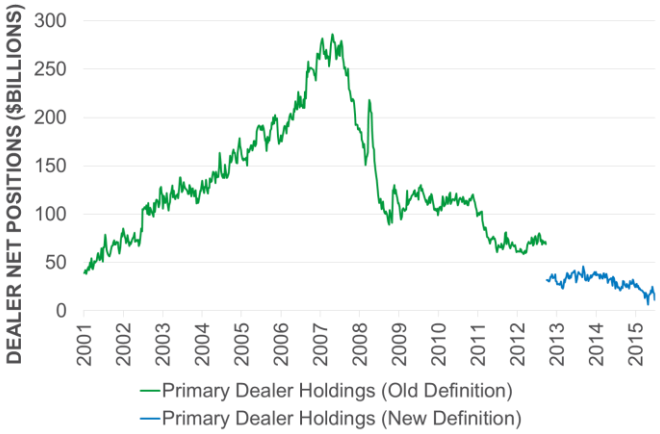
The data in Exhibits 1 through 5 have been frequently cited in reports addressing bond market liquidity. We include them here as part of the complete picture.

Many commentators have noted the reduced risk appetite of dealers post-Crisis as they re-evaluate their business models, particularly in light of the myriad of new banking regulations. Exhibit 1 shows the buildup in dealer inventories leading up to the 2008 Financial Crisis (the Crisis), and the subsequent decline in inventories since 2008. Notably, the methodology for calculating dealer corporate bond inventory changed in April 2013 to exclude non-agency MBS, which is included in the data prior to April 2013.[3] A Goldman Sachs analysis found that the methodology used prior to April 2013 overstates the decline in pre-Crisis inventories because it includes non-agency MBS holdings.[4]

Exhibit 2 shows the increase in US corporate bond issuance. As you can see, issuance dipped in 2008 and has rebounded strongly in the post-Crisis years. During the Crisis, a number of companies faced a challenge in rolling over commercial paper, which has led a number of corporate treasurers to extend the term of their debt by issuing bonds to retire commercial paper. In addition, given accommodative monetary policies that have kept interest rates extraordinarily low, many companies have taken advantage of low rates to borrow cheaply. Some corporations have even used this cheap money to fund stock repurchase programs.

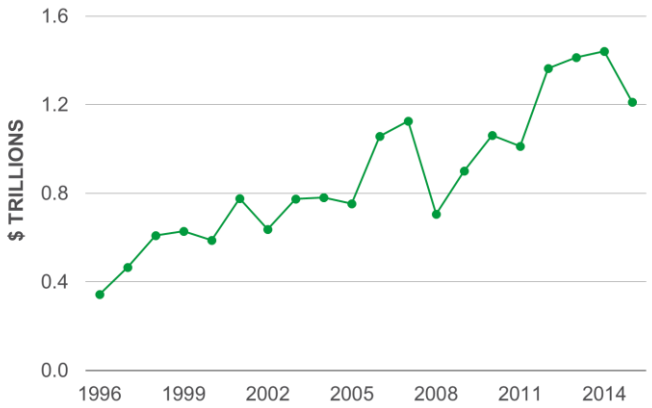
Exhibits 3 and 4 combine TRACE data (which captures the secondary trading volume of individual bonds in the US) with the amount of bonds outstanding to create a turnover ratio for investment grade and high yield bonds, respectively. As these charts highlight, **both the numerator (secondary trading volume) and the denominator (bonds outstanding) have increased since the Crisis**; however, since the amount of bonds outstanding have increased more significantly, the bond turnover ratio has declined. While this data is US-focused, European policy makers are looking to implement

Exhibit 1: DEALER INVENTORY OF CORPORATE BONDS



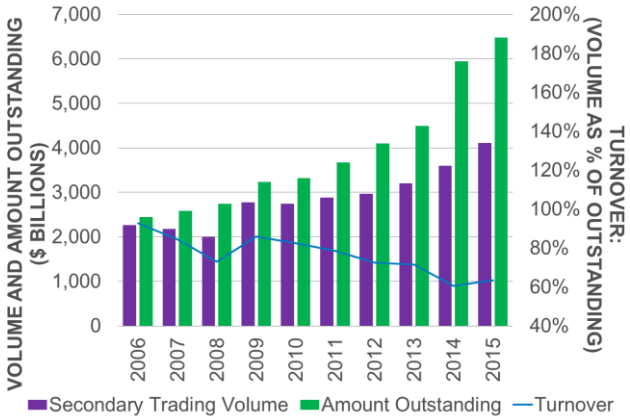
Source: New York Federal Reserve, Haver Analytics. As of Dec. 31, 2015. Prior to April 2013, the primary dealer corporate bond positions data included non-agency RMBS and CMBS.

Exhibit 2: ANNUAL US CORPORATE BOND ISSUANCE



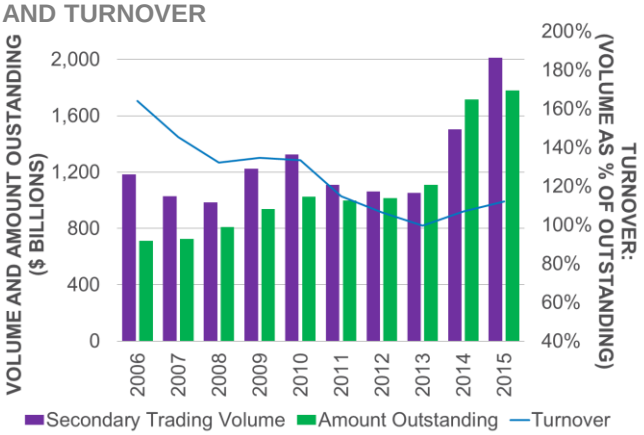
Source: SIFMA. As of Q3 2015.

Exhibit 3: US INVESTMENT GRADE: VOLUME, OUTSTANDING, AND TURNOVER



Source: MarketAxess. As of Dec. 31, 2015.

Exhibit 4: US HIGH YIELD: VOLUME, OUTSTANDING, AND TURNOVER

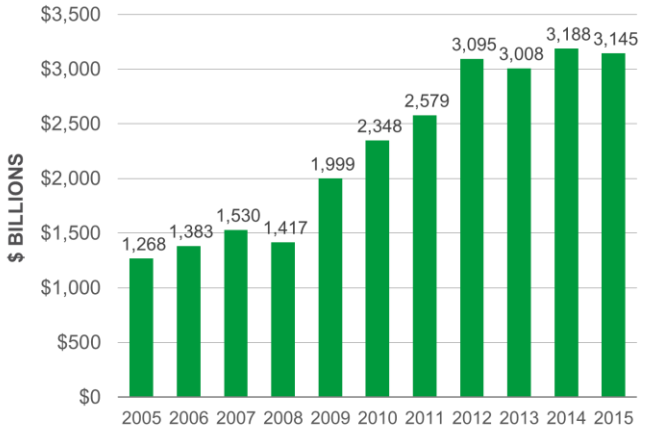


Source: MarketAxess. As of Dec. 31, 2015.

reporting requirements that will allow for similar data analyses in the EU.[5] Further, the European Commission will review the functioning of the EU corporate bond markets, focusing on market liquidity and developments, as part of the ongoing Capital Markets Union initiative.[6]

Exhibit 5 completes the current conversation by showing the growth of US open-end bond mutual fund assets under management (AUM), reflecting a variety of active and passive investment strategies including long-term, short-term, and intermediate-term bonds as well as corporate bonds, municipal bonds, and a number of other strategies.

Exhibit 5: US Open-End Bond Mutual Fund AUM



Source: SimFund. As of Dec. 31, 2015. This universe is comprised of open-end bond mutual funds as defined by SimFund. Excludes fund of funds, ETFs, and unit investment trusts (UITs). Does not capture multi-asset funds that may invest part of their AUM in bonds.

While all of these charts provide relevant pieces of information, they reflect only a partial view of today's bond market ecosystem, meaning that they are not sufficient to draw conclusions about risks to the financial system. Rather, they reflect structural changes to market liquidity that are encouraging market participants to evolve their technology and processes. As we described in our July 2015 *ViewPoint* "Addressing Market Liquidity," BlackRock and other asset managers have been adapting to a new normal for several years. For example, we have made substantial investments to enhance our trading capabilities through building new technologies and tools and changing our behavior to help effectively obtain liquidity on behalf of our clients. Likewise, many of our portfolio managers have adapted their portfolio construction processes to account for changes to market liquidity, and our risk management team has built new tools and enhanced its monitoring of liquidity risk in BlackRock-managed portfolios. While not all market participants have necessarily made changes in recent years, there is an increasing recognition that adapting is necessary as structural changes are here to stay. Recent events have demonstrated that an inability or unwillingness to adapt and manage liquidity through thoughtful portfolio construction, robust trading capabilities, and prudent risk management can lead to problematic outcomes, particularly when managing portfolios with daily redemption features.[7] BlackRock has advocated for changes to ensure that all market participants and the market structures that support bond markets can evolve to address these challenges. In our July 2015 *ViewPoint*, we recommended a three-pronged approach:

(i) **Market structure modernization**: Encourage evolution of market structure to better reflect current dynamics.

(ii) **Enhance fund "toolkit" and regulation**: Endorse best practices for liquidity risk management and expand fund toolkit to address concerns about fund redemption risk.

(iii) **Evolution of new and existing products**: Support the development and adoption of new and existing products that help market participants address challenges associated with changes in fixed income markets.

With respect to market structure, market participants have increasingly looked for ways to become more efficient at aggregating fragmented sources of liquidity and to find smarter solutions to execute trades. This has resulted in increased interest in electronic trading platforms and a series of new platforms have emerged, offering a variety of trading protocols. We believe the market will continue to test new platforms and that the offerings will evolve and consolidate as market participants determine the optimal trading methods and the best business models for their trading needs.

