This Time *Is* Different, but It Will End the Same Way: Unrecognized Secular Changes in the Bond Market since the 2008 Crisis That May Precipitate the Next Crisis

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Abstract

The US bond market had over $42.39 trillion of outstanding debt at the end of the third quarter of 2018, eclipsing the US stock market's approximately $30 trillion in market capitalization. The sheer size of the bond market provides ample opportunities, as well as risks, for institutional investors. Some of these risks escape investors' radar because of the nature of fixed-income securities: low transparency, illiquidity, and over-the-counter (OTC) trading. In this paper, we present our concerns regarding five secular changes brought up by the over-regulation of the marketplace after the financial crisis of 2008 and investors' persistent thirst for yield. Further, while painful lessons were gleaned after the punishing 2008 financial crisis, we present empirical evidence that suggests that many sectors, such as the auto loans and collateralized loan obligations, that were largely unscathed by this crisis may be at risk in the next downturn. This paper is based on original data sources and academic research. The authors are in continuing dialogue with other experts that may further the research, and welcome interested parties to get in contact.

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Introduction

The US bond market had over $42.39 trillion of outstanding debt at the end of the third quarter of 2018, eclipsing the US stock market's approximately $30 trillion in market capitalization. When we compare the outstanding debt at the end of 2008 with that at the end of 2018Q3, we find that the mortgage market has remained relatively unchanged, with $9.5 trillion outstanding in 2008 versus $9.7 trillion in 2018Q3. It is interesting, however, that corporate debt outstanding has grown more than 1.66x from $5.5 trillion in 2008 to over $9.2 trillion in 2018Q3.[4] Given this rapid growth in the corporate credit market, there is urgency in understanding the current market dynamics and identifying possible hidden risks therein. Some themes in our examination of the corporate markets will, unsurprisingly, echo the past crisis in the mortgage markets. While corporate credit is one of the areas most susceptible given these changes, most of the tradeable fixed-income universe (as well as those privately negotiated sectors priced as a spread to that universe) is exposed to these risks.

The five secular changes we will highlight are as follows:

1. Lack of market-making and other regulatory changes that will impede price discovery in the next downturn
2. Masking of the deterioration of underlying collateral and "rearview mirror" analysis
3. New versions of the old games played by the rating agencies
4. Explosion in Asset-Liability mismatched structures
5. Regulatory changes in compliance of financial institutions

[4] Data sourced directly from SIFMA which is the leading trade association consisting of broker-dealers, investment banks, and asset managers within the US. "Monthly, quarterly, or annual issuance and outstanding volumes for the U.S. fixed income markets," US Bond Market Issuance and Outstanding, SIFMA, last modified April 4, 2019, https://www.sifma.org/resources/research/us-bond-market-issuance-and-outstanding.

Note that some areas have significant overlap in terms of their manifestations in the marketplace. For example, corporate bond ETFs and open-ended mutual funds have been created to appease the demand from retail investors for access and exposure to corporate bonds and loans. These products are attractive to retail investors (and those that have sold products to them) because they believe that ETFs and mutual funds have daily liquidity. What retail investors may not have considered, however, is that this perception of daily liquidity is not entirely accurate: these products are based on OTC securities, which are riddled with hidden risks in down-market cycles. To fully understand trading dynamics, one must understand asymmetric market-making risks, whereby in up markets these underlying OTC securities trade relatively efficiently, but in down markets their liquidity (and the market-makers that supply it) completely disappear. In down markets, redemption suspensions will catch corporate bond ETFs and mutual fund investors by surprise and result in tremendous confusion and possible retail investor panic as this asset-liability mismatch becomes evident. The investors in the assets—ETFs and mutual funds—will be shocked to find that they cannot quickly redeem because the underlying OTC securities will have no bids and, thus, no exits.

In 2008, the US real estate markets had too much easy credit available for those who sought to purchase homes outside their financial means, eventually resulting in the implosion of the housing market and a staggering economic downturn. Have we subsequently learned the lessons of being over-levered? The answer is a resounding no, as evidenced by the current state of the auto loan market. Since auto loans appeared relatively resistant in the financial crisis of 2008, lenders have concluded that the auto loan sector is resistant in general to financial crises, relying on the prior track record, as observed through the lens of their rearview mirror. But this reasoning is flawed: the factors that gave rise to the mortgage crisis of 2008 are increasingly present in the auto

loan market, and there is no basis for finding that the auto loan market is immune to market collapse.

As investors pour more capital into the auto loan market, auto loan originators, whose primary responsibility is to screen auto loan candidates by their credit worthiness, will be inclined to lower their standards in order to distribute this increased capital in the form of auto loans. As credit standards weaken, the number of auto loan borrowers will increase as those who were previously unqualified for an auto loan become able to secure a loan. Furthermore, the originators are financially incentivized to issue as many loans as possible, which shows the scale of the train wreck to come in this sector. Why do the investors and originators take on such massive risk to reap outsized profits? Are there no systemic restraints or consequences for these parties? Surprisingly, no, there are none, due to the principle of moral hazard. After the 2008 financial crisis, the federal government bailed out the entire subprime mortgage industry and stuck the taxpayers with the bill. If, within a sector, there is massive upside to taking on massive risk, but very limited downside, a crisis is all but inevitable.

At this juncture, we do not see pre-2008 leverage levels building up in the real estate market, but we do see signs that debt levels are rising beyond the high point in 2008. We document evidence of an overly levered corporate bond market providing early warning signs that we are nearing the limits of our credit markets. The pain of the 2008 mortgage downturn seems to be fading from our collective memories because many similar stories are building in overly levered components of the financial markets, and market participants buying these securities are behaving as if unaware of the true dangers and risks.

The urgency with which we examine and present these five areas of secular changes is due to the present critical stage in the markets. An important and supportable assumption made in this

paper is that, since economic cycles exist, the question of the next financial crisis is a matter of "when" rather than "if."

In this paper, we will examine the secular changes in the bond and loan markets since the 2008 financial crisis. The theme we highlight throughout this article is that downturns in the economy are inevitable. While the timing of downturns is beyond the scope of this discussion, we will cite some of the widely accepted indicators of economic slowdown to frame our discussion.

FIVE SECULAR CHANGES

1. Lack of Market-Making and Regulatory Changes That Will Impede Price Discovery in the Next Downturn

A. Fixed-Income Trades OTC are Complex and Already Illiquid

Fixed-income markets, unlike their counterparts, the more liquid stock markets, are characterized by having the majority of their trades executed OTC. Similar to stocks, once a bond is issued in the primary market, investors can, in theory, trade the bonds in the secondary market. However, while secondary market trading for stocks occurs on popular lit exchanges such NYSE, Nasdaq, and AMEX, there are currently no significant lit exchanges for fixed-income securities, meaning more fixed-income securities are packaged into ETFs. [5]

Wrapping fixed-income securities into ETFs does not solve the problem of the lack of exchange-traded markets for fixed-income securities. It only hides the lack of liquidity of the

[5] We acknowledge trading in bonds does occur on the NYSE, however, without the loss of generality we assume that most bonds trade OTC. Lit exchanges are those that allow the order book to be publicly available to all the participants on the exchange. "Types of Bonds," Bonds, NYSE, accessed March 2019, https://www.nyse.com/products/bonds.

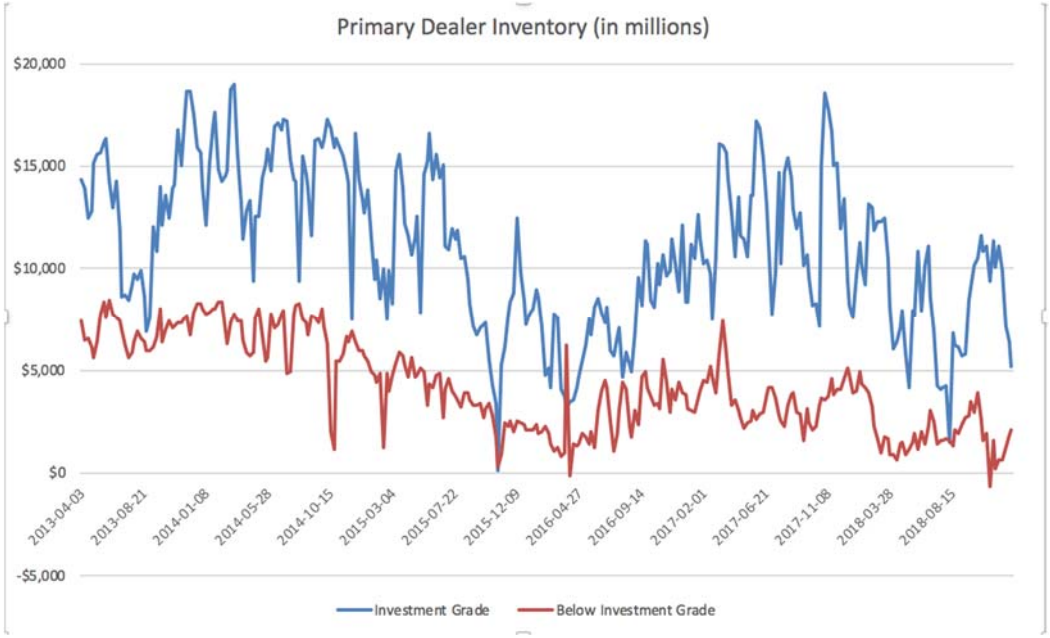
underlying constituents. These underlying securities, troublingly, do not trade on any major liquid exchange.

OTC bond market-makers are dealers who stand ready to make markets even in periods of market crisis. Since the 2008 financial crisis, the bank-affiliated dealers are buying fewer corporate bonds for their own accounts. It is estimated that inventories of corporate bonds held by dealers declined from $29.2 billion at the end of 2013 to $14.2 billion at the end of 2018.[6] Further, it is likely that even this lower level of inventory is comprised of much higher-grade securities than before the 2008 crisis. For example, in a study of about 56,000 infrequently traded corporate bonds, Goldstein and Hotchkiss found that dealers have shorter holding periods for riskier and more illiquid securities.[7]

Since April 2013, the Federal Reserve Bank of New York has been tracking the level of inventories of primary dealers in corporate bonds. The data contains a breakdown of investment-grade and below-investment-grade bonds, which was not available prior to April 2013 when only the aggregate-level data was available. The graph below shows the monthly changes in inventories for both the investment-grade and below-investment-grade corporate bonds. One can clearly see a general downtrend in inventory levels for all bonds. More precisely, the graph shows that from April 2013 to the end of 2018, investment-grade bonds in primary dealer inventory decreased from approximately $14 billion to $5 billion, while the inventory level for bonds below investment grade decreased from $7 billion to $2 billion.

[6] Robert S. Kaplan, "Corporate Debt as a Potential Amplifier in a Slowdown," accessed March 2019, https://www.dallasfed.org/research/economics/2019/0305.aspx.
[7] Michael A. Goldstein, Edith S. Hotchkiss, "Providing Liquidity in an Illiquid Market: Dealer Behavior in U.S. Corporate Bonds," last modified July 21, 2018, https://ssrn.com/abstract=2977635.

Figure 1. Primary Dealer Inventory



Source: Federal Reserve Bank of New York

When an extreme crisis hits, historically, OTC market liquidity disappears. That is, no one is available to take the other side of the trade. There are simply no bids, no offers, and no trading activity in OTC markets. The recent reduction in dealer inventories means that markets will be even more volatile in the next crisis.

Lack of liquidity impedes bond price discovery in a crisis. Several features affect the pricing of bonds, such as the yield to maturity, the credit quality, and macro cycles. Some academics have shown empirically that the pricing relationship of bonds is driven by credit quality and liquidity. Friewald et al. (2010) examined over 20,000 corporate bonds available from the Trade Reporting and Compliance Engine (TRACE) over the period from October 2004 to April 2008, including two crises, the GM/Ford crisis in mid-2007 and the subprime crisis starting in mid-

2007.[8] They discovered that transaction costs greatly increase in periods of crisis, indicating severe illiquidity in the market. They also found that liquidity explains about one-third of the yield spread variation in general, with higher explanatory power during crises. This highlights the importance of transparency of trades in the bond market, which otherwise will impede price discovery when liquidity inevitably decreases in periods of crisis.

