Evolution of Debt Financing Toward Less Regulated Financial Intermediaries*

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Abstract

Nonbank lenders have been playing an increasingly important role in the supply of debt financing, especially post Great Recession. These nonbank financial institutions not only participate in syndicated loans to large businesses but also act as direct lenders to small and mid-sized businesses, providing loans previously were primarily supplied by banks. Moreover, the composition of bondholders has changed, with mutual funds and other less regulated entities having gained nontrivial market shares. What is the extent of nonbank lending? How important are the distortions associated with the varying degrees of regulatory oversight for banks that differentially limit risk-taking across alternative sources of credit? What are the financial stability implications of this transformed landscape of credit markets? This selective review addresses these important questions and also discusses how banks and nonbanks helped provide liquidity to the nonfinancial sector during the pandemic.

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1. Introduction:

There is a significant change in the composition of lenders towards nonbank financial institutions in both corporate loan and bond markets, especially since the Great Recession.[1] This paper aims to provide a selective review of papers on this growth of nonbank lending, focusing on the 2000s in the United States.[2]

Why is the change in lender composition important? Primary lenders of the corporations have been shifting from regulated financial institutions to unregulated ones. Implications of this trend for credit availability for firms and credit market stability, in general, are essential. We start by providing evidence on the extent of nonbank participation in the direct and syndicated loan markets. We discuss the credit gap in small business lending by commercial banks, widened since the financial crisis, with a 45 percent drop in the volume of small business lending by medium and large-sized commercial banks between 2007 and 2010. We see some but not full recovery later, increasing the volume to about 77 percent of the pre-crisis level by 2019. Research shows that the growth in nonbank lending filled this gap, especially in counties previously dominated by the largest banks. Using data from Uniform Commercial Code (UCC) on non-real estate secured loans, Gopal and Schnabl (2020) show that total small business lending by finance companies and Financial Technology (FinTech) lenders reached 56 percent by 2016.

When we analyze mid-sized firms, we also see a significant shift to borrowing from nonbanks, with about one-third of these firms borrowing from finance companies, private equity firms, hedge funds, and other nonbank financial institutions (see Chernenko, Erel, and Prilmeier, 2020). Unprofitable borrowers with higher leverage are significantly more likely to borrow from nonbanks, typically paying higher interest rates. Syndicated loans to large borrowers have also been experiencing an increase in institutional participation, especially by CLOs, hedge funds, private equity firms, and loan mutual funds. Nonbank participation in leveraged term loans has recently reached over 80 percent. Research has shown that, unlike in the case of smaller loans,

[1] Note that the growth of nonbank lenders in the personal loan market is also significant, with Quicken Loans, for example, being the largest mortgage lender now (see, e.g., Buchak, Matvos, Piskorski, and Seru (2018) for secured mortgage lending and De Roure, Pelizzon, Thakor (2019) for unsecured personal loans, focusing on the role of bank regulation on this growth). Our focus in the paper is the corporate leverage.

[2] Nonbanks, also identified as shadow banks, are non-depository financial institutions. Unlike traditional commercial banks, credit unions, or thrifts, nonbanks cannot issue insured deposits and, therefore, they are not regulated as traditional banks are. In the rest of the paper, we will typically use the word nonbank but will also refer to a shadow bank.

institutional investors' participation in syndicated loans reduces loan spreads as it shortens the syndicated deal completion time (Ivashina and Sun, 2011a) and leads to securitization of these loans through CLOs (Naduald and Weisbach, 2012).

We extensively discuss the role of regulation for commercial banks in the changing landscape of direct and syndicated lending in the U.S. Understanding whether this shift in lending from traditional banks to nonbanks is mainly due to regulatory arbitrage --i.e., providing credit without bearing the costs of banking regulation – and increased bank regulation post Great Recession will be our focus. Research has shown that nonbank lending to middle market firms is driven by bank regulation that makes it costly for banks to lend to negative EBITDA firms (Chernenko, Erel, and Prilmeier, 2020). Moreover, interagency guidance on leveraged lending led to a shift of leveraged lending from regulated commercial banks to nonbanks that finance this lending partially by loans from banks (Kim, Plosser, and Santos, 2018). Irani, Iyer, Meisenzahl, and Peydró (2021) also emphasize the role of bank regulation in the growth of nonbanks' participation in syndicated loans: they show that there is a negative relation between nonbank participation and the syndicate banks' average regulatory capital ratio. Banks with regulatory capital shortfall, especially after the adoption of Basel III rules in 2010, sell their syndicated loans to nonbanks.

Next, we discuss changes in the corporate bond market – the primary source of external funding for the largest public firms in the economy. Our focus in this part is the increasing role of lightly regulated mutual funds, owning comparable shares of corporate bonds with regulated insurance companies. We show that holdings by asset management companies increased from about 5% in 1990 to 35% in 2020. Insurance companies and mutual fund families complement each other in the bond market: while insurance companies specialize in investment-grade (IG) bonds, mutual funds prefer risky high-yield (HY) instruments.

Institutional investors in the bond markets are subject to their own regulatory treatment and funding structure, crucially affecting the demand curve for these fixed-income instruments. For example, after the National Association of Insurance Commissioners (NAIC) relaxed the capital requirements for holdings of securitized CLO instruments, insurance companies shifted the focus of their investment towards CLOs generating higher yields relative to bonds with the same rating (Fringuellotti and Santos, 2021).

We document the mechanisms of the fragility of both major types of institutional bondholders. Mutual funds are subject to runs creating a fire-sale threat and excess volatility on the secondary market. Moreover, these liquidity shocks propagate to primary market and directly affect borrower's corporate decisions. The risk-based capital requirement of insurance companies can also trigger fire-sales by capital-constrained companies. Finally, both types of institutional investors demonstrate herding behavior, further exacerbating the effect of adverse liquidity shocks.

Our review includes an extensive discussion of implications of this sharp increase in nonbank lending and its fragility for credit market stability, emphasizing nonbanks' interconnections with the regulated banks. We also cover the problem of decreased inventories of bank-affiliated bond dealers – the major providers of bond liquidity in the secondary markets – contributing to overall financial instability following a series of post financial crisis regulations.

Finally, we analyze the COVID-19 pandemic shock, focusing on the ability of regulated banks and unregulated nonbanks to supply sufficient liquidity to nonfinancial firms during an economic downturn. We provide evidence on the funding fragility of FinTech lending platforms by showing how small business lending by FinTechs dried up in March 2020. Nevertheless, we also discuss how FinTech lenders help serve borrowers and regions underserved by banks during the economic downturns in the context of government subsidies – i.e., allocating Paycheck Protection Program funds (Erel and Liebersohn, 2021). On the leveraged loan market, new leverage loan issuances dropped to almost zero in March 2020 but bounced back quickly in 2020. We note record high levels of leverage ratios of outstanding borrowers, though. Leverage lending market has continued to grow with the highest participation (over 80 percent) of nonbank lenders in the syndicated leveraged term loans.

Financial fragility of illiquid mutual funds, subject to runs, also got tested during the initial phase of the COVID-19 shock. In March 2020, bond mutual funds with illiquid investments vulnerable to fire sales suffered from over $200 billion net outflows. Insufficient inventory capacity of major bank-affiliated dealers created severe liquidity mismatch in typically liquid instruments. As a result, yield spread on investment-grade and high-yield bonds tripled relative to the pre-pandemic levels, reflecting both credit and liquidity risk. Only after the intervention by the Federal Reserve, these outflows reversed, and yield spreads fell, especially for the most fragile funds (Falato, Goldstein, and Hortaçsu, 2021, O'Hara and Zhou, 2021). We conclude our review

by briefly discussing possible solutions for enhancing financial stability without government intervention in this period of increased reliance on nonbanks for credit.