In addition to changes by market participants, policy makers are recognizing the need to study fixed income market structure. For example, the US Treasury recently issued a request for comment on US Treasury market structure.[8] Further, regulators have taken action to enhance fund regulation. For example, European policy makers introduced rules for alternative investment funds post-Crisis.[9] Likewise, the SEC issued a series of proposals to modernize regulations for US mutual funds to account for today's environment.[10] Additionally, the International Organization of Securities Commissions (IOSCO) recently reiterated the importance of having liquidity management tools available to funds and performed an analysis that compares the tools available to funds in different jurisdictions around the world.[11]

Distinguishing Market Risk from Systemic Risk

In the context of enhancing the resiliency of fund structures to account for market liquidity challenges, some observers have connected this set of issues with the potential for systemic risk to arise due to large-scale and correlated redemptions from open-end mutual funds. The concern raised is that as accommodative monetary policies are unwound, increased bond holdings by these funds could cause them to be unable to meet redemptions and potentially lead to contagion and systemic risk.[12] While concerns about the resiliency of mutual fund structures should be addressed, it is important to distinguish market risk from systemic risk. For example, inherent in the price of all fixed income assets is the notion

that obtaining liquidity from the market entails a cost – in other words, liquidity is never "free". When market participants demand liquidity with immediacy, the cost of liquidity may be higher, particularly if immediacy is demanded during environments in which liquidity is scarce. This can lead to investment losses for some investors and, at the same time, relative value opportunities for market participants who can buy assets being sold at a discount. As we observe the beginning of the US Federal Reserve's trajectory to move away from extraordinary monetary policies amidst significant volatility related to a variety of macroeconomic factors, it is clear that there will be many winners and losers as asset valuations change. This reflects market risk, not systemic risk.

When considering potential systemic risks, it is important to understand the behavior of various asset owners who may be buyers if mutual funds become net sellers of bonds. As we have seen over time, there are many market participants who respond to changes to market conditions differently and mutual funds do not participate in the capital markets in isolation. We recently witnessed this phenomenon during the high yield market volatility in December 2015. While mutual fund investors redeemed $9.6 billion from high yield bond funds that month,[13] several institutional clients added to their high yield allocations, viewing the sell-off as an attractive buying opportunity. As this discussion demonstrates, focusing solely on the growth of open-end mutual funds provides an incomplete picture of market behavior in response to changes to market conditions. As such, we believe the dialogue around systemic risk and changes to market liquidity would benefit from a more comprehensive picture of the diverse set of participants within the bond market ecosystem.

In our May 2014 *ViewPoint* entitled "Who Owns the Assets? Developing a Better Understanding of the Flow of Assets and the Implications for Financial Regulation," we highlight different investment objectives and constraints of various types of asset owners. These objectives and constraints reflect important context because they arise due to a variety of uncorrelated factors including: return objectives, risk tolerance, tax status, regulatory regime, time horizon, liquidity needs, and liability structure. These factors are central to asset owner investment decisions and the overall investment strategies asset owners pursue. For example, taxable investors must consider tax liabilities that will be incurred when they sell securities. Oftentimes, this incentivizes taxable investors to employ lower velocity strategies. In contrast, tax exempt investors may pursue more active investment strategies.

As we explain in the following sections, today's bond market ecosystem includes a diverse set of asset owners with a variety of investment objectives and constraints. We believe this diversity of participants in the bond market challenges notions of the potential for *all* market participants to exhibit the same behavior at the same time in response to changes to market risk factors. Clearly, structural changes to liquidity create market risks to which investors need to adapt. The case for systemic risk, however, is unclear when asset owners and other data are factored into the discussion.

Bond Ownership & Growth of Outstanding Debt

Federal Reserve Z.1 "Financial Accounts of the United States" data (Fed Z.1 Data) is broadly recognized as a useful data set. Fed Z.1 Data provides a historical perspective on debt holders and how the mix of ownership has changed over time. The Fed Z.1 Data includes aggregate balance sheet data for US asset holders and foreign holders of US debt that is collected on a quarterly basis. This data is produced using a top-down approach that looks at the flow of funds within the US and between the US and other countries.

Exhibit 6 shows a historical time-series of total debt ownership by asset holders in the Fed Z.1 Data, including insurers, households and nonprofit organizations, private and public pensions, open-end mutual funds, and a category of investors called "rest of world". As shown in Exhibit 6, total debt holdings by each of these types of entities have increased significantly since 2000. Specifically, holdings of debt securities by these entities were collectively approximately $16 trillion as of the first quarter of 2000 and have more than doubled to approximately $39 trillion as of the third quarter of 2015. The overall growth in debt holdings reflects the significant increase in debt outstanding over the last several years. **As Exhibit 6 shows, the prevailing dialogue is focused on approximately $5 trillion (debt securities held by open-end mutual funds[14] and ETFs) out of approximately $39 trillion of debt securities included in the Fed Z.1 Data.**

Pension funds and insurance companies have consistently held large portions of outstanding debt with $5.7 trillion of collective debt holdings in 2006 growing to $7.5 trillion in 2015. Private depository institutions and households and nonprofit organizations have consistently been large holders of debt securities with $3.8 trillion and $3.4 trillion, respectively, as of the third quarter of 2015. As described in more detail in the following section, each of these asset owners has different needs for income as well as different regulatory, accounting, tax, and other constraints.

By far, the largest increase in overall debt holdings is reflected in the "rest of world" category, which increased from $2 trillion in 2000 to over $10 trillion in 2015. "Rest of world" consists of all entities (firms, institutions, governments, and individuals) not residing in the US that hold US debt securities.[15] Looking at Federal Reserve Foreign Holdings of US Securities data, the increase in rest of world holdings of corporate bonds has been predominantly in the non-US private sector, whereas the increase in rest of world holdings of US Treasuries has been mostly driven by foreign official sector holdings.[16] Note that the data analysis in this *ViewPoint* is US-focused given that the Fed Z.1 Data is produced by the US Federal Reserve. Similar analysis could be undertaken in other regions, subject to data availability.

The graphs in Exhibit 7 drill into the data from Exhibit 6 to examine the composition of owners of corporate and foreign bonds and US Treasuries. The composition of bond holders over time differ materially between the corporate and foreign bond markets and the US Treasury markets. Exhibit 8 provides a different view of the graphs shown in Exhibits 6 and 7, showing percentages of the Fed Z.1 Data owned by each asset holder at three points in time: 2000, 2006, and 2015. As shown in Exhibit 8, 42% of US Treasuries in the Fed Z.1 Data are held by the rest of world holders today. Rest of world holders comprise 24% of corporate and foreign bond holdings in this sample as of the third quarter of 2015. Another category of asset holder that has increased its holdings of bonds over time is open-end mutual funds. This increase in ownership has sparked significant inquiry and we specifically address changes in mutual funds starting on page 11. As illustrated in Exhibit 8, open-end mutual funds have increased their relative share of debt holdings from 7% in 2000 to 13% in 2015. This is driven primarily by larger holdings in corporate and foreign bonds. Open-end mutual funds comprised 7% of corporate and foreign bond holdings in 2000, compared to 24% in 2015. These shifts reflect the evolution and adaptation of various types of investors and investment strategies. For example, given the size of quantitative easing (QE) programs and the focus of those programs on high quality asset purchases, many investors have shifted allocations from US Treasuries and mortgages to corporates, as the opportunity-set for investments in the former has declined. The evolution of bond markets is also reflected in the growth of bond ETFs. While bond ETFs have been and continue to be a very small category of bond holders, the trading volumes of bond ETFs have increased significantly in recent years. In our discussion of bond ETFs on page 12, we explain how ETFs work. One of the key features of bond ETFs is the trading of ETF shares on an equity exchange. Importantly, this secondary market activity for ETF shares does not require transactions in the underlying bonds.

Exhibit 6: HOLDERS OF DEBT SECURITIES

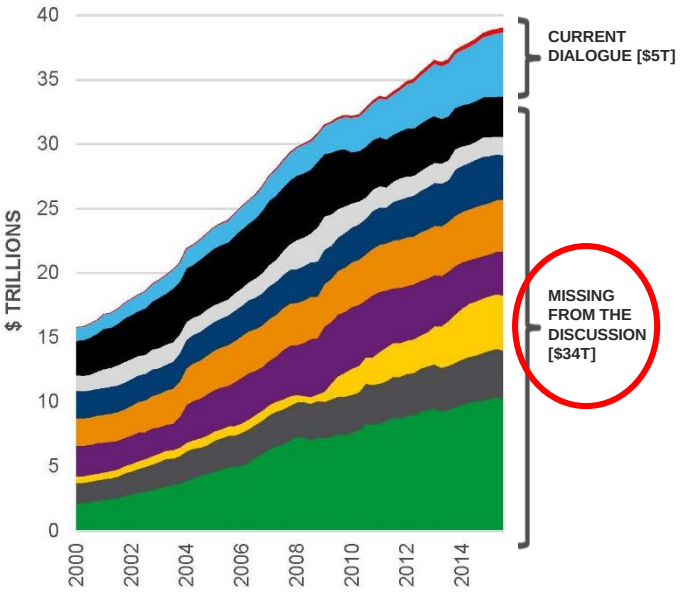
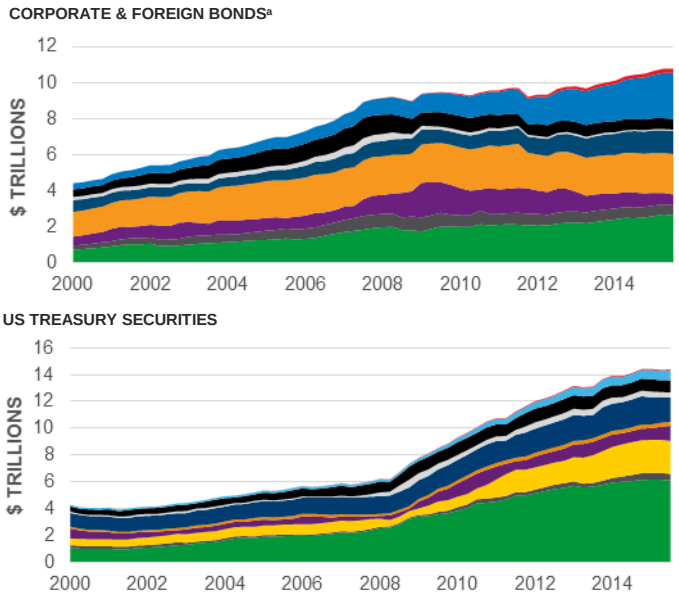
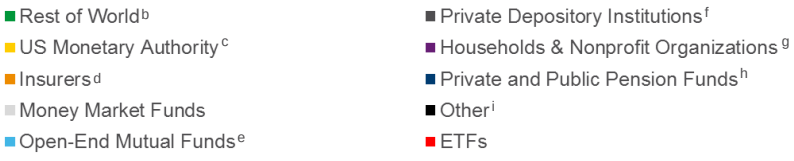