While stock risks are identified by well-known factors such as value/growth, momentum, earnings quality, and size, bonds are more difficult to characterize by factors.[9] Cochrane's (2011) "factor-zoo" does not currently exist for bond markets, and the bond markets have yet to witness the same explosion in growth of "smart-beta" equity products.[10] The bottom line is that bonds are very distinct in their risk, behavior, and trading characteristics compared to stocks.

One particular feature of the fixed-income market is the complexity of all the instruments traded in that market, which include bank debt, ABS, and mortgages. First, unlike the stock market, each individual issuer may have many different outstanding securities represented. Therefore, for one single issuer, we may have a heterogeneous collection of illiquid or thinly traded securities (see Fender and Lewrick, 2015).[11] The second layer of complexity in the fixed-income market is deeper and multi-faceted. It involves all the credit derivatives and the entire securitization market (the existing securities of which are constantly being repackaged into still more securities)[12] that

[8] Nils Friewald, Rainer Jankowitsch, and Marti G. Subrahmanyam, "Illiquidity or Credit Deterioration: A study of Liquidity in the US Corporate Bond Market during Financial Crisis," *Journal of Financial Economics* 105, no. 1 (July 2012): 18-36, https://www.sciencedirect.com/science/article/pii/S0304405X12000190.

[9] Common equity factors have been made popular by Fama and French (1993, 2008, 2015) as well as many other academics who have documented that equity markets price more than just the CAPM's beta of Sharpe (1964) and Litner (1965), as well as multifactor model extensions such as APT by Ross (1976).

[10] Cochrane, John H. "Presidential Address: Discount rates." *The Journal of Finance* 66, no. 4(July 2011): 1047–1108.

[11] Ingo Fender and Ulf Lewrick, "Shifting tides - market liquidity and market-making in fixed income instruments," *BIS Quarterly Review*, March 18, 2015, 97-109, https://www.bis.org/publ/qtrpdf/r_qt1503i.htm.

[12] This occurs as securities are repackaged, causing still more securitizations, or "re-securitizations," as well as through the combination of re-securitization and credit derivatives.

has allowed participants to have access to a wide range of investment opportunities without necessarily grasping the full consequences of their investments during economic downturns.

Given the bond market's complexity and the lack of liquid exchange-traded markets for most bonds, the majority of the trading activity occurs with counterparties in the OTC market in order to gain better control of fixed-income risk exposure. According to Duffie (2012), "The OTC market covers essentially all trades in bonds (corporate, municipal, U.S. government, and foreign sovereign bonds), loans, mortgage related securities."[13]

The fact that fixed-income securities are mainly traded in the OTC market has three major consequences:

1. It is difficult to get a sense of the "true" liquidity of the market and to quantify it properly. This is directly related to the opaque nature of the OTC market and the lack of data. In comparison, in an equity exchange-traded market, one has access to intra-day and daily price data and can measure the trading activity, thanks to the availability of the bid and ask quotes, traded prices, and volume. In the OTC market, to the best of our knowledge, there is very limited access to bid and ask quote data and questionable volume data. One can only get access to the buy and sell data through proprietary databases that are difficult to access and process. Although the TRACE database through FINRA exists and provides secondary trade prices, the ability to access this data is cumbersome enough to effectively render it difficult to employ. The natural consequence, therefore, is that bonds are less liquid and less understood.
2. The lack of liquidity can be amplified by the fact that there are fewer diverse participants in bond markets. In the equity market, while retail investors have smaller account sizes

[13] Darrell Duffie, "Market Making Under the Proposed Volcker Rule," *Rock Center for Corporate Governance at Stanford University Working Paper no. 106*, January 24, 2012, Stanford University.

than that of institutional investors, the amount held by retail investors is very large. In the bond market, there is very limited active retail trading activity.

3. Given that the trading happens in a closed loop among relatively few institutional entities, bad news can impact liquidity dramatically due to feedback effects. The example of Lehman Brothers is illustrative of this effect during the crisis. While there are discrepancies regarding the precise catalyst of the credit crisis of 2008, most believe that the crisis began with Lehman Brothers' sudden inability to secure short-term borrowing from other counterparties. Why would other counterparties, who have been faithfully doing business with Lehman for years, suddenly stop lending to Lehman?

In their book, *Animal Spirit*, Akerlof and Schiller (2009) argue that the cornerstone of any business transaction is trust. As soon as the Street learned about Lehman's large book in MBS, they were terrified of the exposure to credit risk that Lehman posed and ceased doing business with them. The fear was viral; as soon as the first counterparty declined to transact business with Lehman, all other counterparties turned their backs on Lehman. A crisis of confidence is essentially a feedback loop of fear that propagates through the whole market.[14]

B. Volcker Rule Further Limits Proprietary Trading

Another important regulatory change affecting the corporate bond market is the Volcker Rule. The intent of the Volcker Rule is to prohibit banking entities with access to the discount window at the Federal Reserve or to FDIC insurance from engaging in risky proprietary trading. It seeks to limit risks in proprietary trading that could lead to an increase in the risk a single institution poses to their entire financial system. After a "laborious process," the Volcker Rule

[14] George A. Akerlof and Robert J. Shiller, *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism* (Princeton University Press, 2009), 11-142.

became effective in 2014 and applied to banks with trading assets in excess of $50 billion.[15] Compliance with the rule was required by July 21, 2015.

One of the main issues in the Volcker Rule is the ambiguity in precisely defining the rules for market-making in the broker-dealer business of banks (see Bao, O'Hara, and Zhou, 2016). The Volcker Rule set guidelines to separate market-making from proprietary trading because market-making should have rapid inventory turnover with the vast majority of profits sourced from bid-ask spreads rather than from inventory appreciation.

The problem in following the guidelines set in the Volcker Rule lies in the inherent difficulty in distinguishing market-making activity from proprietary trading. This ambiguity in the guidelines may motivate dealers to choose more conservative trading strategies. New rules favoring customer-facing trades may discourage dealers from using the interdealer market, and inventory-based metrics may lead dealers to reduce their inventory exposure. For example, Bessembinder et al. (2018) show that the inventories in corporate bonds for bank-dealers have decreased continuously since 2006 and more significantly after the implementation of the Volcker Rule .[16]

Additionally, metrics such as inventory turnover or inventory aging, which are used to analyze stocks, cannot be applied in the same way to corporate bonds. Duffie (2012) notes that the average half-life order imbalance in investment-grade corporate bonds is two weeks, whereas it is about three days for stocks.[17] The average half-life order imbalance allows one to have a measure of the time required to revert to an acceptable inventory target level. While this figure is an average,

[15] Jack Bao, Maureen O'Hara, and Xing (Alex) Zhou, "The Volcker Rule and Market-Making in Times of Stress," Finance and Economics Discussion Series 2016-102, Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2016.102.
[16] Hendrik Bessembinder, Stacey E. Jacobsen, William F. Maxwell, and Kumar Venkataraman, "Capital Commitment and Illiquidity in Corporate Bonds," *The Journal of Finance* 73, no. 4, (August 2018): 1615-1661.
[17] Darrell Duffie, "Market Making Under the Proposed Volcker Rule," *Rock Center for Corporate Governance at Stanford University Working Paper no. 106*, January 24, 2012, Stanford University.

it is reasonable to believe that it could change significantly in periods of crisis as liquidity disappears. The difficulty in measuring and monitoring such metrics for the successful implementation of the Volcker rule is yet another factor giving rise to difficulties encountered with measuring liquidity risks in bond markets.

C. OTC Market Making is Impossible While Having a Matched Book

Furthermore, it is impossible to participate in market making without having a matched book, which particularly affects liquidity in times of stress. Bao et al. (2016) show that liquidity decreases especially during a market crisis, ironically when liquidity is needed the most and the willingness to trade in corporate bonds is high. Ultimately, market makers must "take a view" to participate, accelerating what would then be a "slippery slope" into proprietary trading. With opaque and therefore wide bid-ask quotes in these markets, it is almost impossible to have a matched book for market makers.

D. Large Asset Managers' Claim that They "Will Be the Market" is Preposterous

Some large asset management companies have publicly stated that they would stand ready to "be the market" in times of market crises in order to allay the fears of investors. A study by Fitch found that some asset managers are already holding higher portfolio cash balances to meet investor redemptions upon demand, in effect trying to offset structural declines in dealer inventories and market liquidity by holding additional internal liquidity through cash.[18] While cash could be used to satisfy margin calls and give borrowers more assurance, this type of liquidity

[18] Yuriy Layvand and Matthew Noll, "Bond Market Liquidity Seen Moving Toward Asset Managers," *Fitch Wire*, November 11, 2014, https://www.fitchratings.com/gws/en/fitchwire/fitchwirearticle/Bond-Market-Liquidity?pr_id=920315.

actually leads to a false confidence because cash liquidity does not always translate into trading liquidity. Trading liquidity provides a mechanism to exit a given position. The ability to unwind a position is paramount, especially during a financial crisis. It is also important to note that many bond mandates require minimizing cash.

A study by Alliance Bernstein on bond market liquidity found that when the system was tested by a period of prolonged selling during the so-called "taper tantrum" of 2013, bid-ask spreads widened sharply.[19] This indicates that in periods of stress, it is unclear whether asset managers can provide the liquidity that is needed. As of December 2018, fixed-income hedge funds held a total of $556 billion in assets under management,[20] corresponding to just 6 percent of the $9.2 trillion corporate bond market.[21] Given their relatively small size, it is simply impossible for hedge funds to "become the market" and absorb large liquidity shocks.

Furthermore, fixed-income hedge funds tend to hold large long positions, which means that when prices fall, the net asset value (NAV) of these funds decreases significantly. This puts them in an unlikely, if not impossible, position to "be the market." It would be imprudent, therefore, to look solely to larger asset management companies to provide liquidity in OTC markets when a financial crisis occurs.

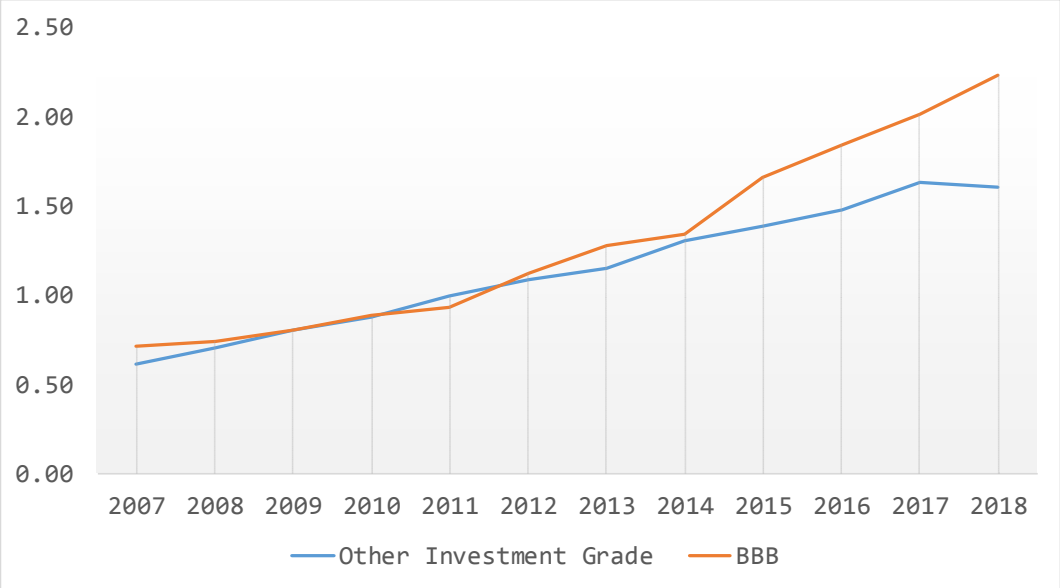
[19] Douglas Peebles and Ashish Shah, "Playing with Fire: The Bond Market Liquidity Crunch and What to Do about It," Alliance Bernstein, https://www.sec.gov/spotlight/fixed-income-advisory-committee/alliancebernstein-bond-market-liquidity-fimsa-011118.pdf.
[20] "Hedge Fund Industry Assets Under Management," Barclay Hedge, accessed March 2019, https://www.barclayhedge.com/solutions/assets-under-management/hedge-fund-assets-under-management/.
[21] See reference 4.