The rest of the paper is organized as follows. In Section 2, we discuss the extent of nonbank lending in the loan market, differences between bank and nonbank lending, focusing on the costs and benefits for the borrowers, and the role of bank regulation in the growth of nonbank lending. Section 3 presents a similar discussion on nonbank's participation in the bond markets, focusing on the shifts between nonbanks as well as consequences for this shift. We will also discuss fire-sale and corporate finance implications in detail. Section 4 focuses on financial stability implications of possible runs on nonbanks and interconnections. Section 5 is on how banks and nonbanks provided liquidity during the COVID-19 shock. Section 6 briefly discusses what to do and concludes.

2. Extent and Characteristics of Nonbank Loans

In this section, we concentrate on the extent and characteristics of nonbank loans to nonfinancial firms in the U.S. We focus on both direct loans to small and medium-sized businesses and participation in larger syndicated loans.

2.1. Nonbank Loans to Small Businesses:

Small businesses are important for economic growth as they employ half of the private workforce, and they typically rely on bank loans for their operations and growth (see Mills and McCarthy, 2014 and Panel A of Figure 1). "Is there a credit gap in small business lending?" asks former Administrator of the U.S. Small Business Administration (SBA) Karen Mills and her coauthor Braydon McCarthy in their 2014 working paper. The answer is yes! They show that access to bank credit for small businesses started declining before the 2008 Financial Crisis but was hit hard during the crisis, with continued decline afterward. According to the FDIC's Quarterly Banking Profile time-series data, the share of small business loans to total business loans was 20 percent in 2017 (compared with 33 percent in 1995), for example. Some of this drop happened when small businesses were hit more than larger businesses during the recession – i.e., between 2007 and 2012, small businesses accounted for over 60 percent of the net job losses in the economy (Mills, 2020).

Around the same time, banks in the US have started hoarding more of their cash, rather than lending it with a significant drop in their loan to deposits ratios (a change from about 80 percent to 65 percent, according to the FDIC data). As Mills argues, various factors – e.g., decline of community banks, banking industry getting more concentrated through mergers, large banks not relying on relationship lending, small business loans being more expensive due to information and regulatory frictions – contribute to the decline in small business lending. According to the Federal Reserve's Small Business Survey, less than half of the employer small businesses that applied for credit received all of it, with at least 20 percent receiving none, in the 2016-2018 time period.

Consistently, Chen, Hanson, and Stein (2017) use Community Reinvestment Act data to show that small business lending by commercial banks fell sharply by more than 30 percent after the 2008 Financial Crisis. The decline was the most significant for the top four banks --Bank of America, Citigroup, JPMorgan Chase, and Wells Fargo-- that cut their small business loans by almost 60 percent by 2010. The reason is they experienced significant nonperforming loans ratios in their small business loan portfolios, which they see peripheral to their overall business strategies historically. As the largest banks in the US were reluctant to return to small business lending once they recovered from the crisis, not only smaller banks but also nonbank lenders (finance companies and other nonbanks) started filling the gap. Authors use confidential data from PayNet and show that nonbank lenders have higher loan growth rates (from 2010 to 2014) in counties dominated by the largest four banks than in countries with lower shares, with even more significant effects for online lenders. Results are economically significant, contributing to about 47 percentage points more nonbank lending in a county with a 100 percent share of the top four banks than a county with no share.

Bord, Ivashina, and Taliaferro (2018) use the Federal Reserve's Community Reinvestment Act (CRA) data on small business lending between 2005 and 2015 and document the significant withdrawal of large US banks from small business lending over the Great Recession as well. This effect is large and has been persistent since then for those large banks operating in counties with a more considerable depreciation in real-estate prices. However, other, healthier banks opportunistically expanded their market share and covered some of the fall in small business lending. Small business lending is identified as loans smaller than $1 million in size at the county level for all medium-sized or large depository institutions with assets larger than $1 billion. The

CRA data include lending by neither small community banks nor by nonbank lenders. We extended their data and created Panel B of Figure 1 to show how the drop in small business lending around the Great Recession by larger banks has not recovered since then. While small business lending by CRA reporting banks amounted to about $158 billion in 1996, it increased to its peak of $341 billion in 2007, after which it dropped to about $187 billion in 2010. This 45 percent drop in small business lending was concerning. Since then, this small business lending by medium and large banks has recovered some, increasing the total volume to about $265 billion by 2019, but to only about 77 percent of the 2007 volume.

Partially filling in the (firm-level loan) data gap in the literature, Gopal and Schnabl (2020) use loan data from Uniform Commercial Code (UCC) and cover only secured (but non-real estate) loans to over 3 million US small businesses between 2006 and 2016. The authors state that the UCC data covers 73% of total small business lending. Using this data set, they can control for firms' credit demand by including firm, industry, or collateral-type fixed effects. They also study the growth of nonbank lenders, with a focus on finance companies and Financial Technology (FinTech) lenders, in small-business lending post Financial Crisis of 2008. Authors start by emphasizing the large drop (by 40%) in total bank lending to small and medium-sized firms over 2008-2010 period. Was this a permanent reduction? If yes, what effect would it have on firm-level investment? are their main questions.

Our Online Appendix Figure OA1 presents Figure 1 of Gopal and Schnabl (2020). Panel A presents total annual bank vs. nonbank loans from 2006 to 2016; and Panel B breaks the nonbank lenders to finance companies, FinTech lenders, and other nonbanks. Unlike other papers, nonbank lenders in their sample could be non-financial firms (cooperatives and nonfinancial) in addition to investment companies. Overall, Figure 1 shows that banks' small business loan origination dropped significantly (by 27%) between 2007 and 2010 and then slowly went back to 2006 level. However, nonbank lenders – mainly finance companies – reduced their lending less between 2006 and 2010; and expanded their lending significantly more starting in 2010, mainly due to growth in lending by FinTechs and finance companies. It is also important to note that nonbank lenders (other than Fintech lenders) – mainly finance companies – provided the majority of US small business loans that were secured by non-real estate collateral already before the Great Recession. However, their share significantly increased after 2010; the total nonbank share reached 56% in 2016, with this increasing share of finance companies and the growth of Fintech lenders.

Authors also find that firm-level investment, employment, wages, and growth recovered post-crisis, despite banks' slow recovery, and it happened due to the increase in nonbank lending. They find that nonbank lending share increases in areas (counties) with a larger market share of bank small-business lending before the crisis, consistent with finance companies and Fintech lenders substituting for a reduction in lending by banks post-crisis.

2.1.1. Digital Lending

Following up on the FinTech focus of the last paper, it is worth noting that investment in FinTech has been growing rapidly in the past decade. According to CB insights, their top Fintech 250 cohort has raised more than $73.8B in aggregate funding between 2016 and 2021. Significant fraction of this funding is going to payment processing platforms, which we will discuss later. However, some of this large investment in FinTech is in digital banking or lending.

Presence of FinTech firms in the small business loans had been growing substantially before the COVID-19 Pandemic.[3] Many purely online FinTech lenders (e.g., Lending Club and Prosper) started in 2007-2008 as peer-to-peer lending marketplaces extending only personal loans. Over time, this digital lending market also moved to direct small-business lending through a funding bank partner (Stulz, 2019). For example, Celtic Bank, an industrial bank from Utah, has been the lender of record for OnDeck, Square, or Kabbage, as is WebBank for PayPal. Facing the pandemic-induced recession, many of these digital lenders are also exploring other lines of business, which would help their liquidity and services. For example, Varo Bank, which started as an app for banking, is now a digital bank – a *neobank*. American Express bought Kabbage in 2020. LendingClub just purchased an online bank, the Radius Bank, in 2021. In other words, these FinTech platforms are also national banks now, allowing them to get liquidity through deposits. These types of mergers typically happen in economic downturns. Whether many of these lending platforms will stay as independent unregulated lenders or would prefer to merge with regulated banks going forward is an open question.