Exhibit 7: CORPORATE & FOREIGN BONDS AND US TREASURIES





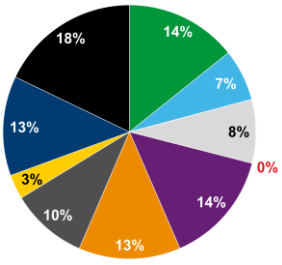
Notes:
Source: Fed Z.1 Data. As of 3Q15. Available at http://www.federalreserve.gov/releases/z1/Current/z1.pdf.

a) Excludes MBS and other ABS.
b) "The rest-of-the-world sector consists of all entities (individuals, firms, institutions, and governments) not residing in the United States that engage in transactions with U.S. residents"…"transactions exclusively among foreigners are not included."
c) US Monetary Authority includes "assets of Federal Reserve Banks and Treasury monetary accounts that supply or absorb bank reserves. Excludes the accounts of the Federal Reserve Board."
d) Includes life insurers and property & casualty insurers.
e) Does not include money market funds or ETFs.
f) Private depository institutions includes US chartered depository institutions, foreign banking offices, banks in US-affiliated areas, and credit unions.
g) Households & Nonprofit Organizations includes "domestic hedge funds, private equity funds, and personal trusts".
h) Includes defined contribution and defined benefit plans.
i) Other includes Nonfinancial Corporate Business, Nonfinancial Noncorporate Business, Federal Government, State & Local Governments (ex. retirement funds), Closed-End Funds, Government-Sponsored Enterprises, Issuers of ABS, Finance Companies, REITs, Security Brokers and Dealers, Holding Companies, Funding Corporations.

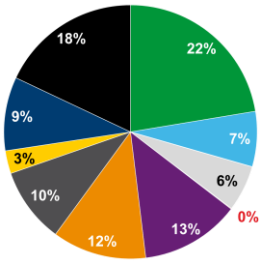
Exhibit 8: BREAKDOWN OF DEBT HOLDERS IN 2000, 2006, AND 2015 IN FED Z.1 DATA

TOTAL DEBT SECURITIES

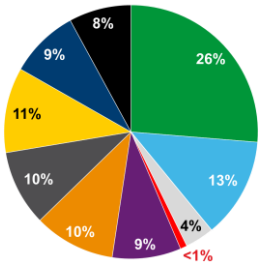
Breakdown of Debt Holders in 2000
(total = $16T)



Breakdown of Debt Holders in 2006
(total = $27T)

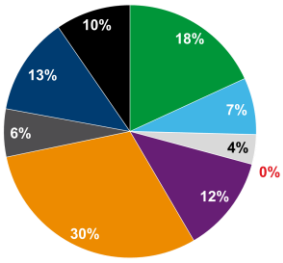


Breakdown of Debt Holders in 2015
(total = $39T)

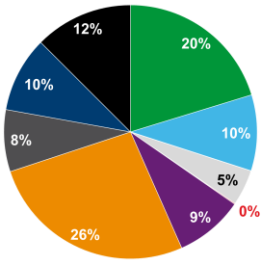


CORPORATE AND FOREIGN BONDS[a]

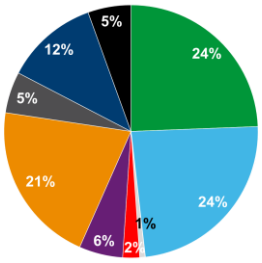
Breakdown of Corporate and Foreign Bond Holders in 2000
(total = $5T)



Breakdown of Corporate and Foreign Bond Holders in 2006
(total = $8T)

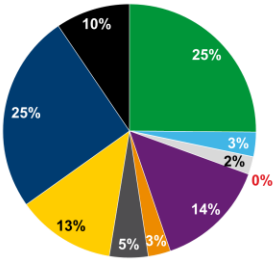


Breakdown of Corporate and Foreign Bond Holders in 2015
(total = $11T)

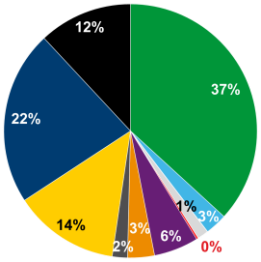


US TREASURY SECURITIES

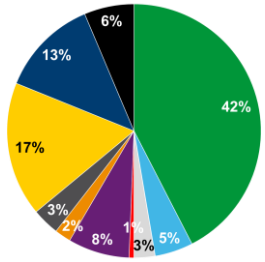
Breakdown of Treasury Securities in 2000
(total = $4T)



Breakdown of Treasury Securities in 2006
(total = $6T)



Breakdown of Treasury Securities in 2015
(total = $14T)



- Rest of World[b]
- US Monetary Authority[c]
- Insurers[d]
- Money Market Funds
- Open-End Mutual Funds[e]
- Private Depository Institutions[f]
- Households & Nonprofit Organizations[g]
- Private and Public Pension Funds[h]
- Other[i]
- ETFs

Notes:
Source: Fed Z.1 Data. As of 4Q00, 4Q06, and 3Q15. Available at http://www.federalreserve.gov/releases/z1/Current/z1.pdf. Note that pie charts sum to 100% of Fed Z.1 Data. This is not entirely comprehensive given that rest-of-world only includes foreign ownership of US debt and does not include foreign ownership of non-US debt.

a) Excludes MBS and other ABS.
b) "The rest-of-the-world sector consists of all entities (individuals, firms, institutions, and governments) not residing in the United States that engage in transactions with U.S. residents"…"transactions exclusively among foreigners are not included."
c) US Monetary Authority includes "assets of Federal Reserve Banks and Treasury monetary accounts that supply or absorb bank reserves. Excludes the accounts of the Federal Reserve Board."
d) Includes life insurers and property & casualty insurers.
e) Does not include money market funds or ETFs.
f) Private depository institutions includes US chartered depository institutions, foreign banking offices, banks in US-affiliated areas, and credit unions.
g) Households & Nonprofit Organizations includes "domestic hedge funds, private equity funds, and personal trusts".
h) Includes defined contribution and defined benefit plans.
i) Other includes Nonfinancial Corporate Business, Nonfinancial Noncorporate Business, Federal Government, State & Local Governments (ex. retirement funds), Closed-End Funds, Government-Sponsored Enterprises, Issuers of ABS, Finance Companies, REITs, Security Brokers and Dealers, Holding Companies, Funding Corporations.

Central Bank Activity

Central banks, including the Federal Reserve Board (FRB) and the European Central Bank (ECB) have impacted bond markets in multiple ways. First, as shown in Exhibit 9, central bank balance sheets have grown considerably. The QE programs of the FRB, the ECB, and the Bank of Japan (BoJ) have involved substantial asset purchases. For example, between September 2008 and December 2015, the FRB balance sheet has increased in size from $862 billion to nearly $4.5 trillion through purchases of over $1.7 trillion in mortgage-backed securities and nearly $1.9 in Treasuries and the FRB continues to reinvest principal.[17] In January 2015, the ECB announced its QE program which was extended in December 2015.[18] Recent statements by ECB President Mario Draghi suggest plans to further extend this easing program.[19] Given the magnitude of these programs, ECB purchases of sovereign bonds exceed new issue volume.[20] Similarly, the Bank of England (BoE) introduced QE in 2009 and adopted further QE measures in 2011 and 2012.[21] In December 2015, the BoJ introduced supplementary measures for its QE program, including extending the average remaining maturity of Japanese government bond purchases and establishing a new program for purchases of ETFs.[22] In January 2016, the BoJ introduced QE with a negative interest rate.[23]

In addition to growing the size of the central banks' balance sheets, asset purchase programs introduce distortions by reducing the supply of the safest and most liquid assets and altering the opportunity set for other fixed income investors. Some have referred to this phenomenon as "crowding out" of the private sector by government purchases of the safest assets.[24] This is, in part, why we observe an ownership shift with private investors owning a higher percentage of corporates, given the reduced opportunity set and concurrent new issuance of corporate bonds. Finally, this dynamic suppresses turnover that would occur if these bonds were trading normally in the market, since investors have fewer opportunities to rotate between bond sectors.

Bond Holders: Objectives, Constraints & Investment Trends

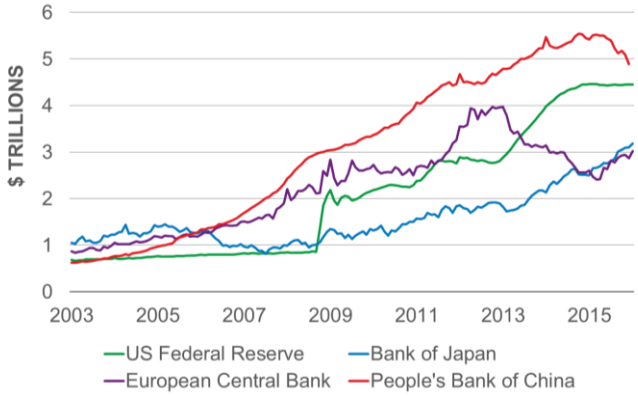
Sovereign Wealth Funds and National Pension Schemes

Sovereign wealth funds (SWFs) are state-owned investment funds or entities commonly established from the balance of payment surpluses, official foreign currency operations, proceeds of privatizations, governmental transfer payments, fiscal surpluses, and/or receipts from resource exports.[25] SWFs are not homogenous with respect to their governance, asset allocation, transparency, or objectives, which leads to different investment strategies among SWFs. SWFs have the ability to make substantial shifts in their asset allocations, generally without the tax and regulatory constraints that are present for other types of asset owners.