2. Masking Deterioration of the Underlying Collateral and Rearview Mirror Analysis

A. Today's BBB Corporate Bond is Yesterday's BB

A metric that is important to consider is the rise of lesser quality bonds in the corporate bond market. An article in the Wall Street Journal recently pointed out the increase in BBB corporate bonds reaching record levels.[22] The graph below shows that increase over time and compares it to other investment-grade bonds for reference.

Figure 2: Outstanding Debt – BBB vs. Other Investment-Grade Bonds over Time



Note: Vertical axis is in trillions of US dollars for US corporate debt. Source: WSJ and Fitch Ratings.

As Figure 2 shows, there has been an alarming increase in the number of BBB bonds issued after 2014. It is important to note that pre-crisis levels of debt were less than $1 trillion. That figure more than doubled by 2018, to $2.3 trillion of BBB-rated corporate debt outstanding and has been

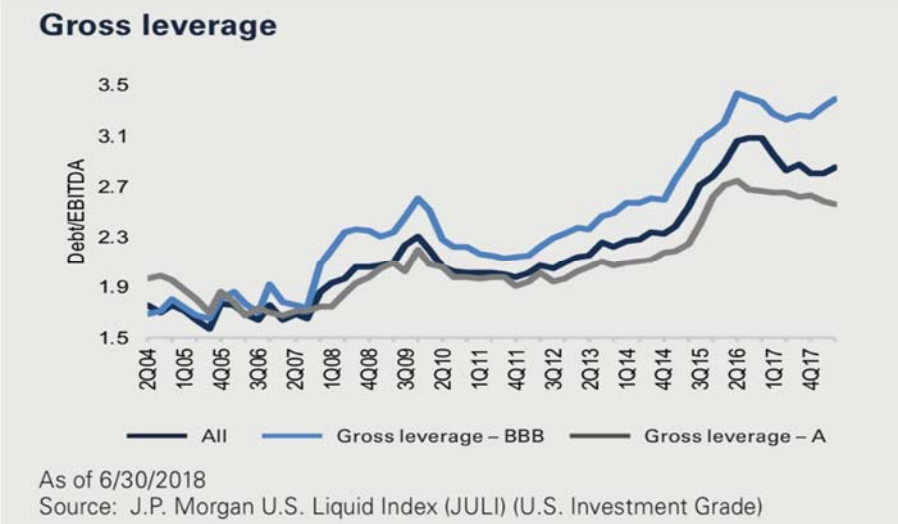
[22] Sam Goldfarb, "Corporate Debt Is Reaching Record Levels," *Wall Street Journal*, December 29, 2018, https://www.wsj.com/articles/corporate-debt-is-reaching-record-levels-11546099201.

rising at a faster rate. In 2007, less than 40 percent of Citigroup's US Broad Investment-Grade Corporate Bond Index was rated BBB. Today, about 47 percent is classified as such.[23] In 2007, average daily trading volume for BBB bonds was $3.3 billion versus $1.5 billion for BB bonds, while in 2018 daily trading volume for BBB bonds rose to $12.4 billion versus $4.2 billion of BB bonds.[24]

The BBB market is not only more crowded, but, disconcertingly, it is also riskier (on a comparable basis) by virtue of having more leverage, as measured by debt divided by EBITDA. Figure 3 below shows that compared with leverage of 2.0x during the 2008 financial crisis, average leverage has crept up markedly to 3.2x for BBB credits.[25] Credit analysts at Morgan Stanley wrote that "If the companies in our universe were rated based on their leverage, we estimate that over a quarter of the investment-grade market would have a high-yield rating, using Moody's leverage buckets across sectors."[26] It is critical to highlight that some of the companies that have piled on debt in order to engage in mergers or acquisitions will easily free-fall into junk bond ratings when the next economic downturn comes. The relatively smaller high-yield market will have to absorb this new supply, leading to a sharp price drop. The present spreads do not adequately compensate investors for the risk they are taking.

[23] Philip Grant, "Triple-B Gees," *GRANT'S*, March 22, 2018, https://www.grantspub.com/almostDailyHTML.cfm
[24] "U.S. Corporate Bond Trading Volume," SIFMA, accessed March 2019, https://www.sifma.org/wp-content/uploads/2017/06/corporate-us-corporate-trading-volume-sifma.xls.
[25] Vito J. Racanelli, "Where the Bond Market's Next Big Problem Could Start," *Barron's*, August 17, 2018, https://www.barrons.com/articles/where-the-bond-markets-next-big-problem-could-start-1534536183.
[26] See reference 24.

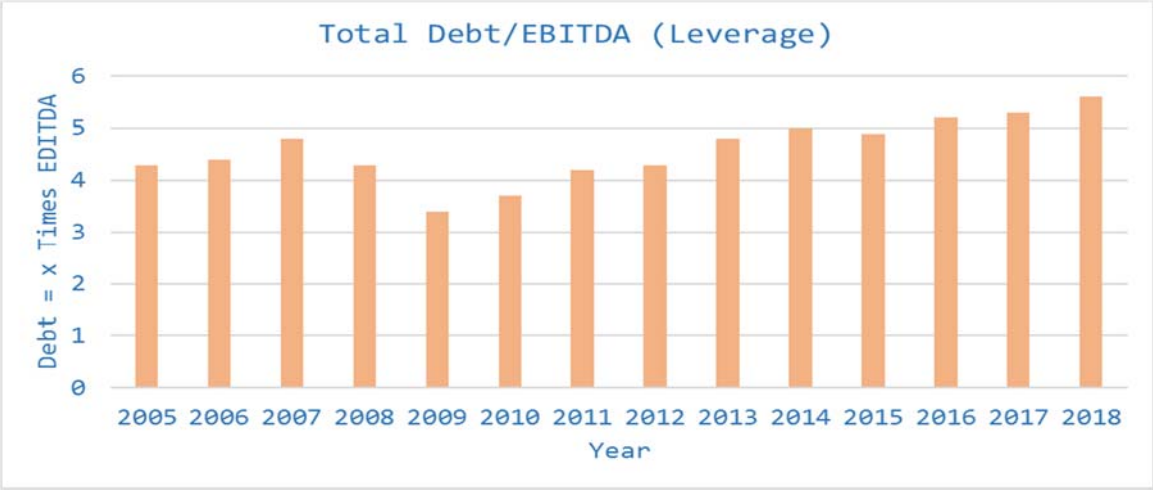
Figure 3: Leverage for Different Investment-Grade Bonds



B. Deterioration in Middle-Market Corporate Lending Standards

Next, we pair the increasing trend of low-quality bonds with an increase in the level of leverage in middle-market companies. Middle-market companies are defined as companies with EBITDA of less than $50 million dollars. Figure 4 below shows the evolution of leverage for middle-market companies.

Figure 4: Leverage for Middle-Market Companies Measured by Total Debt/EBITDA



Source: S&P Global Market Intelligence and WSJ.

The level of leverage is one of the most important gauges of credit risk, and it has increased consistently since 2010 for middle-market companies. That level is now higher than the level of leverage immediately preceding the financial crisis of 2008. The most reasonable explanation for the current high leverage level is the availability of easy money over the past decade. This was precisely the primary underlying cause of the 2008 financial crisis and should be a red flag going forward. In response to the high leverage concern in the wake of the 2008 financial crisis, the Federal Reserve imposed tighter regulations and reserve requirements on financial institutions with the aim of bringing about better leverage control. These more stringent regulations resulted in deposit-taking financial institutions being more self-disciplined and responsible with their use of balance sheets. However, this merely shifted the same leverage risk to insurance companies, pensions and other institutional investors by way of private fund offerings.

Along with rising leverage levels, the increase in direct private debt should also cause concerns about a developing bubble. For mid-size companies that are too small to enter the bond market but too big to simply rely on bank loans, private debt can be a good option. Private debt tracked by Preqin has increased four-fold over the last decade. Although there is a trend of decreasing returns, feedback shows that most investors think returns from private debt will meet or exceed their expectations.

However, attractive returns from private debt are fleeting because too many investors chasing yields have caused those yields to compress. When the next downturn comes, it will become clear that the low returns ultimately cannot compensate for the risks.

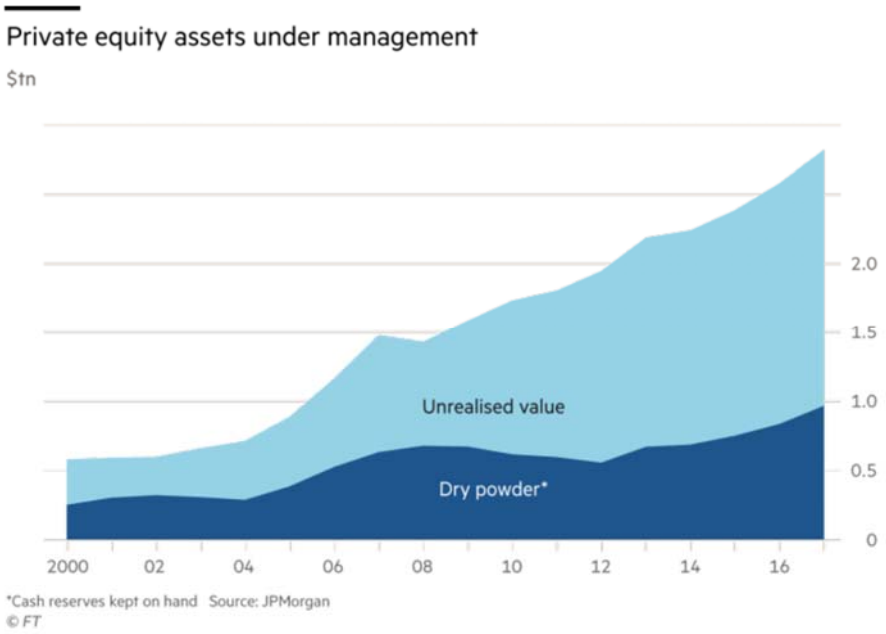
Similarly, there are an increasing number of investors in PE funds. Preqin shows that in 2018, Apollo IX completed fundraising of nearly $25 billion dollars, a record high level.[27] Also,

[27] Prequin, "Largest Buyout Deals and Exits," 2018 Preqin Global Alternative Reports, 104, https://docs.preqin.com/samples/2018-Preqin-Global-Report-Sample_Pages_Combined.pdf.

six well-known PE funds have recently closed or announced closures that combined, exceeded $100 billion.[28] Strong demand from investors leads to intense rivalry among fund managers. Consequently, some managers are paying 11-12 times EBITDA to secure deals, which is an even a higher multiple than the previous peak in 2007. It is important to note that according to Warren Buffet, the long-term return for corporate equity risk is about 6 percent.[29] This environment of fierce competition makes it unlikely that PE funds will perform as strongly as they have in years prior. A principal at AQR, Antti Ilmanen, said, "Private equity doesn't seem to offer as attractive an edge over public market counterparties as it did 15 or 20 years ago."[30] Analysts also warn that the PE industry may have reached a peak and caution that sustaining high performance in the coming years appears challenging. With so much money on the sidelines, one risk is that managers will end up overpaying for assets, thus reducing future returns. Figure 5 shows that the dry powder of PE totaled nearly $1 trillion by the end of 2017,[31] meaning that more than 30 percent of the total AUM in PE funds was not invested.