The emergence of new nonbank lenders fully relying on FinTech in their lending has been changing the landscape of small business lending. Federal Reserve's 2020 Small Business Survey shows that 32% of the employer small businesses applying for a loan from an online lender chose

[3] See also Cornelli, Frost, Gambacorta, Rau, Wardrop, and Ziegler (2021) providing empirical evidence on the growth in digital lending worldwide.

their lender because they were denied by others. Moreover, online borrowers are more than twice as likely (as applicants to the banks or finance companies) to state that denials by other lenders led to this application for a loan. Butler, Cornaggia, and Gurun (2016) use data from Prosper -a peer-to-peer lending platform, which mostly extends personal loans but also some small business loans and show that local access to finance from banks explains the shift to borrowing from FinTechs (over 2008-2010). Consistently, using data from the Federal Reserve Small Business Credit Survey, Barkley and Schweizer (2020) show that borrowers from online lenders are not representative of a typical small business in the US. They are, in fact, younger and less profitable businesses, which are underserved by traditional banks. Therefore, online lenders increase the pie of access to finance for very small businesses.

Overall, research has shown that FinTech credit has become an important source of loans for small businesses, and it makes loans accessible to companies that otherwise would not be able to receive bank credit. But what about the role of banking relationships? Balyuk, Berger, and Hackney (2020) also use data from Prosper – which, for example, grew its small business loans from $151,000 to $176.3 million from 2006 to 2018 – and also from Funding Circle. They show that the heterogeneity in the growth of these FinTech lending platforms in different regions is due to characteristics of traditional banking in these regions. We know that FinTech lenders have been trying to gain market share from commercial banks or fill in the gap in lending created by them. We also know that there is extensive literature on how small banks rely on "soft" information and generally make smaller, relationship-based loans, while large banks rely on "hard" information and generally focus on larger borrowers (see, e.g., Petersen and Rajan 1994). Balyuk and coauthors find that digital lending is higher in counties with a greater relative presence of large and out-of-market banks. Moreover, they also explore within country, cross-time variation and find that FinTech generally penetrates to areas with greater levels of large, out-of-market bank presence, rather than small, in-market bank presence, and without strong banking relationships. Overall, this paper provides evidence that FinTech lending competes with hard information-based lending rather than soft-information-based relationship lending.

2.2. Nonbank Loans to Medium and Large Businesses:

2.2.1. Direct Loans:

Direct commercial and industrial (C&I) lending has been typically done by commercial banks, as they are experts in due diligence and monitoring, which we have believed to be essential in a loan relationship (see, e.g., Diamond, 1984; Fama, 1985; and Diamond, 1991). However, this bank-type direct lending, where the lender negotiates directly with a borrower, by nonbank financial intermediaries has grown dramatically since the global financial crisis. According to Preqin's 2019 Global Private Debt Report, global assets under management of private debt funds, which are mostly structured like closed-end private equity funds investing in non-syndicated direct loans, has grown to almost $900 billion before the pandemic (see also European Direct Lending Review and Outlook 2021). The growth in investors' interest in private debt funds is believed to be due to reaching-for-yield incentives of these investors as interest rates have been at historical lows.

Private debt funds are only a part of nonbank lender universe. Lenders include not only increased share of finance companies (FCOs), as they historically participated in this market, but also hedge funds, private equity/venture capital (PE/VC) firms, investment banks, insurance companies, business development companies (BDCs), mutual funds and other investment managers. There has been significant anecdotal evidence on this growth[4], which triggered academic research as well.

In this review, we present some of the findings of Chernenko, Erel, and Prilmeier (2020) as they use unique hand-collected data on direct loans to publicly traded middle-market firms between 2010 and 2015. Their data set includes not only the size of the loans and identity of the financial lenders but also characteristics of loan contacts with bank or nonbank lenders. Middle-market firms are defined as firms with sales between $10 million and $1 billion, typical borrowers of bank-type loans. In this work, authors show that about *one-third* of middle firms in their sample borrow from nonbanks (see Figure 2). This number is surprisingly large – as one would assume commercial banks would almost exclusively lend to these firms. Figure 2 also shows the shares of various nonbank lenders. Top nonbank lenders are unaffiliated FCOs with 23%, to which FCOs affiliated with banks add another 13%, PE and VC firms with 19%, and hedge funds with 16%. Investment banks (10%), investment managers (8%), insurance companies (6%), Business Development Companies (BDCs, 4%) follow them.

What about the characteristics of borrowers from nonbanks? Compared to bank borrowers, nonbank borrowers are riskier with lower (even negative) profitability and higher leverage (see

[4] https://dealbook.nytimes.com/2011/06/08/bank-said-no-hedge-funds-fill-a-void-in-lending

also Denis and Mihov, 2003). Chernenko and coauthors find that firms with a small negative EBITDA are about 34% more likely to borrow from a nonbank than are firms with small positive EBITDA (see our Figure 3 presenting their Figure 1). It is important to note that unconditional probability of default is (about 8%) higher for nonbank borrowers than bank borrowers; however, controlling for firm and loan characteristics, nonbank borrowers are *not* more likely to default or show worse accounting/stock price performance, within the next five years or so.

A growing lender in the direct loan market is Business Development Companies (BDCs), which are particular types of closed-end funds that were created to provide loans directly to businesses with small and mid-size companies. In the 2000s, especially after the 2008 Financial Crisis, BDCs grew rapidly with total assets of about $100 billion in 2017 (see Figure 1 of Davydiuk, Marchuk, and Rosen, 2020) and about $120 billion in 2019 (Balloch and Gonzales-Uribe, 2021).[5] There are a couple of recent papers that study the role of BDCs in the direct lending market. For example, Davydiuk, Marchuk, and Rosen (2020) study loans by Business Development Companies (BDCs) to middle market firms. They use some exogenous shocks to credit supply --new banking regulations and the collapse of a major finance company-- to identify the causal effect of BDC lending, as a substitute for traditional financing, on real economic activity. We will comment on the regulatory shocks later, but, as for the shock to the finance company alternative, they use the failure of the CIT Group, as a shock to the credit supply in the middle market with a direct impact on BDCs' potential borrowers. They show that when lending by banks contracts due to regulatory shocks, BDC activity increases in countries that are more exposed to the shock. They also study the local outcomes of the BDC lending and find that BDC lending helps economic growth at the county level. Balloch and Gonzalez-Uribe (2021) study leverage limits – as enforced by the SEC – of the BDCs in good and bad times and explore how these leverage limits affect their direct lending. We will discuss their findings, focusing on lax regulation for this nonbank lender, later in Section 2.4.3.

2.2.2. Syndicated Loans:

[5] In fact, BDCs were authorized by the Congress in 1980 to incentivize fund investment on illiquid securities to small and middle-market firms. But their size increased in 2000s. They can also provide equity financing, but the majority of their investment is in debt.

Majority of loans to large corporations are syndicated. In a typical syndicated loan, a commercial bank is a lead arranger, and banks typically participate in the syndicate by providing revolver and term A loans, which are amortizing term loans, also known as pro-rata tranches. Even though the lead arranger in most syndications is a commercial bank, participations vary, with an increasing share of hedge funds, mutual funds, insurance companies, and other unregulated/lightly regulated financial institutions.[6] Other lenders, except for finance companies, typically invest in Term Loans B…K, also referred to as *institutional* tranches. For example, collateralized loan obligations (CLOs), which are structured vehicles to typically hold (leveraged) term loan B tranches, are the most common institutional investors in syndicated loans. As shown by Ivashina and Sun (2011a), already in 2006, there were more than 250 different nonbanks participating in the syndicated loan deals, with about 70% of high-yield loans – i.e., loans for leveraged buyouts (LBOs) and mergers and acquisitions -- held by these institutional investors.

Nonbanks typically invest in term loans to non-investment-grade firms or non-rated firms -i.e., leveraged loans. In Figure 4, we present the time series of leveraged loans, covering 30 years between 1991 and 2021. We use the most recent version of Thompson Reuter's LPC (Dealscan) to classify leveraged loans as syndicated senior loans to nonfinancial firms in the U.S. with all in spread margins (over LIBOR) of 150 basis points or larger. Moreover, we flag these loans as nonbank loans if they are term loan B to term loan K, following the prior literature (as term loan A tranches and revolvers are almost exclusively extended by commercial banks; see, e.g., Ivashina and Sun, 2011a). We get similar results if we use whether the Market Segment variable contains the word "Institutional" as a flag for nonbank lending. We only include the first tranche-deal and, therefore, exclude amendments from the sample.