From 2007 to 2015, SWFs have grown substantially. As depicted in Exhibit 10, SWF AUM has increased from $3.4 trillion in September 2007 to $7.2 trillion in December 2015. According to Preqin, 86% of SWFs invest in fixed income securities, and 11% of these sovereign entities invest solely in fixed income.[26] Amidst greater volatility in global markets, some SWFs have been increasing cash and fixed income holdings. For example, Future Fund, Australia's Sovereign Wealth Fund, increased its cash and debt holdings from 23.6% to 32.4% of the fund over the past year.[27] While there has been significant growth in SWFs over the past eight years, the significant drop in oil and commodity prices in 2014 and 2015 has impacted current account surpluses and the asset allocations of SWFs, particularly those that are exposed to commodity prices.[28] Exhibit 10 shows that SWF AUM declined in September 2014 for the first time since 2007, and some SWFs have reportedly liquidated assets.[29]

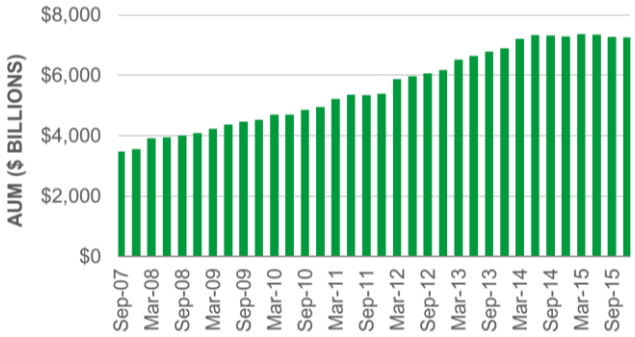
National pension schemes are another type of official institution that often have significant bond holdings. Several national pension schemes have made large asset allocation changes in recent years. For example, in October 2014, Japan's Government Pension Investment Fund (GPIF)

Exhibit 9 : CENTRAL BANK BALANCE SHEETS



Source: Thomson Reuters Datastream, central banks and BlackRock Investment Institute. As of Jan. 15, 2016.

Exhibit 10: SOVEREIGN WEALTH FUND AUM



Source: Sovereign Wealth Fund Institute. As of Dec. 2015. Available at http://www.swfinstitute.org/sovereign-wealth-fund-rankings/.

announced a shift in strategic asset allocation, decreasing Japanese domestic bond holdings from 60% to 35% while increasing foreign bond holdings from 11% to 15% of their portfolio, among other changes.[30] This move marked a dramatic shift for GPIF in an effort to enhance returns for the rapidly aging Japanese population. In 2012, Spain's Social Security Reserve Fund undertook a de-risking strategy, migrating nearly all of its assets to Spanish government bonds. Likewise, since 2010, Portugal's Social Security Financial Stabilization fund has increased fixed income allocations.[31] These are just a few examples of national pension schemes that have made asset allocation shifts.

Insurers

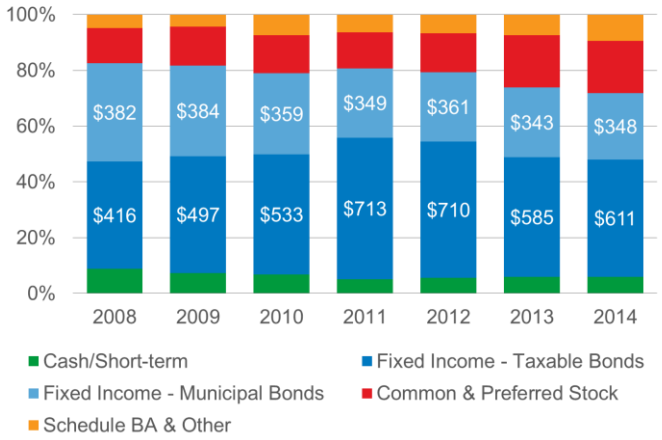
Insurance companies include life, property and casualty (P&C), health, and reinsurers. Each type of insurance company has a different business model with specific insurance products from which they project their liabilities. While individual insurer portfolios differ significantly, the asset allocation of a typical insurance company is heavily weighted towards high quality fixed income securities.[32] These companies try to earn a spread while matching their liabilities and meeting various regulatory and rating agency constraints. Most insurance company portfolios are taxable, meaning that tax considerations need to be taken into account when buying or selling securities, as this can impact overall portfolio return. As a result, many insurers tend to pursue lower velocity investment strategies.

Exhibit 11 highlights the significant emphasis that P&C insurers place on fixed income and the shifts in their allocations to taxable bonds from tax exempt municipal bonds over the past few years. The prolonged period of low yields has challenged the profitability of many P&C insurers, leading some to increase asset allocations to higher yielding fixed income and alternative assets.[33]

The life insurance industry has been similarly challenged by the prolonged low yield environment, as profitability for a life insurer is achieved by earning a spread on the investment portfolio over the cost of life insurance contract liabilities. In a higher yielding environment, life insurers were historically able to rely on long duration, high-quality fixed income assets with little to no exposure to alternative asset classes. Given the long-term nature of the business, the life insurance industry was slower to shift their portfolios in response to the low yield environment; however, life insurance portfolios reflect similar trends to P&C insurers as shown in Exhibit 12.

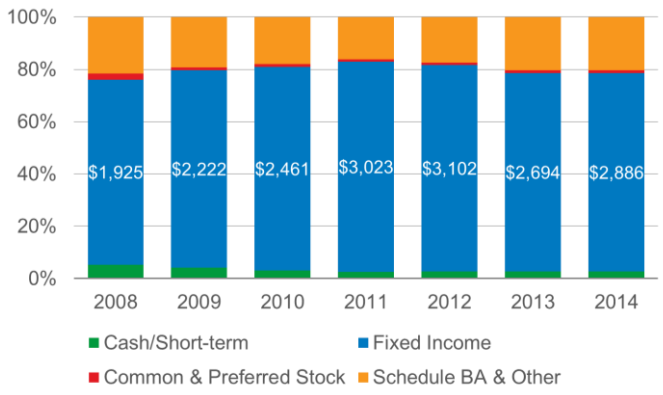
In October 2015, BlackRock partnered with The Economist Intelligence Unit to conduct a survey of global insurance companies. This survey found that insurers are turning to a broader range of risk assets in part due to QE. Approximately half of all survey respondents indicated a desire to increase their holdings of high quality fixed income assets, with investment grade corporate bonds and government bonds the most popular choices. However, over two-thirds of these insurers indicated difficulty sourcing sufficient traditional fixed income investments.[34] **Not only are insurance companies looking to add fixed income allocation as they grow premium proceeds, but they must also reinvest annual proceeds that originate largely from maturities and pay downs related to their portfolio holdings**. To put this in perspective, such annual proceeds averaged $636 billion for life insurers and $347 billion for P&C insurers – 22% and 36% of fixed income holdings, respectively.[35] Given the significant amount of proceeds that need to be reinvested, some insurers are facing challenges in maintaining adequate allocations to fixed income.

Exhibit 11 : HISTORICAL ASSET ALLOCATIONS OF P&C INSURERS ($ billions)



Source: SNL, BlackRock. As of Dec. 31, 2014. Schedule BA & Other category includes policy loans, mortgage and commercial loans, real estate, derivatives, and other.

Exhibit 12: HISTORICAL ASSET ALLOCATIONS OF LIFE INSURERS ($ billions)



Source: SNL, BlackRock. As of Dec. 31, 2014. Schedule BA & Other category includes policy loans, mortgage and commercial loans, real estate, derivatives, and other.

Given insurers' regulatory and tax constraints and continued need for fixed income, we would not expect them to make significant portfolio sales of fixed income assets in response to changing market conditions. In a scenario where rates rise and other asset owners shed bonds, insurers are naturally poised to add high quality bonds to their portfolios.

Corporate Defined Benefit Pension Plans

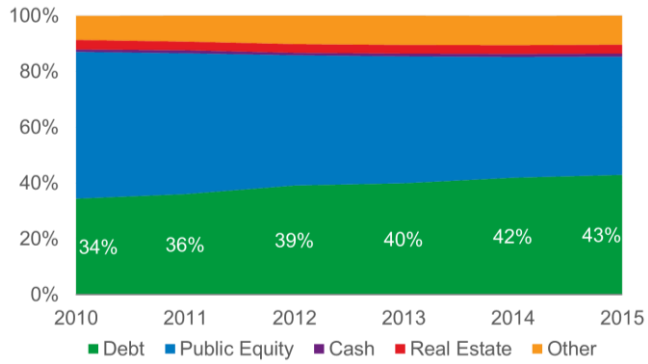
Corporate DB pension plans are generally tax advantaged investors whose investment objectives are designed to fund projected pension liabilities owed to company workers for their service to the company. The funding status of corporate DB pension plans has implications for corporations' financial statements.