[28] The six firms include Apollo, CVC, Blackstone, Hellman & Friedman, Carlyle, and Warburg.
[29] Shawn Tully, "Here's What 1999 Warren Buffett Might Say About the 2018 Stock Market," *Fortune*, February 14, 2018, http://fortune.com/2018/02/14/economy-stocks-warren-buffett.
[30] Antti Ilmanen, Swati Chandra, and Nicholas McQuinn, "Demystifying Illiquid Assets: Expected Returns for Private Equity," AQR, January 31, 2019, https://www.aqr.com/Insights/Research/White-Papers/Demystifying-Illiquid-Assets-Expected-Returns-for-Private-Equity.
[31] Javier Espinoza, "Private equity's winning run faces late-cycle challenge," *Financial Times*, July 5, 2018, https://www.ft.com/content/69eff818-7f7c-11e8-8e67-1e1a0846c475.

Figure 5: Private Equity Assets Under Management



C. Just Because Subprime Auto Loans "Did Well Last Time" Doesn't Mean They Are Safe Now

An example of a typical behavioral bias is overconfidence. This bias is exacerbated when it is supported by what has worked in the past. We use the auto loan market to illustrate this principle.

An *ABS Alert* article on subprime auto loans in 2015 reported that the financial firm Skopos sold $154 million of asset-backed securities (ABS) in auto loans where the collateral pool included 14 percent of loans from a borrower with no credit score. The rapid increase in the number of structured products sold to investors possessing a weak credit base are ominous echoes of similar structures that were packaged, sold, and backed by household borrows for the NINJA loans that preceded the financial crisis of 2008: NINJA stood for no income, no job, or asset.

Figure 6: Motor Vehicle Loans Outstanding Over Time

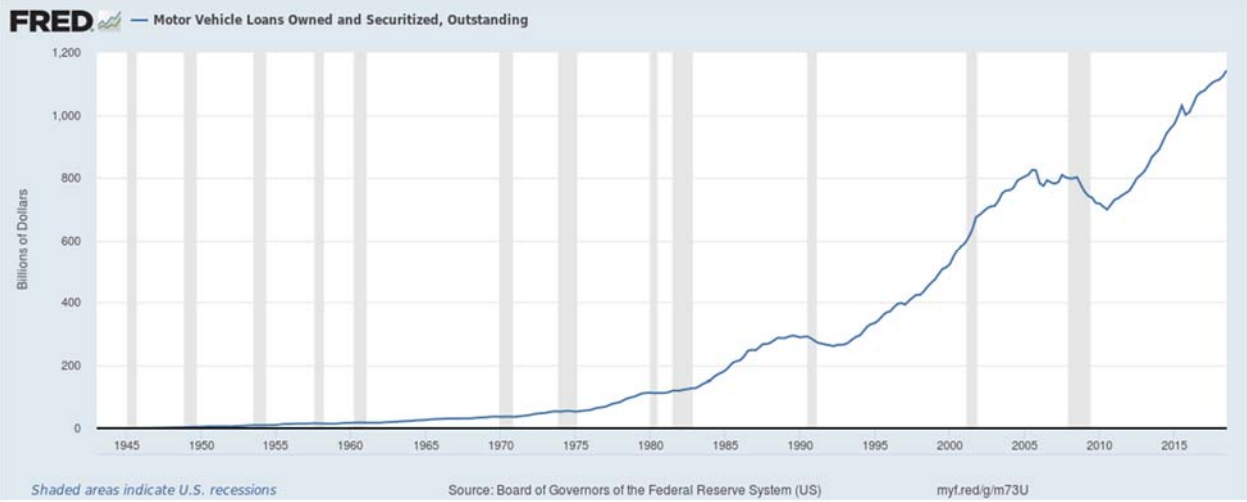
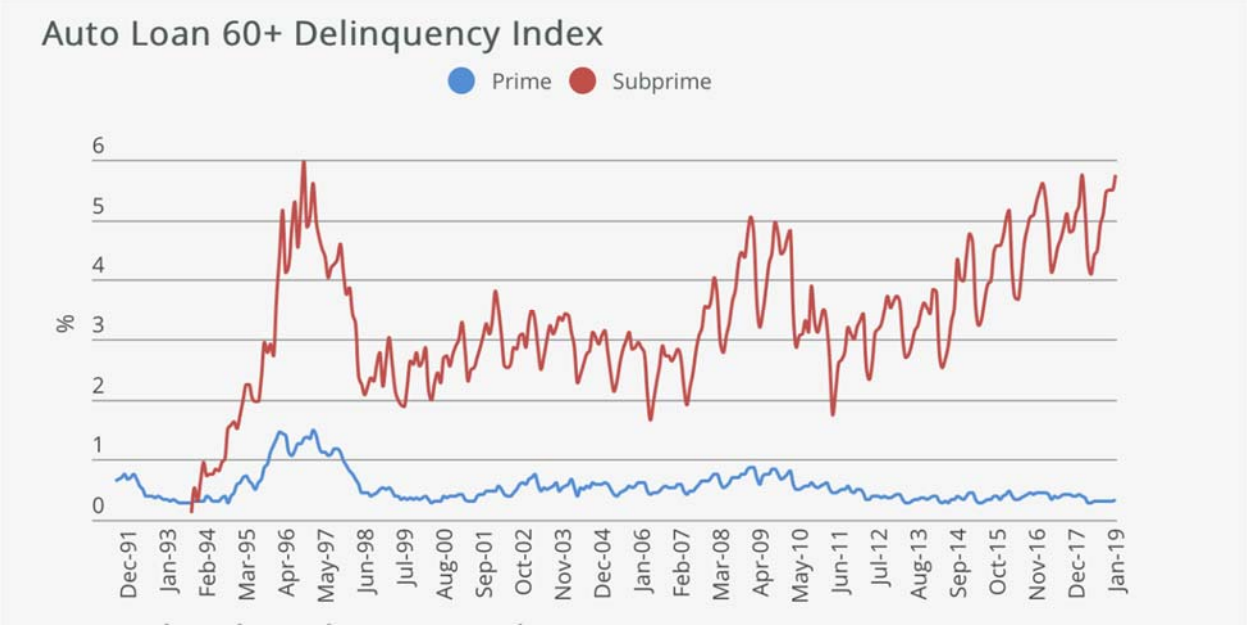


Figure 6 above shows the growth of car loans. We can clearly see the growing trend, with car loans currently representing a total of $1.2 trillion of outstanding debt. From a behavioral perspective, we tend to think that because car loans were relatively safe during the financial crisis of 2008, they will be safe in future financial crises. Figure 7, however, shows that the delinquency rate of subprime auto loans has been steadily rising since 2011, reaching a historically high rate of 5.5 percent as of the beginning of 2019, while prime auto loans maintained a delinquency rate lower than 0.5 percent over the same time period.

Subprime auto loans are tempting, providing easy access to credit for consumers who want to purchase status cars that they cannot otherwise afford. This scenario is a clear harbinger of economic trouble for the sector. Additionally, when the economy takes a dip, many of these consumers will suddenly struggle to make car payments on a car they could barely afford to purchase even when the economy was strong. Investors would be wise to keep a vigilant eye on the auto loan markets: once this market descends into mass default, it is possible that those defaults will create a domino effect across the entire credit market.

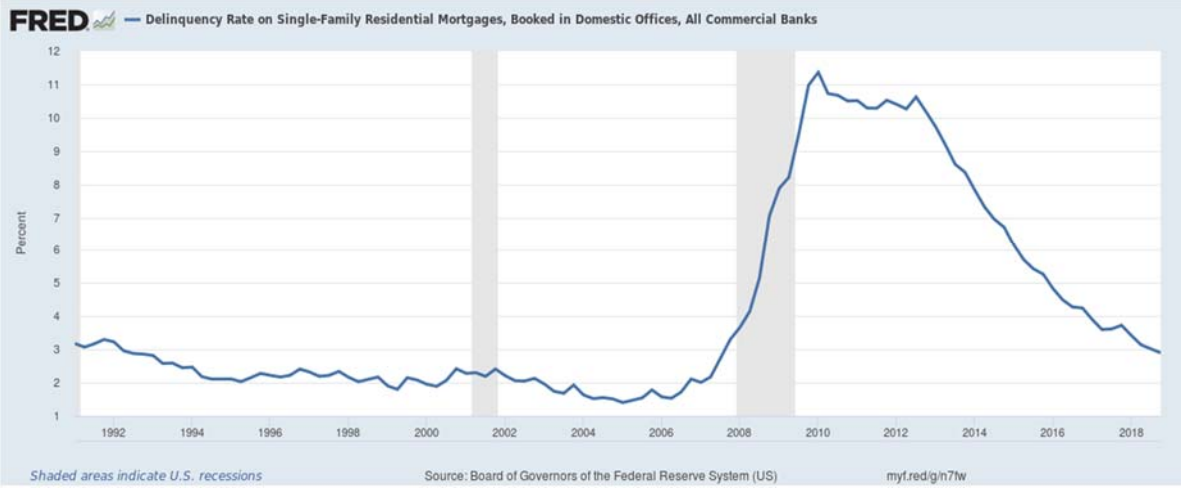
Figure 7: Delinquency Index of US Auto Loans



Source: Fitch Ratings

Similar to the pattern of delinquency rates in the auto loan market, Figure 8 shows the delinquency rate of residential mortgages before and after the crisis. Two years prior to the financial crisis, the delinquency rate rapidly increased until it peaked in 2010; then it sharply dropped to its lowest point, where it stabilized at a level of 2-3 percent. The striking similarities between the delinquency rates of these two markets allows us to draw a supportable conclusion that a subprime auto loan bubble is developing and will likely traverse the same disastrous route as the subprime mortgage market in 2008.

Figure 8: Delinquency Rate on US Residential Mortgages

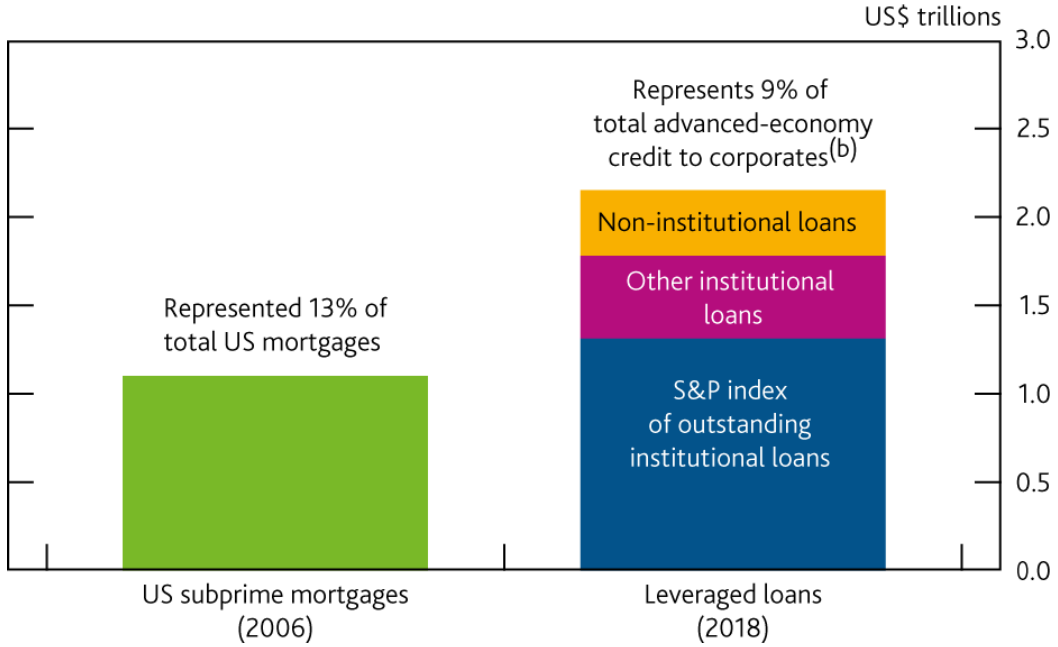


D. Leveraged Loan Data

To put things in perspective, we now turn our attention to the leveraged loan market and compare it to the pre-crisis subprime mortgage market in 2006. This comparison is illustrative because a leveraged loan and a subprime mortgage share common features. A subprime mortgage is created for individuals with poor credit (a FICO score ranging between 500 to 600), in the same way that a leveraged loan is created for corporations with poor credit ratings.