While nonbanks' participation in syndicated leveraged loans was almost zero in early 1990s, the volume increased to about $440 billion, 51% of the total volume of leveraged loans in 2007. Then, we see a significant drop in all leveraged loans (to about half of the 2007 volume)– but, especially, in the ones extended by nonbanks – during the Financial Crisis of 2008-2009. Nonbank loans amounted to about $77 billion in 2008 and $47 billion in 2009. Recovery was fast, though. Already in 2013, total leveraged loan volume exceeded the 2007 level with a total of $875

[6] Kim, Plosser, and Santos (2018) show that more nonbank lenders recently –i.e., after the Interagency Guidance on Leverage Lending of 2013—started serving as lead arrangers in the syndicated loans but they fund themselves with bank loans.

billion in lending, and nonbanks provided 38% of that volume. In Section 2.4, we explore whether bank regulations have contributed to this increase.

Interestingly, we do not see a similar drop in 2020 as the one during the 2008 Financial Crisis. Leveraged loan market amounted to almost $570 billion, with nonbanks participating in 40% of the loans, in 2020. We have only part of the 2021 data, but the share of nonbank loans in syndicated leveraged loans seems to have just exceeded bank lending, with 54% of nonbank participation. In Figure 5, we present time series of participation by nonbank lenders in leveraged term loans only, again covering 30 years 1991-2021. When we concentrate on risky term loans, participation of nonbank lenders is even more impressive: more than half of the volume of the leveraged term loans have been provided by institutional lenders since 2003, dropping to slightly below 50 percent only during the financial crisis of 2008-2009, and reaching more 80% in 2021.

Figure 6 use syndicated loan data (drawn and undrawn commitments) from the Shared National Credit Program (SNC), with minimum aggregate loan commitments totaling at least $20 million ($100 million after 2018) that were shared by two or more regulated financial institutions (banks).[7] The focus is on "classified" commitments, which include commitments rated substandard, doubtful, and loss. Not surprisingly, classified loan volume peaked in 2009 (see Panel B), of which a significant fraction —about half—was held by nonbanks. Since then, the ratio of nonbank loans within the universe of classified loans has increased, with the ratio peaking at about 70% in 2014 (see Panel A). These ratios provide evidence for the appetite of nonbanks for riskier loans -i.e., their reaching for yield incentives.

Irani, Iyer, Meisenzahl, and Peydró (2021) also focus on large, syndicated loans and use SNC data. They consider only term loans as revolvers are typically issued only by traditional banks. According to their Figure 1 (which we include in our online appendix as our Figure OA2), nonbank participation increased from about 20% in 1993 to 70% in 2014, with a notable acceleration between 2002 and 2006. The advantage of their dataset is that they can differentiate different nonbank lender types. CLOs became the largest nonbank investor by 2002. But hedge funds, private equity firms, and loan mutual funds, in total, caught up by 2014. Irani and coauthors also have data on the secondary market trades of these syndicated loans. For the secondary market, the shift to nonbanks is even more dramatic (see Figures 2 and 3 of Irani et al., 2021). In fact, nonbanks started dominating the secondary market purchases from 2002 onwards; however, the

[7] Note that DealScan data is 95% similar (Ivashina and Scharfstein, 2010).

volume of sales and purchases increased so significantly from well under $50 billion in the early 2000s to well above $100billion in the late 2000s and early 2010s.

However, it is worth noting that banks remain special, playing the monitoring role for the borrowers, even though the share of nonbank lenders in the primary and secondary syndicated loan market has been increasing (Gande and Saunders, 2012). Banks are still the primary suppliers of direct and syndicated loans and revolvers to mid-size and larger size borrowers, especially during economic downturns. As Ivashina and Sharfstein (2010) show, for example, there was a run to undrawn loan commitments at banks during the Financial Crisis of 2008.

2.3. How different are nonbank loans from bank loans?

To access the real effects of nonbank loans on borrowers, we consider not only the size of the nonbank lending but also the price and nonprice terms that borrowers get differently from nonbanks than banks.

Starting with small businesses, Mills and McCarty (2014) show that online lenders provide faster turnaround and online accessibility for customers and utilize data to create more accurate credit scoring algorithms compared with banks. Speed of service is essential for small businesses. The average small business borrower spends more than 25 hours on paperwork for bank loans and typically has to approach multiple banks during the loan application process (Mills 2020). An increase in the number of nonbanks that operate online – i.e., FinTech lenders – helps increase the average speed of loan approval. OnDeck and Kabbage, for example, offer rapid online vetting for small business loans, based on personal data other than credit scores (Kaufman Foundation's report on Changing Capital: Emerging Trends in Entrepreneurial Finance 2016). Federal Reserve's 2020 Report on Employer Firms, using the 2019 Small Business Credit Survey, presents that the top two reasons for loan applications from Online Lenders are the "speed of decision or funding" (54 percent) and "chance of being funded" (46 percent). 44 percent of finance company borrowers chose them for speed, while this drops to 23-26% for large and small banks. "Flexibility of the product" and "no collateral required" are also stated important reasons for loan applications to online lenders and finance companies.

Using their novel data set on loan contract terms for public middle-market firms, Chernenko, Erel, and Prilmeier (2020) study how price and nonprice terms differ for nonbank

loans compared with bank loans. They find that controlling for observable borrower and loan characteristics, nonbanks charge almost 170 basis points higher interest rates than bank loans. The difference is 435 basis points unconditionally. Nonbank, on the other hand, are 37% less likely to include financial covenants in their loan contracts. They instead use warrants, for example, differently from banks. Nonbanks are also more likely to provide unsecured loans. Overall, nonbank lenders seem to be more innovative and flexible in their loan contracts. Consistently, Davyduk et al. (2020) show that BDCs charge 4%–5% larger rates on their direct loans to middle-market firms than banks do. However, compared with banks, BDCs offer significant flexibility -- loan tailoring, quick deal execution, and loose covenants—to their borrowers.

When we concentrate on larger loans, the benefits of nonbank lenders speak mostly to the increase in liquidity, more/better information gathering on borrowers, and, differently from smaller loans, lower cost of funding for the borrowers. For example, Jiang, Li, and Shao (2010) show that the dual ownership of both equity and debt of the same borrower by nonbanks leads to 16-32 basis points lower spread in syndicated loans. They attribute this finding to incentive alignment between creditors and owners that this dual ownership creates.

Ivashina and Sun (2011a) also study the increase in the nonbank institutional demand for syndicated loans, prior to the Great Recession (over the 2001-2007 period), leading to reductions in loan spreads. The mechanism in their paper is the reduced deal completion time –i.e., "time on the market," which is reduced by institutional demand pressure and is associated with lower loan spreads.

Naduald and Weisbach (2012) focus on Term Loan B loans to B-rated firms, which are the types of syndicated loans securitized by the CLOs. Using difference in differences design, they show that securitization of these loans is associated with 17 basis point lower loan spreads. Overall, they provide strong evidence that nonbank's participation in syndicated loans, through the securitization market, caused a reduction in the cost of capital for borrowing firms. These findings are rather important, especially given that we saw a huge increase in the CLO market not only before the Great Financial Crisis but also afterward (see Panel A of Figure 7 and the findings of Benmelech, Dlugozs, and Ivashina (2012)). Authors find that securitized loans through CLOs do not perform worse than comparable unsecuritized loans originated by the same bank. Authors believe that this result is due to the fact that these loans are parts of the syndicated deals, which include mechanisms that help reduce adverse selection with respect to the CLO collateral.