Corporate DB pension plans have engaged in a multi-year de-risking where their asset allocation mix has been gradually shifting away from public equities towards fixed income and alternative investments. This trend reflects the desire of corporations to lock in assets that better match their liabilities and thus reduce the volatility of their financial statements that can be associated with corporate DB plans under current accounting rules. For example, International Accounting Standard (IAS) 19 requires companies to discount their DB pension fund liabilities at AA corporate bond yields when valuing the size of the pension fund deficit or surplus on their balance sheet. This change has created a clear incentive for companies to decrease allocations to equities and increase investments in corporate bonds. Exhibit 13 shows an analysis conducted by Towers Watson on the change in target asset allocations since 2009 for the top 100 publicly traded US sponsors of large DB pension plans. Per the analysis, target allocations to fixed income for these plans have grown by nearly 10 percentage points from 34% of the average target asset allocation in 2009 to 43% of the average target asset allocation in 2015.[36] According to Fed Z.1 Data as shown in Exhibit 14, the amount of bond holdings by US corporate DB plans has increased in tandem with higher target allocations to fixed income from over $520 billion at the end of 2009 to over $860 billion as of the third quarter of 2015.

Similar trends have been observed in Europe. As noted in the July 2014 BoE discussion paper titled "Procyclicality and Structural Trends in Investment Allocation by Insurance Companies and Pension Funds": "In the UK, defined benefit pension funds (both corporate and local authority) appear to have behaved countercyclically in the short term (i.e., monthly-quarterly) including during the financial crisis."[37] The discussion paper goes on to note the longer-term structural shifts towards fixed income as DB pension plans de-risk. These trends are not limited to UK DB plans. The European Insurance and Occupational Pensions Authority (EIOPA) issued a report on stress tests of Institutions for Occupational Retirement Provisions (IORPs) across European countries during 2015. This report found that nine out of fourteen EU member states included in the survey invest at least half of their DB pension portfolios in bonds. Further, the vast majority of fixed income investments across all European countries in the study are either government bonds or corporate bonds, averaging 54% and 44% of total fixed income assets of DB portfolios, respectively.[38]

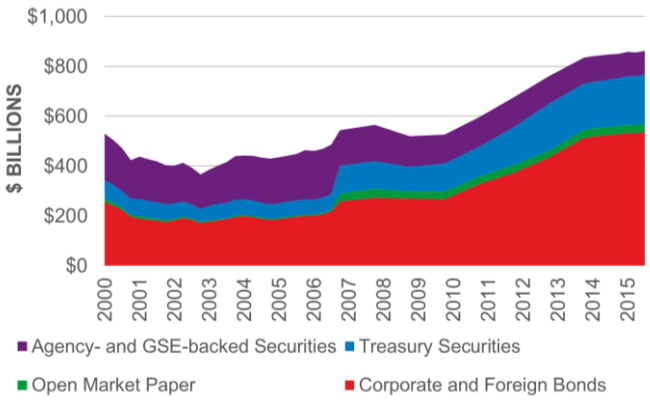
As pension funds acquire more bonds for de-risking purposes, these bonds are often held to maturity and therefore do not trade in the secondary market. Finally, it is interesting to note that some DB plan sponsors have waited to pull the trigger on implementing liability-driven investing (LDI) strategies due to the low level of interest rates. In a scenario where interest rates rise, DB liabilities will be discounted at a higher discount rate. For pension plans that have not entered into LDI strategies, this will create an attractive opportunity to move ahead with de-risking and add

Exhibit 13: AVERAGE TARGET ALLOCATIONS FOR TOP 100 PUBLICLY-TRADED DB PLAN SPONSORS



Source: Towers Watson, "TW Pension 100: Year-End 2014 Disclosures of Funding, Discount Rates, Asset Allocations and Contributions" (Apr. 14, 2015), available at https://www.towerswatson.com/en-US/Insights/Newsletters/Americas/insider/2015/04/tw-pension-100.

Exhibit 14: PRIVATE DB HOLDINGS OF DEBT SECURITIES



Source: Fed Z.1 Data. Table L.118b. As of Sep. 30, 2015.

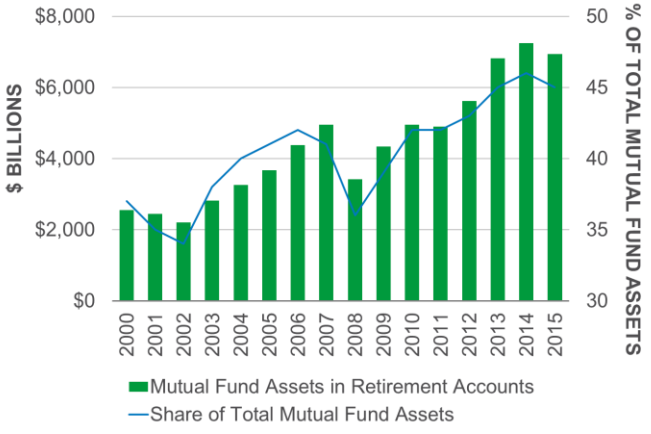
high quality bonds to their portfolios. For those that have already executed LDI strategies, they are likely to continue to hold their bonds to maturity as the whole point of these strategies is to match assets with liabilities and manage the fund more like a traditional insurance portfolio.

Corporate Defined Contribution Plans

Over the past decade, US corporate defined contribution (DC) plans have grown significantly as an increasing number of corporate DB plans have been frozen along with a commensurate shift to DC plans. Unlike corporate DB plans, where the DB pension is a liability of the corporation, corporate DC plan assets are owned directly by the individual employee. Further, whereas DB pension plans often purchase securities directly (either through internal portfolio management or by hiring an asset manager to manage a separate account), a large amount of DC assets are invested in commingled funds, either 1940 Act mutual funds or collective investment funds (CIFs).[39] As a result, **DC assets have been an increasing component of mutual fund ownership through time**. This phenomenon is demonstrated by Exhibit 15, which highlights the growth in mutual fund ownership by retirement accounts, both in absolute dollar-value and in the percentage of total mutual fund assets owned by retirement accounts. According to ICI, 45% of mutual fund assets are held by retirement accounts.[40] Mutual fund shares held by DC plan participants tend to exhibit less turnover than other types of mutual fund holders given that most DC plan participants seldom rebalance their DC account holdings. For example, ICI conducted a study of DC plans and found that between 2009 and 2015, only 6.4% to 7.7% of individuals participating in DC plans changed their asset allocations.[41] A real-world example of this phenomenon can be observed in light of recent equity market performance. Despite the poor performance of the S&P 500 in early 2016, retirement savers do not appear to be fleeing from equities or otherwise exhibiting large-scale correlated investment behavior.[42] This is inclusive of DC retirement accounts as well as individual retirement accounts (IRAs). Historically, these assets are relatively "sticky," as investors have not reallocated their retirement assets very often.

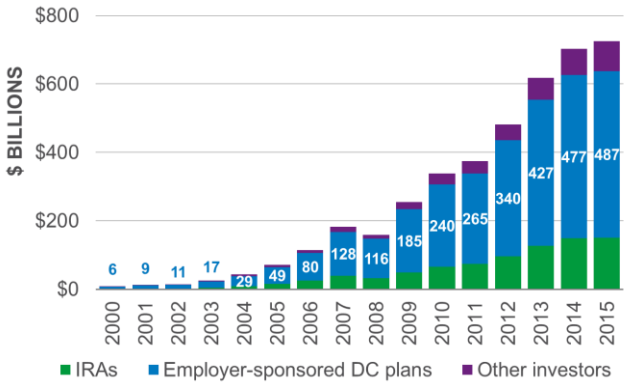
Another aspect of DC plans that differ from DB pensions is that whereas DB plan sponsors invest in a wide range of public and private assets across equity, fixed income, and alternative asset classes, DC plan participants generally have more limited investment options. Historically, corporate DC plans were primarily invested in company stock and conservative fixed income strategies; however, that has changed significantly in the past ten years.[43] The Pension Protection Act of 2006 (PPA) addressed the shift to DC plans by introducing a number of important features including auto-enrollment, auto-escalation, and qualified default investment alternatives (QDIAs). The growth in target date funds (TDFs) can largely be attributed to the PPA and QDIA rules, which allow plan sponsors to offer a multi-sector asset allocation fund as a default investment option for plan participants. A large percentage of participants take the default option. Exhibit 16 shows the growth of TDF mutual funds in US retirement accounts. In addition to this mutual fund growth, many TDFs are offered to DC plans in the form of CIFs. While there is less publicly available data on the aggregate size of CIFs, their inclusion would materially increase the amounts shown in Exhibit 16. According to EBRI/ICI, from 2006 to 2013, the percentage of DC assets invested in TDFs has increased from 5% to 15% while DC plan assets overall have been increasing.[44]

Exhibit 15: GROWTH IN MUTUAL FUND OWNERSHIP BY RETIREMENT ACCOUNTS



Source: Investment Company Institute, "The U.S. Retirement Market, Third Quarter 2015" (Dec. 2015), available at www.ici.org/info/ret_15_q3_data.xls.

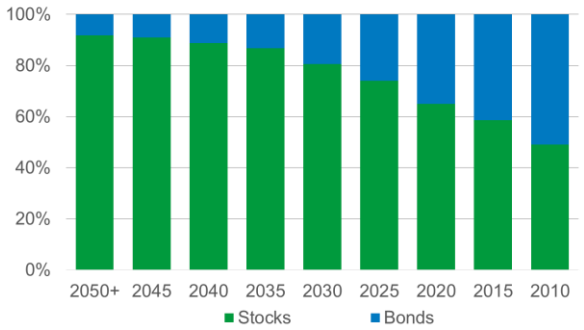
Exhibit 16: GROWTH OF TARGET DATE MUTUAL FUNDS IN US RETIREMENT ACCOUNTS



Source: Investment Company Institute, "The U.S. Retirement Market, Third Quarter 2015" (Dec. 2015), available at www.ici.org/info/ret_15_q3_data.xls. DC plans include 401(k) plans, 403(b) plans, 457 plans, Keoghs, and other DC plans without 401(k) features.