According to the definition of S&P Leveraged Commentary & Data (LCD), a well-known provider of leveraged loan news and analytics, a leveraged loan is typically for borrowers with low credit ratings of BB- or lower, and additionally, any loan that has a borrowing rate of at least LIBOR plus 125 basis points and that has no current rating. Note that the definition of leveraged loans varies between different types of lenders.

Figure 9: US Subprime % vs. Global Leveraged Loans %



(b) Leveraged loans as a share of total corporate credit in US, UK and eurozone
Source: *Bank of England Financial Stability Report* 44, November 2018

Figure 9 above shows global leveraged loans compared to corporates as a share of total corporate credit in the US, UK and Eurozone, and the US subprime mortgage in 2006 as a percentage of the total US mortgage market. Figure 9 shows that the amount of leveraged loans has substantially increased over the past decade and now represents a significant 9 percent of the advanced economies' credit to corporates.

Figures 10, 11, and 12 below show[32] the growth in leveraged loan issuance, increase in the covenant-lite share of outstanding leveraged loans, and rising debt-to-EBITDA ratio, respectively, in the US since 2006.

[32] "What to do About the New Subprime Boom," *Bloomberg*, February 20, 2019, https://www.bloomberg.com/opinion/articles/2019-02-20/subprime-corporate-debt-leveraged-loans-could-cause-next-crisis.

Figure 10: US Leveraged Loans Outstanding

Figure 11: Covenant-Lite Share of Leveraged Loans Outstanding

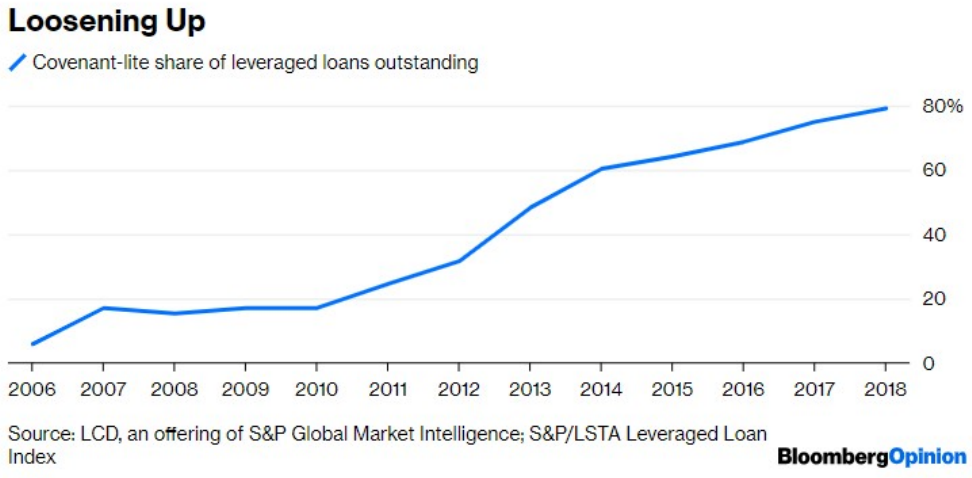
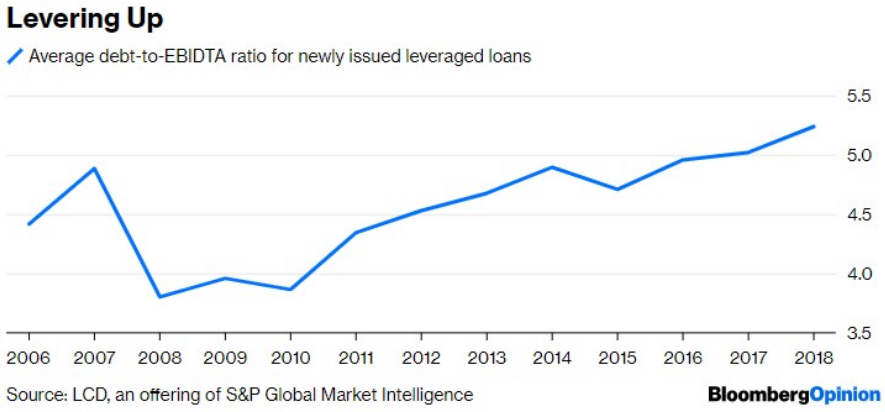


Figure 12: Average Debt-to-EBIDTA Ratio for Newly Issued Leveraged Loans



In addition, more companies are increasingly relying on newly issued leveraged loans for refinancing. If an economic downturn occurs and defaults start to pick up, demand would dry up, leaving companies with nowhere to go for refinancing, triggering even more defaults.

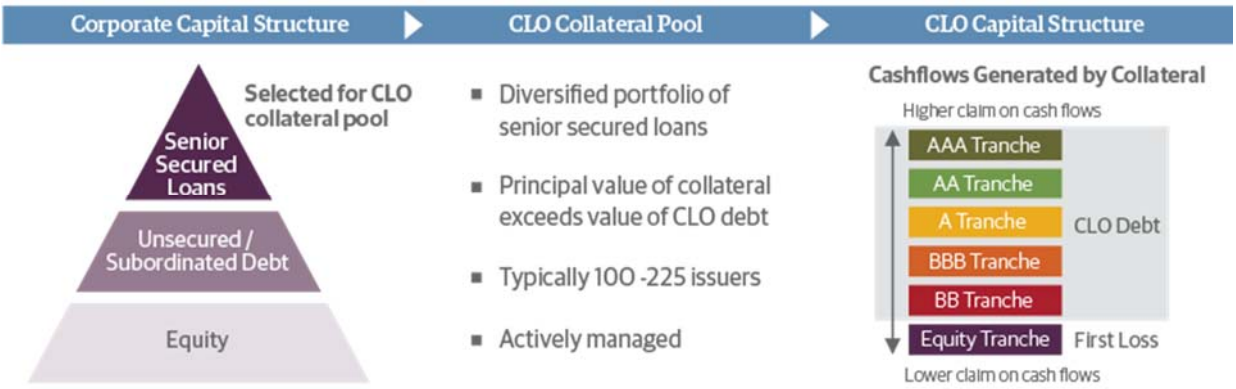
It is reasonable to think of pre-crisis subprime mortgages as leveraged loans because the customers for both are weak borrowers with poor to no credit ratings. In too many instances, the borrowers of subprime mortgages are not required to make down payments, nor to show evidence of employment or consistent income.

In that sense, a subprime loan is a leveraged loan by any definition of leverage. This comparison naturally leads to the observation that BBB-rated bonds show similar patterns as the mortgage market did before the credit crisis. As is the case for the high level of leverage in mid-market companies, the greatest danger that leverage poses is its ability to amplify otherwise small levels of uneasiness in the system, which can trigger a systemic shock. This has happened in the subprime market in the past and it can happen in the corporate credit market now. With economic downturns occurring on a dependable cycle, it is only a matter of time before we witness—and suffer—the consequences of an over-leveraged credit market implosion.

E. Rearview Mirror Analysis of CLOs

Collateralized loan obligations (CLOs) are investment vehicles that buy pools of floating-rate leveraged loans from banks and then package those loans into tranches of debt with credit ratings ranging from AAA to BB, as well as one tranche of equity. Figure 13 shows a typical capital structure for a CLO, and distinguishes the various tranches and their respective ratings from rating agencies.[33]

Figure 13: CLO Capital Structure



Issuance of CLOs hit a record high of $125 billion dollars in 2018 as investors sought a floating-rate product in the rising interest rate environment, as shown in Figure 14.

Meanwhile, CLOs outstanding as a subset of collateralized debt obligations (CDOs)[34] have risen significantly, from only 25 percent of all CDOs a decade ago to about 80 percent of CDOs in 2018

[33] "Understanding Collateralized Loan Obligations (CLOs)," Portfolio Strategy, Guggenheim, April 5, 2017, https://www.guggenheiminvestments.com/perspectives/portfolio-strategy/collateralized-loan-obligations-clo.

[34] The CDO denomination here refers to structured finance CDOs, trusted preferred CDOs, collateralized bond obligations, collateralized loan obligations, and collateralized fund obligations. It does not include asset-backed securities.

(a 130 percent change). This also occurred in the midst of a shrinking CDO market, as shown in Figure 15.[35]

CLOs seem to be a good option for institutional investors chasing plump yields. Two publicly traded, closed-end funds, Eagle Point Credit Company (ECC) and Oxford Lane Capital Corporation (OXLC) that focus on CLO equity (the riskiest tranches) could reach yields of up to 14 percent in 2019. More conservative funds investing in both debt and equity also generated yields of around 9 percent in 2019. Considering the impressive performance, CLO default rates have been extremely low in recent years, even during the crisis. During 2006-2007, 96 percent of equity tranches paid off, and there were zero default cases from 1994 to 2013 in senior secured tranches. High yields and low default rates are what attract CLO investors.

Investors, however, should be cautious, given the hidden risks. Leveraged loans are provided to corporates with poor credit ratings. The market size of leveraged loans has doubled since 2008, to $1.3 trillion. It is equivalent in size to subprime mortgages immediately before the crisis. What CLOs do is to effectively turn these dubious debts into securities with high investment grades, creating a false sense of safety for investors. Furthermore, as investor demand for securities increases, credit quality and underwriting standards for leveraged loans are deteriorating. CLO managers with little or no skin in the game are willing to accept higher debt multiples and weaker covenants.[36] This same problem of lenders being incentivized to take outsized risks was a primary root cause of the 2008 financial crisis.

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[35] Mayra Rodriguez Valladares, "CLO Issuance Is Far Surpassing Other Types of Asset-Backed Securities," *Forbes*, November 5, 2018, https://www.forbes.com/sites/mayrarodriguezvalladares/2018/11/05/clo-issuance-is-far-surpassing-other-types-of-asset-backed-securities/#672b8a1d1384.

[36] The US Court of Appeals for the District of Columbia Circuit ruled in February 2018 that CLO funds will no longer have to comply with risk-retention rules, the "skin-in-the-game" rules designed to align interests between managers and their investors. United States Court of Appeals For The District of Columbia Circuit, The Loan Syndications and Trading Association v. Securities and Exchange Commission and Board of Governors of the Federal Reserve System, October 10, 2017,

Figure 14: US CLO Issuance History

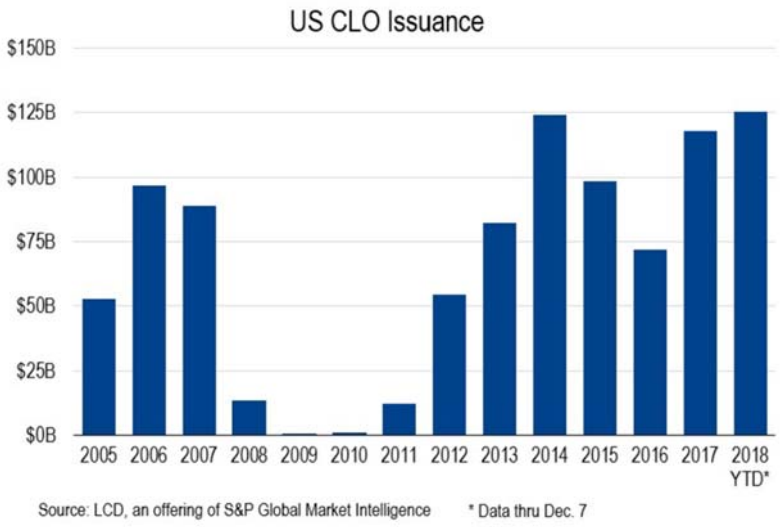


Figure 15: US Outstanding Collateralized Debt Obligations

Source: SIFMA.

https://www.cadc.uscourts.gov/internet/opinions.nsf/871D769D4527442A8525822F0052E1E9/$file/17-5004-1717230.pdf.