Relatedly, nonbank lenders are more likely to offer covenant-lite (cov-lite) contracts in the syndicated loan market (see Panel B of Figure 7). Becker and Ivashina (2016) show that time series of cov-lite issuance overlaps with inflows to institutional lenders. Moreover, concentrating on cross-sectional variation, they show that cov-lite syndicated loans are associated with the highest ownership by CLOs or mutual funds. However, as Berlin, Nini, and Yu (2020) show, banks typically monitor through covenants included in the lines of credit they offer within the same deal as the covenant-lite term loans.

Several other papers have also studied the participation by nonbank institutions in loans syndicated by banks and found some adverse effects for borrowers. For example, Lim, Minton, and Weisbach (2014) argue that nonbank lenders, with higher costs of funding than banks, participate in syndicated loan tranches that would not otherwise be filled by banks and therefore they would require larger returns. Consistently, they find that loan facilities, including a nonbank lender – especially a hedge fund or a PE firm-- in their syndicates have higher spreads than otherwise identical bank-only facilities. Moreover, Biswas, Ozkan, and Yin (2020) study operating performance and investment behavior of nonbank borrowers as compared with propensity-score-matched bank borrowers in the syndicated loan market. They find adverse effects and argue that nonbanks extract rents from borrowers as lenders of the last report for riskier borrowers, to whom regulated banks are unwilling to lend.

Although nonbank lenders provide greater liquidity and the sharing of risk across the financial system, there are also potentially unintended risks of nonbank loans. These risks are generally due to lenders' being outside of the regulation for banks. An important one is data security, as many of these nonbanks, especially FinTechs, rely on big data and artificial intelligence. Ownership of confidential data outside of regulated financial system creates concerns. As Mills and Dang (2020) state, "An increasingly connected, digital world calls for 'smart,' forward-looking financial services regulation, where the focus shifts to the real and pressing issues concerning data access and ownership, data transparency, and data security." (page 20). As the interest for FinTech lenders or even BigTech lenders continue to increase, data privacy issue will be even more binding.

Another important and related question is whether nonbank lending would involve more fraudulent loans. For example, Griffin, Kruger, and Mahajan (2021) argue that a fraudulent loan application is easier to place online and by borrowers with no prior relationship with traditional

banks. They also show that FinTech lenders were significantly more associated with fraudulent reporting by borrowers to get Paycheck Protection Program (PPP) loans.

Lastly, literature has shown some important effects of the higher participation in the leverage loan market of nonbank lenders, who also participate in the equities markets. Ivashina and Sun (2011b) show nonbank financial institutions use their private information on loan renegotiations in their subsequent trading of the borrower's stock, and they outperform in these trades, compared with other traders of the same stock or their trading in other stocks, by approximately 5.4% in annualized terms.

2.4. The Effects of Bank Regulation on Nonbank Lending

Unlike nonbank financial institutions, banks face tighter bank regulation -e.g., regulatory capital ratios, liquidity ratios, leverage-lending guidelines, etc. See, for example, Acharya and Richardson (2009), Adrian, Ashcraft, Boesky, and Pozsar (2010), Hanson, Kashyap, and Stein (2011), and Acharya, Schnabl, and Suarez (2013) for extensive discussions of bank regulation -regulatory capital arbitrage- and the growth of shadow banking leading to the Financial Crisis. Since then, bank regulators have tightened these regulatory constraints by increasing core Tier 1 capital requirements, implementing stress tests, and issuing interagency guidance on risky, bad loans. Many authors argue that tighter bank regulation could increase nonbanks' advantage in avoiding these regulatory costs and consequently their participation in the debt markets, possibly increasing the fragility of the financial system (see, e.g., Plantin, 2015; Martinez-Miera and Repullo, 2019; Farhi and Tirole, 2020; and Chretien and Lyonnet, 2018). In this section, we explore the role of bank regulation in the growth of nonbank lending by again presenting a selective review of the empirical evidence on this topic.

2.4.1. Substandard Loans

Bank regulators often flag riskier loans, making these loans more expensive for commercial banks. A typical measure of loan riskiness is, of course, the riskiness of the borrower as measured by its profitability or leverage. While some banks are supervised by states, others are supervised by the federal regulator --the Comptroller of the Currency (OCC), -- which is shown to be stricter than state regulators (see Agarwal, Lucca, Seru, and Trebbi, 2015). The OCC Handbook on Rating

Credit Risk (2001) states that their primary consideration in credit risk assessment is the strength of the primary repayment source -i.e., operating cash flow if the loan is not backed by an asset and refers to profitability to classify *substandard* loans.[8] Furthermore, their 2008 Handbook on Leveraged Lending[9] refers to a borrower's EBITDA as "a good metric to evaluate profitability." Being flagged as substandard would lead to larger loan loss allowances for these loans and possibly lower regulatory ratings --e.g., CAMELS ratings-- for the regulated commercial bank lenders.

Consistently, Chernenko, Erel, and Prilmeier (2020) provide strong evidence that the extent of nonbank lending to middle-market firms is driven by bank regulation that makes it costly for banks to lend to negative EBITDA firms. For example, the shift to lending to negative EBITDA firms by nonbanks, as shown by the authors (see Figure 3 and Table OA1), is due to cash-flow loans deemed substandard by the Comptroller of the Currency (OCC) Handbook, rather than asset-based loans.[10] Concentrating on bank borrowers, they also find that negative-EBITDA borrowers are about one-third less likely to borrow from a bank supervised by the OCC, which is known to be less lenient than state regulators. Moreover, they explore the banking markets and show that firms with negative EBITDA are significantly more likely to borrow from a nonbank if their banking markets are dominated by OCC-supervised banks, an effect once again driven by cash-flow loans (see Table OA2 of this paper presenting Table 5 of Chernenko, Erel, and Prilmeier, 2020).

Chernenko, Erel, and Prilmeier (2020) also explore the effect of having Debt/EBITDA greater than six for the borrowers, as the 2013 Interagency Guidance on Leveraged Lending uses this threshold to flag loans to highly leveraged borrowers.[11] This guidance was issued by the OCC, the Federal Reserve System, and the FDIC, in response to an increase in leveraged lending. The aim is to ensure that federally regulated banks reduce their leveraged lending activities and hence risks in the banking system. Authors find that firms in this category are about 15% more likely to borrow from a nonbank lender. They also find that after bank regulators issued the 2013

[8] https://www.occ.treas.gov/publications/publications-by-type/comptrollers-handbook/rating-credit-risk/pub-ch-rating-credit-risk.pdf

[9] https://www.occ.treas.gov/publications-and-resources/publications/comptrollers-handbook/files/leveraged-lending/index-leveraged-lending.html

[10] Lian and Ma (2021) find that only about 20 percent of corporate debt is asset-based -i.e., collateralized by specific physical assets (e.g. real estate, inventory, equipment, receivables, etc.).

[11] "… a leverage level after planned asset sales (that is, the amount of debt that must be serviced from operating cash flow) in excess of 6X Total Debt/EBITDA raises concerns for most industries" (Page 7 of the https://www.federalreserve.gov/supervisionreg/srletters/sr1303a1.pdf.)

Interagency Guidance on Leveraged Lending, firms with negative EBITDA and with Debt/EBITDA ratio greater than six became even less likely to borrow from OCC-supervised banks.

Overall, using their hand-collected data on loans of middle-market firms between 2010-2015, Chernenko, Erel, and Prilmeier (2020) provide strong evidence that bank supervision through guidance on lending standards is an important driver of nonbank lending. Bank regulation indirectly has an effect also on price that nonbank borrowers pay for their loans: overall, negative EBITDA firms that borrow from nonbanks pay 254 basis points more than bank borrowers. Chernenko and coauthors also find that firms with negative EBITDA and Debt/EBITDA greater than six pay 89 and 183 basis points more after the revised leveraged loan guidance became effective.