TDFs exhibit counter-cyclical investment behavior as asset class allocations are periodically rebalanced back to their target allocations – meaning that when the value of an asset class decreases, the TDF will buy more of that asset class to get back to its target allocation and vice versa when the value of an asset class rises. For purposes of this liquidity discussion, it is important to understand that TDFs follow a glidepath that changes TDFs' asset allocations over time. As illustrated in Exhibit 17, the typical glidepath favors greater allocations to fixed income as the TDF nears the target retirement date. Exhibit 18 shows the AUM of TDF mutual funds across the industry by target retirement date. As Exhibit 18 shows, assets tend to accumulate in TDFs over the life of the fund, with AUM at its greatest as the TDF nears its retirement date. This happens to occur concurrently with the period when TDFs have the greatest allocations to fixed income. Once the retirement date is reached, AUM decreases as individuals draw on their TDF holdings to fund their retirement needs.

Exhibit 17: ASSET ALLOCATION OF TARGET DATE FUNDS FOR DIFFERENT RETIREMENT DATES



Source: S&P Indices calculations using input from EDGAR and Bloomberg databases. Data as of 5/31/2011. Reflects median stock and fixed income allocations by target retirement year.

Exhibit 18: AUM OF TARGET DATE FUNDS FOR DIFFERENT RETIREMENT DATES

Source: Morningstar. As of Jan. 27, 2016. Includes only TDF mutual funds.

KEY TAKEAWAYS – BOND HOLDERS: OBJECTIVES, CONSTRAINTS, TRENDS

1. The bond market has a diverse set of asset owners, each with unrelated objectives and constraints.
2. The presence of a diversity of asset owners subject to different objectives and constraints lead to different investment decisions based on uncorrelated factors.
3. Investment objectives and constraints drive asset owner investment behavior. Some examples include:
   a. Asset owners seeking to fund liabilities often employ different investment strategies than asset owners with total return objectives.
   b. Taxable investors consider tax implications of selling securities, incenting buy-and-hold behavior.
   c. Investment strategies that require rebalancing to asset allocation bands result in counter-cyclical investment behavior.
4. The low yield environment has challenged many asset owners. These asset owners stand to benefit greatly from higher interest rates.
5. Insurers and many DB plans are more likely to add bonds to their portfolios than reduce their allocations.
6. Increased holdings of bonds by insurers and pension plans using lower velocity strategies may suppress bond turnover statistics, as these holdings are not actively traded.
7. The shift in DC assets to TDFs provides a source of counter-cyclical investment behavior.

Open-End Mutual Funds & ETFs

Active and Index Open-End Bond Mutual Funds

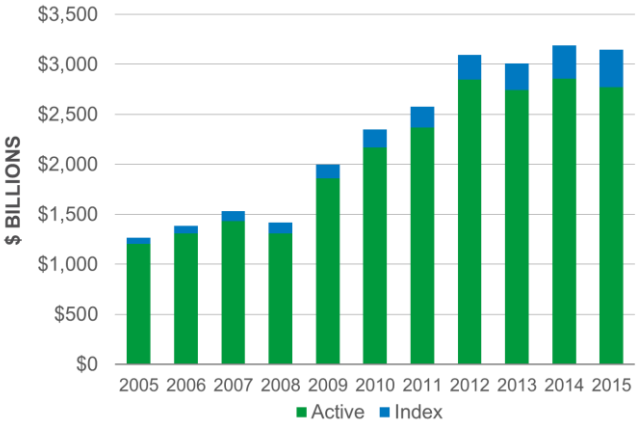
In addition to the various types of asset owners, there are numerous types of open-end mutual funds that hold bonds, across a multitude of investment strategies ranging from multi-asset class funds (e.g., TDFs, balanced funds), to broad market bond funds (e.g., multi-sector fixed income funds), to sector-specific bond funds (e.g., high yield bond funds), as well as numerous other combinations of fixed income sectors and sub-sectors. Some of these funds pursue an active investment strategy whose performance is measured against a benchmark or on a total return basis, whereas others employ a passive approach seeking to closely track an index, and still others have an absolute return objective.

The increased focus by regulators on low-fee investment options has encouraged greater use of index products. The holding period for investments in index funds tends to be longer than investments in active funds.[45] While fixed income mutual funds using an index strategy are a relatively small category (approximately 14% the size of active bond funds), index mutual funds have grown in popularity alongside

separate accounts, ETFs, and other commingled vehicles employing passive strategies.[46] Exhibits 19 and 20 show the growth in US open-end mutual funds employing dedicated fixed income strategies and US fixed income ETFs, respectively. Since 2005, the AUM of US open-end index bond mutual funds has increased from $63 billion to almost $375 billion as of December 2015. Similarly, US bond ETF AUM has increased from $15 billion in 2005 to approximately $343 billion as of December 2015. **By definition, index portfolios have lower turnover as the manager seeks to track the index as closely as possible**.

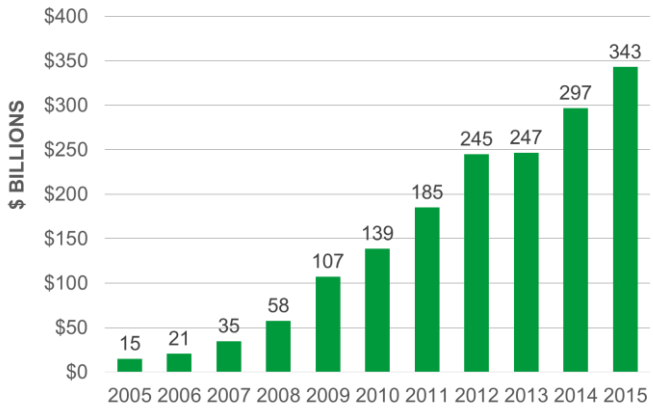
Actively managed open-end bond mutual funds have experienced net inflows for the past few years. As Exhibit 19 shows, AUM in actively managed bond mutual funds (including broad market and sector-specific funds) has increased from $1.2 trillion in 2005 to $2.8 trillion in 2015. Over time, fund managers have adapted to changing

Exhibit 19: US OPEN-END FIXED INCOME FUNDS



Source: Simfund. As of Dec. 31, 2015. Includes active and index open-end taxable and tax-free bond mutual funds, as defined by SimFund. Excludes fund of funds, ETFs, and UITs. Does not capture mixed asset funds which may invest part of their AUM in fixed income.

Exhibit 20: US FIXED INCOME ETF AUM



Source: Simfund. As of Dec. 31, 2015. This universe is comprised of open end taxable and tax free bond ETFs. Excludes fund of funds and UITs. Does not capture mixed asset funds which may invest part of their AUM in fixed income.

dynamics in the bond markets, including the impacts due to QE policies and financial regulatory reform. As portfolio managers consider rebalancing a portfolio, one of the key considerations is the transaction costs associated with selling and/or purchasing securities. Net inflows of cash provide portfolio managers with additional flexibility as they can invest new cash to shift the overall shape of the portfolio instead of selling securities to rebalance. When new cash is used in lieu of asset sales, reported bond turnover numbers may be lower than in an environment with static fund flows or net outflows. This is another facet of bond fund management that needs to be factored into observations about bond turnover.

Exchange-Traded Funds

In our July 2015 *ViewPoint*, "Bond ETFs: Benefits, Challenges, Opportunities", we outlined the benefits of bond ETFs to bond market liquidity, noting that ETF trading offers a vision of the future state of the bond market, exhibiting low cost, transparent, electronic trading in a standardized, diversified product. A few of the key points from that paper include:

- ETFs can help enhance price discovery,[47] provide investors with low execution costs to establish a diversified portfolio, and increase bond market liquidity and transparency.
- ETF liquidity is incremental to the underlying bond market liquidity because buyers and sellers can offset each other's transactions without necessarily having to trade in the underlying market.
- Even during periods of market stress, ETF shares are at least as liquid as the underlying portfolio securities.

As we review the role of ETFs in the context of structural changes to the bond market, ETFs provide some of the most intriguing data with respect to assessing liquidity today. As shown in Exhibit 20, assets in bond ETFs have grown substantially over the past decade but bond ETFs still hold only a very small fraction of outstanding bonds. Recall Exhibit 8, which showed that ETFs comprise less than 1% and 2% of total debt securities and corporate and foreign bonds, respectively, in the Fed Z.1 Data as of the third quarter 2015.

Before looking further at bond ETF data, it is important to revisit the mechanics of how bond ETFs work. Investors in a bond ETF own shares of the ETF, similar to how single stock investors own shares of a company's outstanding stock. These shares trade on a stock exchange, in the same way that shares in a single company stock trade. Within the ETF market this trading is referred to as secondary market trading. **Importantly, the trading of ETF shares on exchanges does not directly result in asset flows into or out of the ETF**. Instead, ETF flows occur through the creation or redemption of shares, a process referred to as primary market activity. A group of broker-dealers and market makers known as Authorized Participants (APs) have the ability to create or redeem shares. These firms generally provide ETF execution services to investors or the broker-dealers who provide such

services. APs will create or redeem shares to manage their own ETF inventory, or to take advantage of a discrepancy between the ETF share price and the value of the fund's underlying bonds.[48] **The creation or redemption of ETF shares is generally performed through in-kind transactions**.

The AP either delivers a basket of bonds to the ETF provider to create new ETF shares, or redeems ETF shares in exchange for a basket of bonds. In these transactions, the underlying bonds are not bought or sold for cash by the fund itself; rather the ownership of the bonds is transferred between the ETF and an Authorized Participant (AP). As a result, bond transaction costs associated with investor-related ETF flows are externalized from the ETF and do not impact fund performance.[49] Creating and redeeming of ETF shares by APs adjusts the number of ETF shares outstanding, which helps keep the price of the ETF in line with the value of the underlying holdings. To the extent that APs are unable or unwilling to create or redeem ETF shares, the ETF will trade at a premium or discount to its published net asset value (NAV), just like a closed-end fund. Even in this scenario, ETF investors can still buy or sell their ETF shares on the exchange at a market-agreed price.