3. Rating Agencies Are Playing New Versions of the Same Old Games

A. Short History of Credit Rating Agencies

The credit rating business dates back to 1909, when John Moody published the first rating on railroad bonds. Fitch Publishing was established in 1922, and the two companies that merged to create Standard & Poor's began as Poor's Publishing in 1916 and Standard Statistics Company in 1922.[37]

There were two important events in the history of credit ratings agencies (CRAs). In 1936, regulators set new requirements for banks to hold investment-grade bonds and prohibited them from holding speculative bonds. The policy justification for these new requirements was that the core regulatory function of banks is "prudential regulation" and thus every effort must be made to keep the banks solvent.[38] This was a major regulatory shift because up until then, banks could choose to completely disregard ratings in considering which bonds they held. Effectively, this regulatory change was the beginning of a transfer of the rating business from regulators to private, third-party companies, namely CRAs.

The second important historical event for CRAs occurred in 1975 when the SEC recognized that, similar to commercial banks, broker-dealers and securities firms needed to take into account the riskiness of the bonds that they hold with respect to their available net capital. In effect, the banks' regulatory obligation of "prudential regulation" now also applied to securities

[37] Lawrence J. White, "A Brief History of Credit Rating Agencies: How Financial Regulation Entrenched this Industry's Role in the Subprime Mortgage Debacle of 2007-2008," George Mason University, *Mercatus On Policy* 59, October 2009.
[38] Lawrence J. White, "Credit Rating Agencies: An Overview," *Annual Review of Financial Economics* 5 (November 2013): 93-122.

firms. The only issue in implementing the regulation was that the SEC did not understand how to designate which CRAs were qualified to assess the grade of a bond.

In response, the Nationally Recognized Statistical Rating Organization (NRSRO) designation was created. Rating agencies could only obtain a NRSRO designation with a certification from the SEC. Over the next 25 years after the regulatory change of 1975, only four firms were certified. The barrier to entry into the rating business became stratospherically high thanks to the SEC required NRSRO designation. Currently, there are 10 NRSROs. As a consequence of these regulatory changes, firms that used to conduct their own credit analysis started to use a bond's NRSRO rating in order to properly assess risk assessment and to remain in regulatory compliance.

The NRSRO proved not to be a panacea for the bond market, however. During the financial crisis, many blamed the rating agencies for their role in misrepresenting the credit quality of mortgage-backed securities and structured products linked to those securities. In the Financial Crisis Inquiry Commission's report, the commission concluded that "The mortgage-related securities at the heart of the crisis could not have been marketed and sold without their seal of approval."[39] The commission specifically called out the big three rating agencies (Moody's Investors Service, Standard & Poor's, and Fitch Ratings) for their role in the crisis.

Historically, the CRAs' business model was based on subscription fees that investors paid to access ratings. In the 1970s, the invention of copying machines disrupted that business model since it became possible to photocopy rating reports and distribute them for free.

As the rating agencies adapted, they changed their business model to an issuer-pays model. Issuers pay the agencies to obtain a rating that allows them to market and borrow money. As we

[39] Phil Angelides et al., *The Financial Crisis Inquiry Report*, The Financial Crisis Inquiry Commission, January 2011, https://www.govinfo.gov/content/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf.

now know, the issuer-pays model created incentives and conflicts of interest that were partially responsible for the credit crisis of 2008. The credit crisis is not the only time when CRAs attracted public attention and ire, however. During the Enron debacle in 2001, just five days before the company declared bankruptcy, the big three agencies had an investment-grade rating on Enron bonds.

Despite their errors in judgment and stumbles, CRAs are essential for the robust functioning of the market. The Dodd-Frank Act, signed into law in 2010, found that CRAs are "systematically important for the financial system" primarily because they uniquely possess the access to data and expertise to evaluate the quality of complex credit securities and provide a quantitative metric for investors to make informed decisions.[40]

Because of the crucial role that CRAs play in the global financial system, any business model issues that affect their ability to accurately and objectively assess the quality of bonds can have a massive impact on the financial system, as we saw in 2008. Two particularly important issues presently plaguing CRAs are discussed below.

B. The Rise of the Non-Big Three

Below is the list of NRSROs with their respective date of initial registration with the SEC. The list shows that there are currently ten institutions operating in the rating business.[41]

Big Three

Moody's Investors Service, Inc. ("MIS")

S&P Global Ratings ("S&P")[42]

[40] Dodd-Frank Wall Street and Consumer Protection Act, Pub.L. 111-203 (2010).
[41] 2018 Summary Report of Commission Staff's examination of each Nationally Recognized Statistical Rating Organization, US Securities and Exchange Commission, December 2018.
[42] Formerly known as Standard & Poor's Ratings Services.

Fitch Ratings, Inc. (“Fitch”)

Others

A.M. Best Rating Services, Inc. (“AMB”)[43]

DBRS, Inc. (“DBRS”)

Egan-Jones Ratings Company (“EJR”)

HR Ratings de México, S.A. de C.V. (“HR”)

Japan Credit Rating Agency, Ltd. (“JCR”)

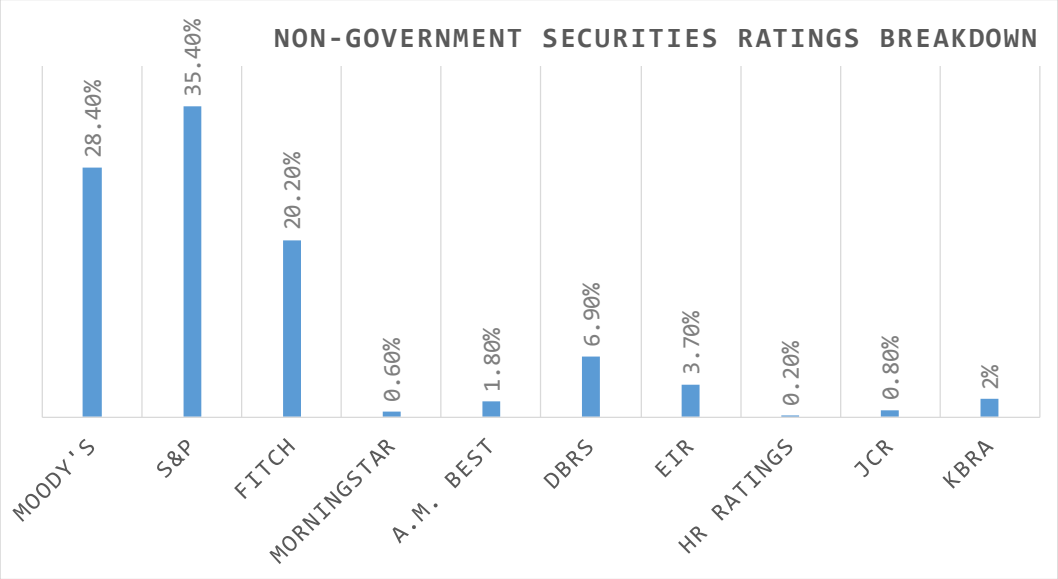
Kroll Bond Rating Agency, Inc. (“KBRA”)[44]

Morningstar Credit Ratings, LLC (“MCR”)[45]

As Figure 16 shows, there are now seven more NRSROs in addition to the Big Three. Because of these new additions, and the subsequent increase in competition, it is reasonable to anticipate that the quality of ratings will improve and we will collectively avoid some of the rate inflations that we saw before the crisis. However, as the graph below shows, there is a clear lack of diversification in the relative importance of the NRSROs. The Big Three control 84% of the ratings for non-governmental securities.

[43] Formerly known as AM Best Company, Inc. It is important to note that AMB focuses mainly on the rating of insurance companies. See www.ambest.com.
[44] Formerly known as LACE Financial Corp.
[45] Formerly known as Realpoint LLC.

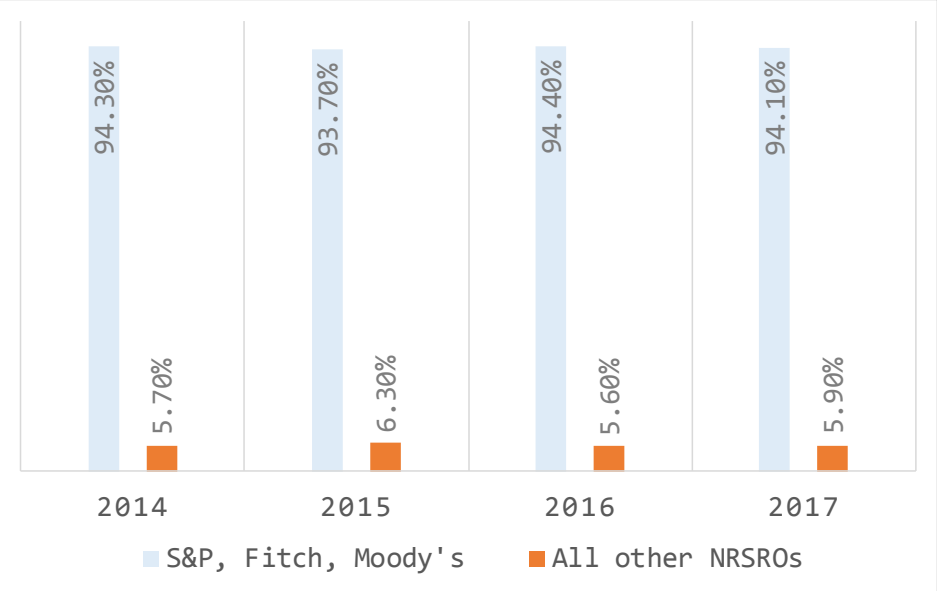
Figure 16: Non-Gov't Security Rating by Agencies



Source: US Securities and Exchange Commission

As we can see, the Big Three have garnered most of the rating business in the non-government sector, which includes the rating of corporate bonds, the most liquidity- sensitive of the trading bonds. Subsequently, the Big Three still overwhelmingly generate the major share of profits in the rating business. The graph below shows the percentage of revenue generated by all ratings agencies since 2014. As one can clearly see in Figure 17, the Big Three are still pocketing more than 90% of the total revenues in the rating business.

Figure 17: Revenues from the Big Three vs. Others over Time



Source: US Securities and Exchange Commission

The barriers to entry in the rating business, a consequence of the SEC's 1975 regulatory efforts, and the lack of diversification in terms of revenues and business share are dangerous factors that will impede the efficient functioning of the rating business. It could lead to polarization and homogenization in bond ratings and quite possibly rating inflation on the part of the smaller players given the natural incentives created by the issuer-pays business model. From a business economics perspective, as the smaller players try to grow, it is conceivable that in trying to keep what few customers they have happy, they will be motivated to please their bond issuers by inflating their ratings. The lack of diversification is undesirable in any industry, but particularly dangerous in the bond ratings market because of the deep trust placed by investors in bond ratings.

B. Lack of Full Implementation of Regulatory Reforms

Given the critical role that the credit rating agencies played in the financial crisis, the Dodd-Frank Act requires the SEC and the Government Office of Accountability (GAO) to implement three regulatory modifications to the business model of NRSROs.

The first requirement is for the SEC and GAO to examine the issuer-pays model for NRSROs and propose a new business model that would be less sensitive to rating inflation. If no business model is found suitable, Dodd-Frank requires that ratings be randomly assigned to the pool of NRSROs. While the SEC studied various alternative business models and found pros and cons in each of the models they examined, they did not conclude their study and therefore did not implement this set of Dodd-Frank recommendations.[46]

The second requirement is for the SEC to diminish the influence of NRSROs by removing and replacing the use of credit ratings in certain capital requirement rules for financial institutions and insurance companies. This requirement includes the use of designated non-NRSROs in order to mitigate the risk of the concentration of businesses and the lack of diversification in the ratings business.