In a related research paper, Kim, Plosser, and Santos (2018) study interagency guidance on leveraged lending. They find that the guidance accomplished its aim to reduce (closely supervised) banks' leveraged lending activity. However, it also led to a shift of leveraged lending to nonbanks. They also show that these nonbank lenders significantly increased their borrowing from banks, post the announcement of the guidance, possibly to finance the increase in their leveraged lending. Therefore, the effect of the guidance on overall leveraged lending and the stability of the financial system is not clear.

2.4.2. Role of Capital Requirements:

As we discussed before, participation by nonbank institutional investors in syndicated loans significantly increased after the Great Financial Crisis. Irani, Iyer, Meisenzahl, and Peydró (2021) find that the increase in regulatory capital for the commercial banks in the U.S. has contributed to this increase in the share of nonbank lenders in the syndicated loans.[12][13] Their data source is the Shared National Credit Program, which is a credit registry administered jointly by the Board of Governors of the Federal Reserve System (Fed), the Federal Deposit Insurance Corporation (FDIC), and the Office of the Comptroller of the Currency (OCC). One advantage of the data set

[12] See also Aiyar, Calomiris, and Wiedlak (2014) for evidence from the U.K.
[13] See https://www.clevelandfed.org/en/newsroom-and-events/publications/economic-commentary/2020-economic-commentaries/ec-202005-evolution-bank-capital-requirements.aspx for a brief history of capital requirements.

that Irani and coauthors have access to is that they can track loan sales and trading activity in the secondary loan market.

Irani et al. (2021) start by showing that there is a positive relation between banks' regulatory capital cushions and loan retention. They concentrate on Tier 1 regulatory leverage ratio – Tier one (core) capital over risk-weighted assets. Authors find a negative and significant relation between nonbank share in the loan syndicate and syndicate member banks' average Tier 1 capital. The effect is economically large: about 2% (one standard deviation) decline in average bank capital leads to about 14% increase in the average nonbank share (of 23%).

Banks are more likely to sell their loans when they are undercapitalized. Most importantly, authors find that a significant fraction of syndicated loans that are removed from undercapitalized banks' balance sheets are sold to nonbanks. Banks cherry pick which loans to sell, towards loans with higher credit riskiness and, therefore, higher capital requirements lead to financial fragility concerns we discuss later. Terms loans derive the results as an active secondary market for credit lines does not exist. Note that lead arrangers almost never sell, consistent with the role of relationships in this market.

In addition to loan syndicate-time and bank fixed effects, for identification, Irani et al. (2021) utilize some variation (surprises) in the adoption of the Basel III rules of 2010 in the U.S. The board announced in 2012 that there would be some adjustments in calculation of risk exposures (e.g., for residential mortgages and commercial real estate) and changes in items that count towards Tier 1 capital, many of which were surprises to the banks. Importantly, these adjustments created variation in capitalization of banks with similar risk-weighted assets. Authors use this variation as an instrument and show that banks with a greater unexpected capital shortfall were more likely to sell their loans to nonbanks.

Results on capital requirements we discussed led many researchers to propose a macroprudential regulation, where regulators should impose similar capital requirements on a given type of credit exposure irrespective of who holds it, bank or a nonbank (see, e.g., Hanson, Kashyap, and Stein, 2011; and Martinez-Miera and Repullo, 2019). On the other hand, Begenau and Landvoigt (2021) propose a quantitative general equilibrium model with regulated banks and unregulated nonbanks (shadow banks). They show that tighter capital requirements for banks lead to a larger shadow banking sector with higher leverage. However, they also argue that tighter capital regulation for banks would reduce comparative advantage of banks due to deposit insurance

and access to cheaper deposit funding. As a result, shadow banks expand and, therefore, their debt becomes more expensive. Facing competition, nonbanks would have to reduce their leverage (risk). In sum, authors argue that optimal capital requirement of 16% would lead to more nonbanks but a safer financial system.

2.4.3. Stress Tests

Stress tests, required by the Dodd-Frank Act (DFA) and implemented by the Federal Reserve, post the Great Financial Crisis have been aiming to ensure that regulated financial institutions are well-capitalized, facing future economic downturns.

Cortes, Demyanyk, Li, Loutskina, and Strahan (2020) show that stress tests have affected small business lending by large banks. They use CRA data and data from the Survey of Terms of Business Lending (STBL). Authors find that large commercial banks most affected by stress tests -with larger potential decline in capital under stress test- reallocate their loans away from riskier markets, where stress-tested banks own no branches. They also raise interest rates on small loans where they have branches. Authors argue that, in this way, banks loosen their capital requirements and concentrate on areas where they have local knowledge. Banks not subject to stress tests seem to fill in the lending gap created so that overall credit availability does not change. Such a withdrawal by larger banks would allow nonbanks to gain market share in riskier markets, as also argued by Chen, Hanson, and Stein (2017). Chen and co-authors show a significant increase in nonbank lending in counties dominated by top four banks, which reduced their small business lending in 2010s, possibly also due to the effect of heightened bank regulation.

Davydiuk et al. (2020) also use the first implementation of these tests under the Supervisory Capital Assessment Program (SCAP) in 2009 as a shock to credit availability to riskier mid-sized businesses. In addition to the stress test shock, they also study an accounting change -FAS 166/167 requiring banks to consolidate their off-balance sheet items into their on-balance sheet items, reducing their regulatory capital ratios. Remember that Davydiuk and coauthors focus on the growth in BDCs as direct lenders to middle-market firms. A regulatory capital shock is likely to affect regulated commercial banks' lending in this market as mid-sized firms are, on average, riskier. They find that, following the capital supply shock due to regulatory changes for banks, exposed counties experienced a significantly higher presence of BDCs than counties in the control group (using a difference in differences estimation).

All this work provides strong empirical evidence that increased regulation for commercial banks, especially post financial crisis, led to the growth of nonbank lending. Therefore, a significant fraction of the extent of direct nonbank lending to small and medium-sized businesses, as well as the participation of these nonbank lenders in large, syndicated loans can be explained by the tightness of bank regulation.

Before we move to the discussion of bonds, we would like to note that some nonbanks are also subject to regulation, with significant variation across. We will discuss regulation for insurance companies and mutual funds extensively in the next section. Even if some nonbanks are partially regulated, enforcement of the regulation is essential. There is some evidence on the slackness of regulatory constraints for nonbanks. For example, studying a regulatory change to the leverage limits of business development companies (BDCs), Balloch and Gonzalez-Uribe (2021) show how slackness of regulatory constraints has important effects on nonbank lenders' incentives to accurately assess fair values of their investments. This regulatory change, which allowed lenders to double their leverage limit, led BDCs to slowly adjust their loan portfolios and increase leverage. However, importantly, authors also find that BDCs also suddenly increased the unrealized losses reported on their loans.

3. Extent and Characteristics of Nonbank Lending in Bond Markets

3.1 Recent Trends in the Landscape of Institutional Bondholders

The corporate bond market is the primary source of external funding for nonfinancial firms. The dominance of corporate bonds as a form of borrowing has been increasing since the early 1990s (see Figure 8). As of 2020, the total amount outstanding in corporate bonds of nonfinancial US firms reached $7.3 trillion – almost three times as the bank lending and leveraged loans taken together.[14] Corporate bond issuance has also been growing relative to equity issuance, starting with twice the equity issuance in 2000 and reaching a seven-fold difference in 2019 – with the 2019 total value of bonds and equity issued being $1425 and $228 billion, respectively.[15]

The rapid growth of corporate bond issuance was accompanied by the change in the landscape of institutional bondholders. Historically, insurance companies and pension funds have

[14] https://www.federalreserve.gov/publications/may-2021-borrowing-by-businesses-and-households.htm
[15] https://www.sifma.org/resources/research/us-equity-and-related-securities-statistics/

been the dominant holders of corporate bonds. Back in the 1980s, they held about 75% of the amount outstanding (Figure 9). The rapid development of asset management industry dramatically reshaped the ownership structure. Following regulatory changes in capital requirements for insurance companies in the early 1990s,[16] asset management companies increased their presence from about 5% in 1990 to 35% in 2020 (Figure 9). The ongoing increase in bond holdings of investment funds is partially attributed to the recent boom of exchange-traded funds (ETFs). As of 2020, the total value of bonds in ETF portfolios reached $725 billion, compared with only $27 billion during the financial crisis of 2008-2009. Meanwhile, open-ended mutual funds – the largest player among asset managers - increased corporate bond holdings from $0.6 trillion in 2008 to $2.7 trillion as of 2020 (Figure 10).