ETFs provide a new source of liquidity to bond investors as the investors in ETFs buy and sell ETF shares on an exchange, and these purchases and sales generally do not require trading of the underlying bonds. In a 2016 study, Greenwich Associates found that fixed income liquidity concerns have led many institutional investors to adopt fixed income ETFs, as ETF liquidity has increased over the past several years.[50] It is worth noting that while bond market turnover has declined over the past several years, bond ETF trading volumes have increased significantly.

Exhibits 21 and 22 show the turnover of investment grade bond ETF and high yield bond ETF shares, respectively, and compare this data to the trading activity in the underlying bond markets. In both graphs, the blue section reflects the daily traded volumes for investment grade bond and high yield bond ETFs, respectively. The yellow line represents the ETF daily traded volume as a percentage of the sum of ETF trading volume and bond trading volume for investment grade and high yield bonds, respectively (we will refer to this sum as "bond exposure trading volume" for the remainder of the paper). For purposes of understanding trends in bond market liquidity, it is particularly relevant to note that **secondary trading of bond ETF shares is not captured in bond turnover data because bond ETF shares are traded on equity exchanges and are, therefore, not reported on TRACE.** Given that ETFs represent an alternate means to obtain bond market liquidity through equity exchanges, aggregating the average daily trading volumes of individual bonds and bond ETFs provides a more complete view of the transfer of bond exposures among market participants. As the graphs show, while ETFs remain a small percentage of bond exposure trading volume, their share of this volume has increased

Exhibit 21: INVESTMENT GRADE ETF TRADING VOLUMES AND TURNOVER

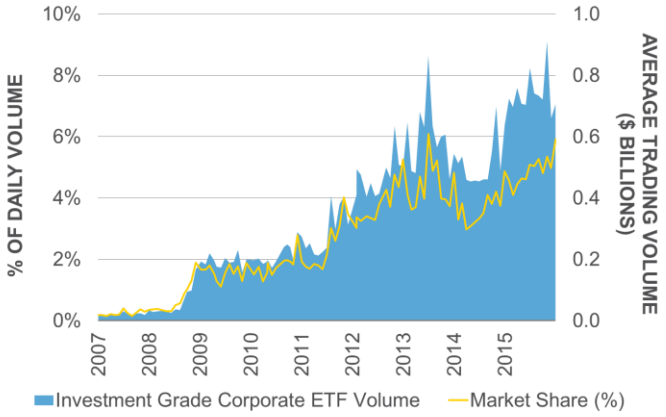
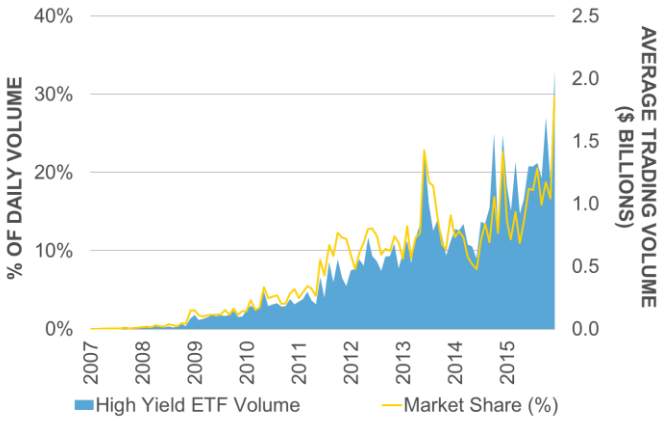


Exhibit 22: HIGH YIELD ETF TURNOVER



Source: Bloomberg. As of Dec. 31, 2015. Daily volumes calculated using monthly data assuming 22 business days. Market share calculated using ETF volume divided by the sum of ETF Volume and Cash Bond Volume.

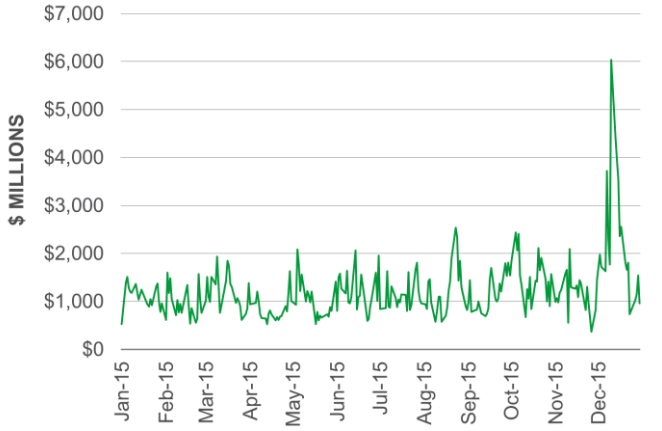
significantly over time. For example, in December 2008, investment grade ETFs represented 1.9% of average daily bond exposure trading volume, compared to 5.9% as of December 2015. The increase in high yield bond ETF trading as a percentage of bond exposure trading volume is more noticeable. In December 2008, high yield bond ETFs represented 2.3% of bond exposure trading volumes, compared to 29.8% as of December 2015, which reflects the extraordinary events in the market in December 2015. Clearly, the growth of bond ETFs and bond ETF trading volumes need to be considered in the context of understanding the future of bond market liquidity.

Data from the Investment Company Institute (ICI) shows that on average, trading of bond ETF shares on the exchange is three to five times ETF create/redeem activity in the primary bond market.[51] Given concerns expressed about bond market liquidity, it is interesting to note that bond ETF trading volume has repeatedly increased during periods of market stress. This behavior was observed during the 2008 Crisis, in the wake of the 2013 Taper Tantrum, in the period following

the sudden departure of Bill Gross from PIMCO in 2014, and during the December 2015 sell-off in high yield bonds. In each of these situations, the market was able to find prices at which buyers and sellers were willing to transact in the ETF shares, and exchange trading volumes of bond ETFs increased significantly.[52] Exhibit 23 illustrates this phenomenon. In December 2015, high yield ETF trading volumes spiked in response to the announcement of the closure and liquidation of the Third Avenue Focused Credit Fund, a fund categorized as high yield.[53]

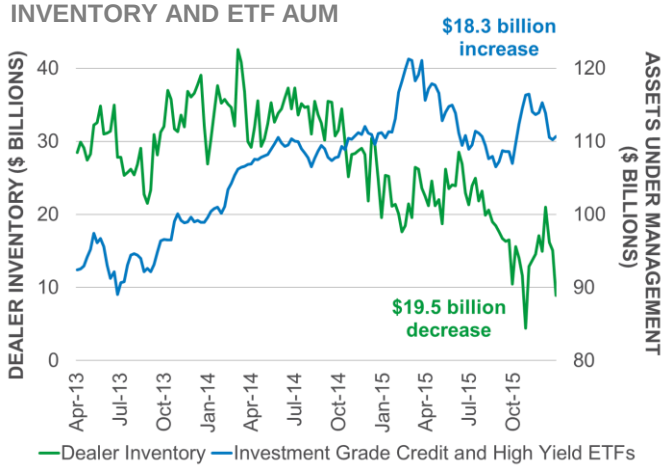
Exhibit 24 is one of the most intriguing charts we have seen. **Looking back at the past three years, bond ETFs appear to be growing and potentially supplanting declining dealer inventories**. Specifically, between April 2013 and December 2015, dealer inventory of US corporate bonds has declined by $19.5 billion from $28.4 billion to $8.9 billion. At the same time, corporate bond ETF AUM has increased by $18.3 billion from $92.4 billion to $110.7 billion.[54] In aggregate, the total value of bonds in the market is roughly unchanged with at least some shift from dealer inventories to ETFs that is not apparent in the data included in the prevailing liquidity dialogue. One of the key observations that can be drawn from this additional data is that the bond market is shifting from a principal over-the-counter (OTC) market to a more hybrid principal-agency structure; ETFs are playing a role in facilitating this evolution.

Exhibit 23: HIGH YIELD ETF DAILY TRADING VOLUME



Source: Bloomberg. As of Dec, 31, 2015. Represents average daily trading volume across all high yield fixed income ETFs.

Exhibit 24: CORPORATE BOND DEALER INVENTORY AND ETF AUM



Source: Dealer inventory data from the New York Federal Reserve as of Dec. 31, 2015. Includes Investment Grade and High Yield Corporate Bonds and Commercial Paper. Investment grade credit and high yield ETF AUM data from Bloomberg as of Dec. 31, 2015. Includes only US ETFs.

KEY TAKEAWAYS – OPEN-END MUTUAL FUNDS AND ETFS

1. Open-end bond mutual fund AUM has increased. This includes bond funds employing a variety of different active and passive investment strategies.
2. Index strategies have lower turnover, which suppresses turnover arising from these strategies.
3. ETFs provide a new source of liquidity to bond investors through trading of ETF shares on exchanges.
4. Bond turnover data omits critical elements of today's bond market structure, including bond ETF trading volumes, which have increased significantly, while individual bond turnover has declined.
5. As dealer inventories of corporate bonds have declined, corporate bond ETF AUM has grown.
6. The growth of bond ETFs reflect the ongoing evolution of the bond market from a principal OTC market to a more hybrid principal-agency market.

Conclusion

To date, the dialogue around bond market liquidity has been focused on dealer inventories, TRACE data, bond issuance, and the growth of open-end mutual fund holdings of corporate bonds. As discussed in this *ViewPoint*, while the current dialogue points to factual data, this dialogue does not provide a complete picture of the structure of today's bond markets. Often the data presented are followed by speculation about one-sided markets developing, fueled by selling from open-end mutual funds. Today's bond markets differ from 2008 in numerous ways – from massive deleveraging across the system, *to* historically low (in some cases negative) interest rates, *to* fundamental regulatory changes to OTC derivatives markets, *to* greater use of bond ETFs. These changes make it necessary to look at additional data to understand what dynamics are developing and to determine appropriate policy responses. This *ViewPoint* highlights several aspects of the fixed income ecosystem that are missing from today's dialogue including:

- The prevailing dialogue focused on open-end mutual funds and ETFs, which represent only $5 trillion out of $39 trillion of debt holdings represented in the Fed Z.1 data that were

analyzed in this paper. This suggests a more comprehensive approach is needed.