The third requirement is for the SEC to find ways to increase the legal liabilities attached to the ratings determined by rating agencies and create a legal framework to build accountability into the business of rating bonds. Finally, Dodd-Frank increased the SEC's oversight reach in general in the regulation of the rating agencies.

These requirements were designed to systematically and logically address the weaknesses of the rating agencies that were revealed when examining the contributing factors in the financial crisis. However, many of these requirements have not been fulfilled, even as years have lapsed

[46] Alice M. Rivlin, John B. Soroushian, "Credit rating agency reform is incomplete," Brookings Institution, March 6, 2017.

since the crisis. For example, the SEC has not yet proposed an alternative to the issuer-pays business model. In addition, the requirement of randomly assigning ratings to the agencies has also not been implemented by the SEC. In spite of the fact that the SEC publishes an annual report in which it examines the functioning of the rating agencies, it has not yet been able to propose and enforce regulations that address the risk of rating inflation and the lack of diversification in the business of bond rating.

4. Explosion in Asset-Liability Mismatched Fund Structures

Mutual funds and ETFs typically provide holders daily, or better, liquidity. It is important to remember that most corporate bonds trade OTC because this trait is a crucial component of the hidden risks that appear in market crisis periods.

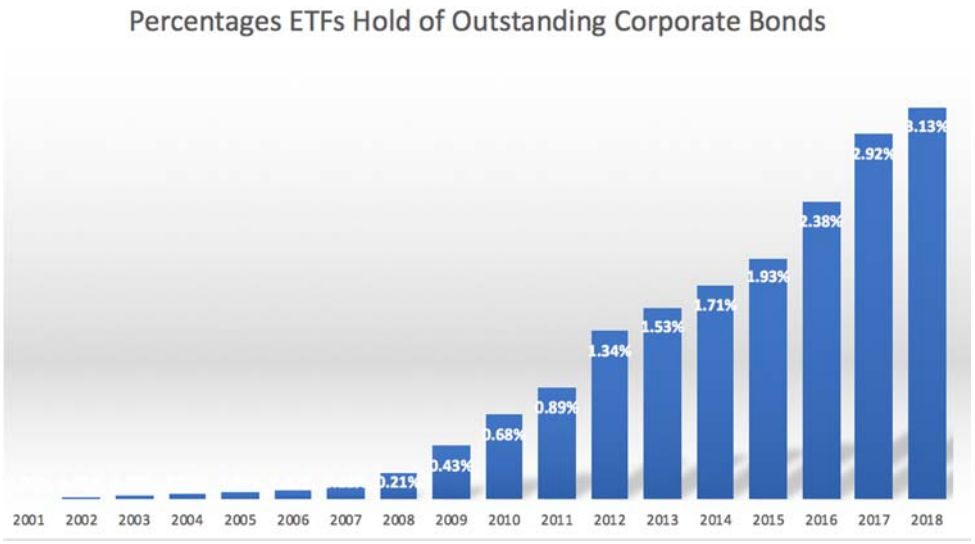
Recall that OTC markets are not as liquid as stock markets. Moreover, when a financial crisis strikes, the OTC market for corporate bonds will completely vanish. That is, when a crisis occurs, no market-makers will be willing to take the other side of the trade and thus provide liquidity for the underlying constituents of the corporate mutual funds and ETFs. Effectively, the mutual fund and ETF holders will have no redemption ability.

This significant mismatch in the liquidity of the underlying corporate bonds and the structures into which they have been packaged, namely mutual funds and ETFs, is underappreciated by retail investors and regulators. The regulators who cannot foresee the variety of risks these investors are exposed to, given the complexities of the corporate bond OTC markets, are especially in the dark.

A. ETFs Create a False Sense of Liquidity

One effective way to understand the structure of the bond market is to identify the entities that own that market. Figure 18 below shows the evolution of the percentage of corporate bonds in ETF space since 2001. The relative share of the ETF market in corporate bonds has gone from zero to 3% of the total debt, over $420 billion dollars as of December 2018. This is a significant increase and serves as strong evidence that retail investors are eager to invest in higher-yielding retail products. Retail investors naturally want their "yield cake," but will they get to eat it too?

Figure 18: ETF Outstanding Corporate Bond Holdings as a Percentage of Total Holdings



As of December 2018. Calculated from Table L.213 in the Flow of Funds Accounts, Financial Accounts of the United States (Release Z.1), published by the Federal Reserve Board in March 2019; includes foreign bonds held by US residents.

Retail investors have been eager to purchase fixed-income ETF products, and Wall Street financial engineers have enthusiastically created a variety of products to meet this demand. Currently, the largest fixed-income ETF is the iShares Core U.S. Aggregate Bond ETF (AGG) with $53.8B in assets. Fixed-income ETFs are a small component of the total fixed-income market.

The total size of the fixed-income ETFs is currently around $640 billion,[47] amounting to less than 6% of the total corporate bond market (estimated around $9.2 trillion).[48] But the ETF market for fixed-income products has been growing over time.

Stephanie Pomboy of MacroMavens concisely summed up the liquidity concern with ETFs when she said, "In 2007, the lie was that you could take a cornucopia of crap, package it together, and somehow make it AAA. This time the lie is that you can take a bunch of bonds that trade by appointment, lump them together in an ETF, and magically make them liquid. The upshot is that these vehicles are only liquid in one direction."[49]

B. Mutual Funds with Daily Liquidity Are Holding Illiquid Assets

As Figure 19 shows below, the evolution of the total debt owned by mutual funds up until 2007 was stable at around 7%. During the credit crisis in 2008, that number decreased slightly to below 7%. Since then we see that the percentage of bonds over the past decade has doubled to more than 15% of holdings, reaching over $2 trillion dollars as of December 2018. As noted above, in the wake of a credit crisis, when the market is in distress mode, it is very difficult to sell illiquid OTC assets. As many authors, including Gary Gorton, have pointed out, a financial crisis is simply equivalent to a lack of liquidity in the market. One cannot help but wonder how the mutual fund industry plans on responding to the sudden lack of liquidity for almost $2 trillion of corporate bond assets in distressed market conditions.

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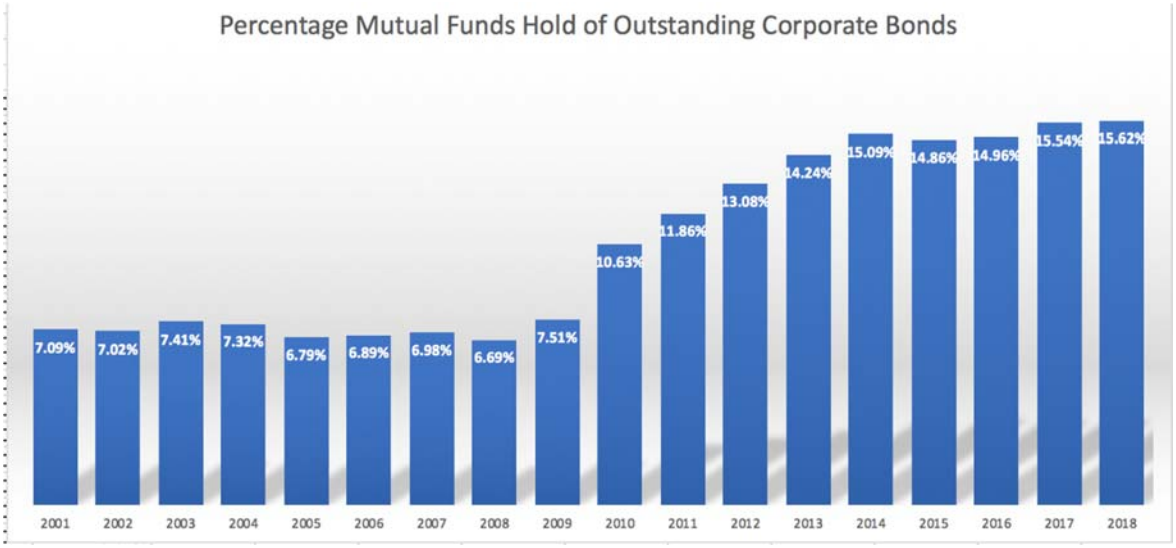
[47] ETF states that there are currently 384 fixed-income ETFs traded in the US markets. These ETFs comprise of bonds and preferred stock with total assets under management of +$600 billion.
"Fixed Income ETF Channel," ETF, accessed [DATE], https://www.etf.com/channels/fixed-income-etfs.

[48] See reference 4.

[49] Randall W. Forsyth, "Corporate Credit Could Be the Next Bubble to Burst," *Barron's*, February 15, 2019, https://www.barrons.com/articles/debt-be-not-proud-danger-in-the-complacency-about-corporate-credit-51550248974.

Figure 19: Mutual Funds % Ownership of Corporate Bonds



As of December 2018. Calculated from Table L.213 in the Flow of Funds Accounts, Financial Accounts of the United States (Release Z.1), published by the Federal Reserve Board in March 2019; includes foreign bonds held by US residents.

One particularly striking example of this lack-of-liquidity scenario and market-making was the freeze in some of the major UK commercial property funds that took place in 2016.[50] First, it should be noted that investors in general, and in the wealth management industry in particular, are drawn to real estate investment assets. Their preference for real estate investments over fixed-income investments may be due to the tangible, straightforward nature of the former versus the complexity of the latter.

Many of these open-ended funds offer daily liquidity. Given these characteristics, namely tangibility, ease of understanding value, and, most importantly, the daily liquidity, it is not difficult to see why investors invest in such funds. The mismatch between the assets' liquidity, that is, the

[50] Aime Williams and Judith Evans, "Property funds in 'vicious circle of redemptions,'" *Financial Times*, July 7, 2016, https://www.ft.com/content/5c1be46c-4456-11e6-b22f-79eb4891c97d.
Aime Williams and Judith Evans, "Property funds' liquidity crisis lives on for investors," *Financial Times*, June 29, 2017, https://www.ft.com/content/4c53b54a-5c0c-11e7-b553-e2df1b0c3220.

underlying real estate properties, and the liquidity provided to investors, which in the example below was daily, we will denote as an "asset-liability mismatch." This mismatch has bleak financial consequences for the investor, as illustrated below.

In 2016, the Brexit vote in the UK triggered a series of redemptions in the UK property fund industry. Seven large vehicles, including names such as Standard Life, Aviva, and M&G, holding 15 billion GBP cumulatively, were forced to suspend redemptions. Investors, therefore, were startled to suddenly find that their daily liquidity window had completely vanished. As an article in the *Financial Times* pointed out, some analysts believed that "Open-ended funds only work on the way up... On the way down the promise of liquidity in an illiquid asset class failed in 2007 and is failing again only eight years post Lehman Bros' collapse."

Another analyst in the same article in the *Financial Times* stated that open-ended property funds have sold "snake oil" by guaranteeing liquidity to retail investors. History has taught us that an open-ended fund's version of daily liquidity disappears in periods of financial crisis. That is, when investors are in sudden and desperate need of this promised daily liquidity, there is none to be found and no opportunity to redeem.

C. Hedge Funds and Other Alternative Vehicles Have Asset-Liability Mismatches

The Hedge Fund universe is often cited as having a considerable liquidity buffer on an aggregate level. But that only provides some comfort systemically. At the end of 2007, 39.8% of hedge funds had a one-year lockup period, and even three years after the crisis there was still $100 billion locked up.[51] In 2013, 36.5% of hedge funds still had a one-year lockup period.[52]

[51] Christine Williamson, "Hedge funds have $100 billion still locked up," *Pensions & Investments*, May 16, 2011, https://www.pionline.com/article/20110516/PRINT/305169963/hedge-funds-have-100-billion-still-locked-up.
[52] "Hedge Fund Lockups & Capital Cycles," Evestment, October 2013, https://www.evestment.com/wp-content/uploads/resources/research-reports/2013/201310-evestment-HF-lockups-capital-cycles-report.pdf.