Since the global financial crisis, the bond holdings of insurance companies have also been growing, although at a much slower pace than the asset management industry. In 2008, life and P&C insurance companies held 25% of the amount outstanding bonds, which evolved to 30% as of 2020 (Figure 9). The recent study by Fringuellotti and Santos (2021) shows that insurance companies shifted the focus of their investment towards CLOs generating higher yields relative to bonds with the same rating. In 2010, the National Association of Insurance Commissioners (NAIC) relaxed the capital requirements for holdings of securitized CLO instruments, making CLOs more profitable investment than corporate bonds. This regulatory change, which aimed to create relief for insurance companies with large downgrades of asset-backed securities, allowed them to assign CLOs or other asset backed-securities tranches into lower-risk weight categories. Further, Becker and Opp (2014) document that insurance companies increased investments in speculative-grade CMBS instruments following the same regulatory reform.

Commercial banks and broker-dealers had significant bond holdings in the pre-GFC period with 11% and 6% of the amount outstanding back in 2007. The introduction of Basel III and the Volcker Rule in the series of post-crisis regulations affected their incentives to hold risky bonds in the recent decade. As of 2020, depositary institutions and broker-dealers hold 5% and 1% of the amount outstanding correspondingly (Figure 9). Deterioration of bond inventories of broker-dealers played a major role in the egregious consequences of the COVID-19 crisis, as we discuss later in the paper. Meanwhile, we continue our discussion with the differences in demand for bonds between insurance companies and mutual funds.

[16] https://content.naic.org/cipr_topics/topic_riskbased_capital.htm

3.2. Institutional Demand for Bonds and Overview of Potential Threats

Insurance companies are subject to strict regulation, imposing higher risk-based capital requirements for bonds with lower credit ratings. Compared to regulated insurance companies, asset managers – consisting predominantly of mutual fund families – have more flexibility in choosing securities along the whole credit rating spectrum. As a result of different regulation treatments, insurance companies and mutual fund families complement each other in the bond market – insurance companies specialize in investment-grade (IG) bonds while mutual funds prefer risky high-yield (HY) instruments (see Figure 11). Within asset management industry, index funds and ETFs predominantly invest in IG bonds, while actively managed funds prefer HY part of the spectrum.

Portfolio choices of insurance companies and mutual funds also differ along other dimensions such as bond maturity, liquidity, and size. Consistent with volatile nature of fund flows, mutual funds prefer more liquid bonds with a shorter maturity, and insurance companies, on the opposite, tilt their investments towards illiquid bonds with longer maturity. Also, mutual funds tend to invest in large bonds, and insurance companies prefer smaller bonds (Bretscher, Schmid, Sen, and Sharma, 2020).

The rapid growth of the public debt market is partially attributed to low interest rates, high market valuation, and, as a result, to increased debt capacity of public firms. Although both investment-grade (IG) and high-yield (HY) bond issuance have been increasing (Figure 12), the overall credit quality has deteriorated over the years. The issuance of IG bonds was far exceeding the growth rate of HY bonds. However, the composition of credit quality within IG category shifted towards BBB-rated bonds (Figure 11). Fewer than 30% of IG bonds were BBB-rated in 2000, evolving to 45% as of 2020 (see SEC Report 2020). A similar pattern can be observed in the international market.[17]

In the low-interest-rate environment, the deteriorating credit quality of borrowers might be attributed to the "reaching for yield" phenomenon – the tendency to invest in higher yield bonds. Both insurance companies and asset managers are prone to this behavior (see, e.g., Becker and Ivashina, 2015; and Choi and Kronlund, 2018). As discussed above, insurance companies are subject to risk-based capital requirements calculated based on NAIC risk rating categories of their

[17] https://www.oecd.org/corporate/corporate-bond-market-trends-emerging-risks-and-monetary-policy.htm

investments. Within rating groups, however, insurance companies prefer higher yield bonds – i.e., regulatory arbitrage. According to Choi and Kronlund (2018), mutual fund families also reach for yield to generate higher returns and attract more inflows to their funds. Reaching-for-yield by two dominant types of players – holding in a total of 65% of the market as of 2020 (Figures 11 and 12) – shifts the overall supply of funds towards riskier borrowers and securities.

The deteriorating credit quality of IG bonds and shift towards borderline BBB rating raise concerns about a potential increase in the number of fallen angels – firms downgraded from IG to HY rating (SEC report 2020, OECD report[18]). Losing investment-grade rating leads to divesting by various investors with rating-based regulation or investment mandates. For instance, insurance companies, especially financially constrained ones, sell downgraded bonds when they increase their capital reserve requirements (Ellul, Jotikasthira, and Lundblad, 2011), which we will cover in detail in the next section. Passively managed mutual funds and ETFs have predetermined investment mandate restrictions, also relying on the credit rating of the instrument. Hence, deterioration in credit rating can be followed by herding behavior and selling pressure from various institutional bondholders, leading to mispricing (Cai, Han, Li, and Li, 2018).

The growth of open-end mutual funds in the bond market raises concerns about the financial fragility of the nonfinancial corporate sector. Corporate bonds are typically characterized by long maturity and low liquidity. On the other hand, the capital provision of open-ended mutual funds is liquid, creating a liquidity mismatch between assets and liabilities. Large enough outflow shock to a bond mutual fund can trigger the liquidation of illiquid and opaque corporate bonds, pushing the price below the fundamental value – a fire-sale risk. The effectiveness and fragility of bond mutual fund liquidity transformation is the hot topic of ongoing academic research and will be discussed in section 4 on financial stability.

3.3. Insurance Companies as Bondholders: The Effects of their Capital Requirements

Regulators restrict the amount of risk an insurance company can take on their balance sheet, like banks, through minimum capital requirements. Although capital reserves crucially depend on both assets and liabilities, risk-based regulatory treatment of their assets makes insurance firms watch the effect of their investment decisions on their regulatory capital. For instance, life insurance's

[18] https://www.oecd.org/corporate/corporate-bond-market-trends-emerging-risks-and-monetary-policy.htm

capital requirement for holding BBB bonds is 1.3% of bond value held; for BB bonds, it is 4.6%; and it keeps growing exponentially up to 23% for CCC bonds (Becker, 2017). Such risk-based regulatory treatment turns out to have several unintended adverse consequences.

Ellul, Jotikasthira, and Lundblad (2011) consider regulation-induced fire-sales of downgraded corporate bonds, which becomes costlier to hold due to higher capital requirements, especially for capital-constrained insurance companies. Unconstrained insurance companies might not be willing to buy the bond due to increased reserves requirement, leading to temporary underpricing, especially when liquidity from the outside of insurance industry is scarce. Ellul, Jotikasthira, Lundblad, and Wang (2015) further document the fragility of the historical cost (HCA) accounting rule. As opposed to HCA, the mark-to-market (MTM) rule has been criticized for causing excessive volatility during turmoil. In the MTM rule, any downward pressure on portfolio holdings adversely affects capital requirement, leading to an asset sale and a further downward price spiral. Considered as a solution, the HCA rule is subject to its own problems. When an asset gets downgraded, insurers using HCA will have an incentive to sell other unaffected securities to restore capital reserves, potentially causing price distortions on illiquid markets (Ellul, Jotikasthira, Lundblad, and Wang, 2015).