- The diversity of asset owners, each with unrelated objectives and constraints that result in different investment behaviors in response to changing market conditions.
- Built-in demand for bonds as central banks, insurers, and some pension funds must reinvest dividends and principal to keep balance sheet assets invested, in addition to potential demand from insurers and pension funds seeking higher yields when interest rates rise.
- Recognition that some of the record bond issuance is opportunistic, and as the cost of money rises, issuance is likely to decline.
- Meaningful ways that market participants are adapting to structural changes in bond market liquidity, including trading strategies and technology, construction of portfolios, and enhanced liquidity risk management.
- Innovations such as technology that will likely facilitate further development of electronic trading platforms.
- Factors that combine to suppress bond turnover statistics, including the large amount of bonds held by central banks, the growing use of lower velocity strategies by corporate DB pension plans alongside insurers, and the increasing appeal of index strategies.
- Important shifts in the holders of mutual funds and in mutual fund strategies, such as the growth of target date funds, whose assets shift towards greater allocations of fixed income over time and rebalance counter-cyclically based on pre-determined glidepath allocations.
- The growing adoption of bond ETFs, which supplement traditional forms of obtaining bond market liquidity through trading of bond ETF shares on equity exchanges.

In the past few years, as we have explored the asset management ecosystem, a number of concepts have been conflated. For example, "market risk" is not the same as "systemic risk" and, in fact, some amount of market volatility is normal and welcomed by investors. In the case of mutual fund investments, mutual fund share prices are expected to fluctuate. Investors knowingly bear this risk. This reflects a fundamental difference between mutual funds and banks. Banks have an obligation to meet liabilities (including the repayment of the principal of their depositors). These bank deposits are further insured by taxpayer money. Unlike banks, mutual fund redemptions are executed based upon a pro rata share of the value of the securities held in the fund, with no guarantee of a particular price. Gains by some investors and losses by others reflect a properly functioning market and are not the same as systemic risk. Furthermore, in the absence of leverage, it is difficult for these market losses to spark the type of *system-wide* selling that characterizes a systemic risk event.

As discussed in our July, 2015 *ViewPoint* "Addressing Market Liquidity", market participants need to focus on solutions that include: (i) market structure modernization, (ii) an enhanced fund toolkit and fund regulation, and (iii) the evolution of new and existing products. Looking forward, we recommend consideration of the following ideas that build upon this *ViewPoint*:

1. **Recognition that "market liquidity" is not the same as "fund redemption risk" and that the latter highlights the importance of liquidity risk management.** We support the regulatory focus of raising the bar for liquidity risk management across the mutual fund industry. Following the Crisis, European securities regulators implemented a number of new rules addressing fund liquidity risk management. In the US, the SEC recently released a proposal addressing some aspects of liquidity risk management and has indicated an intention to release a proposed rule on stress testing of portfolios.[55] While we are supportive of the objectives of these rules, we have raised some concerns about how these goals will be accomplished. We recommend the use of objective measures rather than introducing subjective judgment into the classification of assets, particularly when information is being disclosed to the public. We also recommend against mandating short-term liquidity minimums as these may be pro-cyclical and are not sufficient to ensure that liquidity risk is being managed appropriately. Instead, we recommend a more holistic approach that considers a number of factors specific to each fund.

2. **Expansion of the "toolkit" of features in fund regulation.** IOSCO recently surveyed 27 members and published the results. As detailed in IOSCO's report, existing tools that effectively enhance the fund toolkit include swing pricing, redemptions in-kind for institutional investors making large redemptions, and out-of-the money gates to deal with tail-risk events.[56] Each of these tools is available in some, but not all, regulatory structures of mutual funds. Where they do not already exist, regulators should consider updating regulation to make the broadest set of tools available, with the understanding that some infrastructure changes may be needed as well. For example, BlackRock uses swing pricing in funds where it is permitted, and we have quantified the benefits of swing pricing to long-term shareholders.[57] While we recognize the benefits of swing pricing, there are implementation challenges to its use in the US. To this end, we recommend consideration of the roadmap to implementation outlined in the comment letter submitted to the SEC by the Global Association of Risk Professionals (GARP).[58]

3. **The need to continue to modernize fixed income market structure.** Keeping in mind that changes in the

OTC derivatives market included massive changes in derivative market structure, comparable changes are necessary to the "plumbing" of the corporate bond market to reflect the new regulatory environment. The shift from a principal OTC market to a more hybrid principal-agency market requires changes in behavior and development of new tools. Both the buyers and the sellers of bonds need to adapt their behavior and become price makers, not just price takers. In addition, all-to-all electronic venues and other agency-like structures need to develop further. Regulatory encouragement would be welcome.

4. **Recognition of the benefits and risks associated with bond ETFs.** By trading on an exchange, bond ETFs provide an additional source of liquidity for bonds, and by redeeming in-kind, bond ETFs externalize transaction costs. That said, we support the need for comprehensive ETF regulation that would include a classification system for exchange-traded products and rules that are tailored to reflect these structures.

5. **Raise awareness of data availability bias.** Data on mutual funds and ETFs is readily available, which has facilitated the analysis of these funds. While this has been important to developing a better understanding of mutual funds, funds are only one component of a diverse asset management ecosystem. As demonstrated by the analysis of the Fed Z.1 Data in this report, open-end mutual funds and ETFs represented approximately $5 trillion out of $39 trillion of debt assets included in the Fed Z.1 Data. Needless to say, an understanding of the dynamics of the bond market requires insight into other asset owners as well as a more contemporary picture of the use of bonds in mutual funds and the evolving structure of the bond market. Recent suggestions of a macro stress test across all mutual funds[59] will suffer from data availability bias as this approach will omit the presence of other asset owners and therefore will not provide meaningful conclusions. We recommend instead the stress testing of individual funds to meet their redemption obligations under a wide range of market scenarios.

6. **Promote global harmonization of regulatory rules and data requirements.** Consistent rules minimize the opportunity for regulatory arbitrage and consistent data reporting facilitates global monitoring efforts. Currently, mutual fund data is reported differently in various regulatory jurisdictions making it difficult to aggregate data across funds or to compare similar funds. We recommend that forums such as IOSCO and the Financial Stability Board undertake a project to agree on data reporting standards with an eye towards harmonizing the content and the format of data being reported.

7. **Periodically evaluate the cumulative impact of regulation to ensure proper calibration.** While individual rules generally make sense, sometimes the interaction between rules is not well understood. Over the past few years, an unprecedented number of rules have been introduced. The European Commission's (EC) recent call for evidence on the "EU Regulatory Framework for Financial Services" highlights the importance of taking a holistic view of regulation. As stated by the EC, "it is important that EU legislation strikes the right balance between reducing risk and enabling growth and does not create new barriers that were not intended."[60] We are supportive of this initiative and encourage a similar undertaking in the US and globally.

RELATED CONTENT

- *ViewPoint* - Addressing Market Liquidity, July 2015
- *ViewPoint* - Bond ETFs: Benefits, Challenges, Opportunities, July 2015
- *ViewPoint* - Who Owns the Assets? A Closer Look at Bank Loans, High Yield Bonds and Emerging Markets Debt, Sep. 2014
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Notes

1. Some examples include: IMF, October 2015 Global Financial Stability Report, Chapter 2: Market Liquidity—Resilient or Fleeting? (Oct. 2015), available at http://www.imf.org/external/pubs/ft/gfsr/2015/02/pdf/c2.pdf; BIS, Committee on the Global Financial System Paper: Fixed Income Market Liquidity (Jan. 2016), available at https://www.bis.org/publ/cgfs55.pdf (BIS 2016 Fixed Income Liquidity Report); Bank of England, December 2015 Financial Stability Report (Dec. 2015), available at http://www.bankofengland.co.uk/publications/Documents/fsr/2015/dec.pdf; Ontario Securities Commission, The Canadian Fixed Income Market (2014), available at https://www.osc.gov.on.ca/documents/en/Securities-Category2/20150423-fixed-income-report-2014.pdf; Bank of England, Has corporate bond market liquidity fallen? (Aug. 27, 2015), available at http://bankunderground.co.uk/2015/08/27/has-corporate-bond-market-liquidity-fallen/; Federal Reserve Bank of New York, Has U.S. Corporate Bond Market Liquidity Deteriorated? (Oct. 5, 2015), available at http://libertystreeteconomics.newyorkfed.org/2015/10/has-us-corporate-bond-market-liquidity-deteriorated.html#.VqETB0orLRY.
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4. Goldman Sachs, Global Macro Research Issue 37: A Look at Liquidity (Aug. 2, 2015) at 6, available at http://www.goldmansachs.com/our-thinking/pages/macroeconomic-insights-folder/liquidy-top-of-mind/pdf.pdf.
5. MiFID II will introduce post-trade reporting in Europe.
6. European Commission, Action Plan on Building a Capital Markets Union (Sep. 30, 2015), available at http://ec.europa.eu/finance/capital-markets-union/docs/building-cmu-action-plan_en.pdf.
7. For example, on Dec. 9, 2015, Third Avenue Management announced the closing and liquidation of the Third Avenue Focused Credit Fund, an open-end US 1940 Investment Company Act mutual fund, due to a significant level of redemption requests and reported illiquidity of distressed credit holdings. *See* SEC Release No. IC-31943 (Third Avenue Trust and Third Avenue Management LLC; Notice of application and temporary order under Section 22(e)(3) of the Investment Company Act) (Dec. 16, 2015), available at https://www.sec.gov/rules/ic/2015/ic-31943.pdf.
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