Even those liquid alternative funds, like GAM Investments, which impose no explicit liquidity constraints (and rather promise their investors daily liquidity) are nonetheless subject to serious liquidity risks. In July 2018, GAM stunned investors with the announcement that it had suspended bond manager Tim Haywood, head of its unconstrained absolute return bond strategy ("ABRF"). This triggered a flood of redemption requests and forced the firm to freeze affected funds. Finally, they shut down the absolute return bond funds, and the CEO stepped down. At this steep cost to GAM's investors, we can glean the valuable lesson that no hedge fund is truly liquid so long as it cannot neither control nor predict the future, particularly the future unethical behavior of its investment directors.

Another illustration of this lesson can be drawn from the BNP Paribas ABS debacle. When examining a financial crisis in hindsight, the first question that arises is: Was there an event that served as the financial crisis equivalent of patient zero? Many believe that the 2008 crisis was triggered when two of the Bear Stearns Asset Management hedge funds (Bear Stearns High-Grade Structured Credit Fund and the Bear Stearns High-Grade Structured Credit Enhanced Leveraged Fund) sent a letter to their investors telling them that they almost lost everything on July 17, 2007. That event, however, is now understood to have been a mere harbinger of the mass panic that was to ensue three weeks later when BNP Paribas Investment Partners temporarily suspended the calculation of NAV and subsequently suspended redemptions in two of their asset-backed security funds. They ominously explained that their actions were due to "the complete evaporation of liquidity in certain market segments of the US securitization market [that] has made it impossible to value certain assets fairly."[53]

[53] "BNP Paribas Investment Partners temporarily suspends the calculation of the Net Asset Value of the following funds: Parvest Dynamic ABS, BNP Paribas ABS EURIBOR and BNP Paribas ABS EONIA," Press release, BNP Paribas, September 8, 2007, https://group.bnpparibas/en/press-release/bnp-paribas-investment-partners-temporaly-suspends-calculation-net-asset-funds-parvest-dynamic-abs-bnp-paribas-abs-euribor-bnp-paribas-abs-eonia.

Figure 20 below shows weekly data in billions of dollars on the vertical axis, for the amount of asset-backed commercial paper outstanding, while the blue line corresponds to the week of the BNP announcement. It is stunningly clear that the BNP announcement triggered a panicked selloff in the commercial paper market. If one cannot calculate NAV, which is essentially a fair valuation of an asset, then there is arguably no price at which one can sell the underlying assets and execute client redemptions. This is yet another example showing that a hedge fund can be deeply vulnerable to a lack of liquidity in the midst of a financial crisis.

Figure 20: Amount of Asset-Backed Commercial Paper Outstanding over Time

Source: FRED Economic Research – Federal Reserve Bank of St. Louis

D. A Note on Shadow Banking

Bill Gross, retired co-chief investment officer of PIMCO, popularized the belief that looser regulations for funds and ETFs compared with banks can lead to a liquidity problem. He has opined

that "mutual funds, hedge funds and ETFs are part of a 'shadow banking system'[54] where these modern 'banks' are not required to maintain reserves or even emergency levels of cash." The low reserves subsequently lead to a severe liquidity squeeze when a financial crisis suddenly erupts.

As we have previously noted, though history lends much support showing that markets are not static and evolve in cycles, there are researchers who are not convinced.[55] Though forecasting the next economic downturn is beyond the scope of this paper, we can predict with near certainty that when the next downturn occurs, much like the Asian crisis, there will be no buyers of the underlying corporate bond securities that are being packaged into ETFs and mutual funds as shown previously in Figure 18 and Figure 19. Essentially, ETFs and mutual funds' client redemption requests will not be met, and the retail holders of these products will be haunted by the "ghost market" of another financial crisis.

5. Regulatory Changes in Compliance Oversight within Financial Institutions

As we discussed in Part 4, the last crisis was triggered partly by BNP Paribas's sudden suspension of client redemptions because it was, in that moment, impossible to calculate NAV. It is interesting to note that this issue was driven by compliance considerations, with the firm citing "equal treatment of [its] investors" and claiming that the decision was "in strict compliance with regulations" for each of the funds.[56] It is unclear how many firms might have faced similar (though less extreme) circumstances and decided to continue with "business as usual."

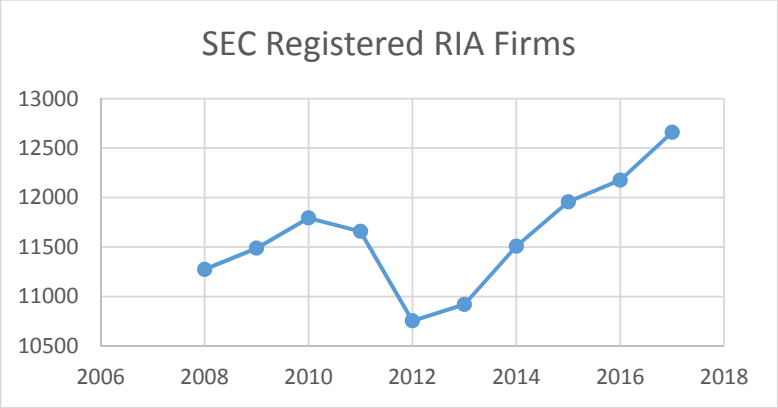
[54] The Straits Times, https://www.straitstimes.com/business/invest/shadow-banking-system-most-vulnerable-in-liquidity-squeeze

[55] Nassim Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2010). Taleb argues that the fact we point to the evidence of a black swan crisis after the fact is a signature of unpredictability of a black swan crisis.

[56] See reference 55.

From 2008 to 2017, the number of SEC Registered RIAs has increased by 12.3%, as shown in Figure 21.[57] The amount of compliance performed has also increased substantially in the past ten years. Recent data gathered from third-party compliance providers indicates that the cost of compliance per year in the banking industry is $270 billion,[58] and a recent cursory search on LinkedIn for "Chief Compliance Officer" showed over 400 job openings. The number of estimated compliance-related positions in investment management and banks in the Unite States is 30,000.

Figure 21: Number of SEC-Registered RIA Firms



Source: See reference 59.

Regulators presumably hoped that requiring the banking industry to invest in compliance oversight at the individual firm level after the financial crisis would reduce systemic risks. This regulatory requirement may have reaped real changes in a firm's detection and management of the risks that led to the financial collapse in 2008 had these new compliance staff and officers had the knowledge and experience to do their job. Unfortunately, most compliance staff had never traded

[57] RIA in a Box, "Number of RIA Firms Grew by 20% while Broker Dealer Firms Declined by 24% from 2008 to 2017," RIA Compliance and Practice Management Blog, September 18, 2018, https://www.riainabox.com/blog/number-of-ria-firms-grew-by-20-while-broker-dealer-firms-declined-by-24-from-2008-to-2017.

[58] Peter Farley, "Spotlight On Compliance Costs As Banks Get Down To Business With AI," *International Banker*, July 4, 2017, https://internationalbanker.com/technology/spotlight-compliance-costs-banks-get-business-ai/.

OTC securities in distressed markets and lacked even the most basic understanding of how the markets work to effectively monitor the risks lurking in OTC securities. As a result, the increase in compliance-related regulatory requirements merely creates a false sense of security and has had little impact on actually reducing systemic risk, though perhaps it helped lead to the shift of that risk from banks to insurance companies and pensions.

Given the negative, asymmetric consequences of a compliance "miss," there is now a great risk of compliance "tails" wagging business substance "dogs" and creating or exacerbating risks they were meant to prevent or mitigate.

Conclusions

In this paper, we highlighted five areas of secular changes that we believe will exacerbate the next inevitable downturn. What is not inevitable, however, is a financial catastrophe for investors; understanding certain risks can help investors navigate to safer harbors.

Given the less-transparent and less-liquid nature of the OTC trading markets, and given participants' limited knowledge of the embedded risk therein, market-making is dramatically different than in stock markets. Price discovery, one of the most important features of an efficient capital market, presumes liquidity and sizeable volumes that are available on both the bid and ask side. Additionally, continuous and consistent liquidity is typically provided by a diverse set of actively trading participants. If the number of counterparties that trade becomes limited, markets begin to thin, and a "ghost market" eventually emerges in times of crisis; this is the potentially precarious outcome of the risks in the fixed-income OTC markets.

Additionally, just because we did not experience a complete meltdown in a given sector of the bond markets, such as in auto loans, during the 2008 financial crisis does not preclude a

meltdown for that sector during the next crisis. The auto loan market proved resilient during the 2008 financial crisis, but this sector has undergone secular changes that have significantly increased its risk profile:

1. The large amounts of capital chasing yields that have flooded this market due to cheap loans
2. Originators, responding to the increase in capital, utilizing aggressive techniques to make more loans (e.g., providing consumers longer payment periods so they can acquire vehicles they would otherwise be unable to afford).

Lending money to weak borrowers with low credit scores and insufficient means to make payments was the original sin of the subprime crisis in 2008, and similar financial consequences will likely play out again.

Furthermore, these credit crisis indicators are not presently isolated to only the auto sector. As the loan size of companies with a BBB rating rapidly grows and middle-market company leverage increases, there are an ever-growing number of ominous signs. Retail investors' persistent appetite for innovative products that provide diversification benefits and increased yield has led to the proliferation of corporate bond mutual funds and ETFs. Although the precise allocation to corporate bonds should be calculated carefully, since many of these "corporate" mutual funds hold a portion of government bonds, the pattern of behavior is clear. Daily liquidity of mutual funds shares may appear to contradict the underlying OTC corporate bond trading liquidity, but the truth will be felt most painfully when we enter a material downturn. The promise of a liquid structure will disappear to the shock and dismay of most retail investors as they find themselves with no exit.

The takeaway here for retail investors is the immeasurable importance of comprehending the hidden dangers in products with asset-liability mismatches. Regulators also need to shoulder the responsibility of taking a proactive stance, rather than merely examining a financial crisis post mortem.

Another ominous sign in the present market is that credit agencies, tasked with accurately evaluating the risks in bond investments, continue to be shadowed by conflicts of interests, since they receive compensation for providing high ratings. While the Big Three have moved into less controversial and easier to understand credit ratings, the new rating agencies have entered the markets and are moving towards those riskier issuances. These players are more than eager to earn their "tips." As a result, BBB securities comprise companies whose rating may not accurately reflect their true risk profile. These companies are likely closer to a junk rating rather than an investment-grade rating.

New regulations of financial institutions from a compliance standpoint, which gained strong momentum after 2008, may prove to ultimately be ineffective. This could be due to the fact that these newly minted compliance officers generally lack the requisite understanding of the market dynamics associated with OTC-trading bond markets and therefore possess an inadequate radar to detect and monitor risks.

Given the sheer size of the bond market and its concentration among several players, even the smallest perturbations of uncertainty in the economy or within this market will have substantial detrimental impact. Many pundits believe that financial crises arise from a run on the banks.[59] These so-called runs on the banks arise from a lack of trust in the system.[60] Essentially, once a counterparty or a client believes that a bank cannot be trusted, they will stop lending to that bank,

[59] Gary Gorton, "Financial Crises," *Annual Review of Financial Economics* 10, 43-58, November 2018.
[60] See reference 10.

as happened to Lehman Brothers during the most recent crisis, or the clients will withdraw their money from the bank. It is not a leap of the imagination to believe that a sudden inability to redeem mutual funds and ETFs will rapidly compound the mistrust of financial markets during market distress or give rise to the next enraged Occupy Wall Street movement.

To conclude our examination of some of the most important secular changes in the financial industry since the crisis of 2008, we particularly want to highlight how a lack of trust in the system could accelerate a financial downturn once it has been triggered. These important secular changes can be summarized, from a larger perspective, as a lack of liquidity in the bond market, because each of the secular changes that we examined will be a barrier to price discovery and investor confidence in the fixed-income markets.

All that said, while we believe these excesses will fuel many losses in the next downturn, the consequence for investors can be manageable if they carefully consider (and act) upon the secular changes examined herein.

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