A recent line of work further documents a strong herding behavior of insurance firms even outside of downgrade-related fire sales (see, e.g., Cai, Han, Li, and Li (2018) and Girardi, Hanley, Nikolova, Pelizzon, and Sherman (2021)). Girardi et al. (2021) construct a measure of pairwise portfolio similarities in the insurance industry and argue that this measure has predictive power for future common sales. Considering high and low-risk assets separately, the authors show that similarities in high-risk securities drive the results, which might be consistent with the reaching-for-yield story discussed earlier (Becker and Ivashina, 2015). Paper considers two shocks to the balance sheet of insurance companies: the bankruptcy of Lehman and natural disasters such as hurricanes Katrina and Rita. In both scenarios, exposed insurers with high portfolio similarities demonstrated greater joint sales, leading to adverse price implications.

3.3.1. Real Consequences of Bond Fire-sales

Several papers explore the consequences of bond fire-sales by insurance companies on the real economy. Massa and Zhang (2021) consider hurricane Katrina as an exogenous shock to the demand for bonds. The paper shows that bond fire-selloff following hurricane Katrina led to price

decline and forced affected firms to switch to bank financing. As a result of this shift, affected firms decreased overall debt maturity. Liu, Rossi, and Yun (2021) also consider insurance companies' selloff of unaffected municipal bonds following natural disasters. Fire-sales of municipal bonds increased borrowing costs in the primary market, adversely affecting overall issuance and investment in muni-dependent sectors. The authors document low GDP growth and high unemployment as a result of muni fire-sales.

The rating-based regulatory treatment naturally makes some bonds more preferable than others for insurance firms. Nanda, Wu, and Zhou (2019) argue that insurance company ownership is priced in the cross-section of bonds. Due to fire-sale risk, bonds with larger insurance ownership demonstrate higher yield spread even after controlling for risk and liquidity. The effect is especially strong for bonds with borderline credit ratings held by capital-constrained firms and during the financial crisis. Murray and Nikolova (2021) document the underpricing of bonds with a rating close to non-investment grade due to low demand from insurance companies. Conversely, investment-grade bonds with high systematic risk exposure demonstrate high demand by insurers leading to overpricing. Notably, there were no price effects before the introduction of rating-based regulation in early 1990s. No doubt, secondary market prices explicitly influence the cost of borrowing in the primary market.

4. Financial Stability Concerns with Interconnected Nonbanks Subject to Runs

Great Recession underlined the importance of financial stability, which collapsed due to the troubles of the highly leveraged shadow banking system interconnected with the banks (e.g., Gorton and Metrick, 2012). And the latest recession of March 2020, unexpectedly, created another test for it. And we know that, in between these last two recessions, there has been a significant shift to nonbank lending not only in syndicated loan market and bonds but also in direct bank-type loans. Therefore, credit risk --especially in high-yield borrowing-- has increasingly been held by nonbanks rather than banks. Then, a natural question to ask is the potential effects of this shift on credit market stability or financial stability in general.

In this section, we will discuss existing theory and predictions on this important question of financial stability implications of the changing landscape of credit extension, and then the next section will provide some evidence from the COVID-19 triggered crisis. As we discussed in the

earlier part of the paper, the role of regulation for banks and insurance companies is the key to understanding the financial stability implications of the growth in nonbank lending.

The reason for increasing regulatory capital requirements and other regulatory restrictions on loan riskiness, post-financial crisis, was to curb risk-taking by banks and increase financial stability (see, e.g., Admati, DeMarzo, Hellwig, and Pfleiderer, 2014; Berger and Bouwman, 2013; Flannery, 2014; and Thakor, 2014). However, as we discussed above, heightened bank regulation has increased lending by unregulated nonbanks, which could, in fact, increase financial fragility. As Plantin (2015) argues: "Tightening capital requirements may spur a surge in a shadow banking activity that leads to an overall larger risk on the money-like liabilities of the formal and shadow banking institutions…"

4.1. Funding Fragility of Nonbanks

As argued by Greenwood and Scharfstein (2013), the Financial Crisis revealed significant financial stability costs of unregulated shadow banking, which extensively rely on short-term financial claims without explicit government guarantees and, therefore, subject to runs when investors become concerned about the entities' solvency (see, e.g., Gorton and Metrick, 2012; Stein, 2012; and Covitz, Liang, and Suarez, 2013).

Starting with Diamond and Dybvig (1983), banking literature considered the effect of runs on banks' survival and financial stability (see Allen and Gale (2009) for a review of this literature). Similarly, nonbanks might be subject to self-fulfilling runs by their investors, as Allen and Walter (2021) argue. They develop a simple model of funds' fragility to show that traditional banks are not necessary to generate a run like in Diamond and Dybvig (1983); nonbanks --i.e., mutual funds-- facing even small frictions can be subject to it. They discuss financial stability implications.

Jeremy Stein, in his 2013 speech, entitled "*Overheating in Credit Markets: Origins, Measurement, and Policy Responses*" as the Governor of the Board of Governors of the Federal Reserve System also emphasizes the financial fragility that the lenders with short-term demandable funds create. He emphasizes the surge in junk bond issuance and leveraged loans in the early 2010s, but he argues that it is more important to understand what fraction of these instruments are financed by investors whose funds are fragile to runs as these claims lead to systemic spillovers in the form of deleveraging and fire sales (a la Shleifer and Vishny 2011).

4.1.1. Fragility in the Loan Markets

Both banks and majority of nonbank lenders have short-term, money-like liabilities. However, as Hanson, Shleifer, Stein, and Vishny (2015) argue, banks are patient fixed-income investors with "sleepy" depositors, while shadow banks are subject to runs and consequent fire-sale losses.[19]

Chretien and Lyonnet (2021) model symbiotic relation between traditional and shadow banks. They argue that regulated banks and unregulated shadow banks coexist through their mutual reliance in a crisis. In bad times, shadow banks, which cannot roll over their short-term financing, stop lending and sell their assets to banks at discounted --fire-sale-- prices. Banks fund these purchases with insured deposits, as they benefit from flight to quality in crises times. They support their findings using data from the Financial Crisis (i.e., the Lehman Collapse of September 2008) and the recent Pandemic shock (Covid-19 breakout of March 2020) in the U.S. As shown in Figures 1 and 2 of Chretien and Lyonnet (2021) (copied as Panels A and B of our online appendix Figure OA3), 2020 looks similar to 2008 in terms of short-term liabilities of funds and run from prime money market funds holding risky MBSs to safer money market funds holding government securities.

Remember that Irani et al. (2021) find a strong negative relation between traditional banks' regulatory capital ratios and their sales of syndicated loans to nonbanks in the secondary market. They also show that this relation is stronger in bad times when market-wide uncertainty is higher and when banks' profitability is lower. They study the 2008 Financial Crisis. Using participation share of nonbanks in syndicated loans pre-crisis, they show that nonbank share has a negative effect on credit availability during the crisis. These nonbank borrowers could not substitute to other syndicated loans either. Moreover, syndicated loans with a greater share of nonbank participation are associated with larger downwards pressure on secondary market prices during the 2008 crisis (a la Shleifer and Vishny, 2011). Both these effects are stronger for nonbanks with more fragile funding (e.g., hedge funds and broker-dealers). Consistently, they show that the shares of lead arrangers are alleviated when nonbanks sell. Lastly, Irani and coauthors also show that loan price volatility during the crisis increases with the share of nonbank participants.

[19] Sunderam (2015) show that investors treat shadow bank debt as money like.

Following on our discussion on nonbanks in syndicated loans, Beyhaghi, Nguyen, and Wald (2019) show that, compared with banks, nonbank participants of syndicated loans are more likely to exit the syndicate before or at renegotiations of the loans than commercial banks. This is especially true for CLOs, closed-end funds, mutual funds, and hedge funds, with 12.4%, 9.7%, 8.4%, and 8.1%, respectively, higher chances of exiting a syndicate than commercial banks after controlling for other factors. Consistent with Stein (2013), mutual funds' net outflows lead to a greater likelihood of exit contributing to greater systemic risk. Nonbanks generally chase higher yields (spreads) and, therefore, the likelihood of an exit increases if the financial condition of the borrower improves. Overall, this paper shows evidence that greater nonbank participation in the syndicated loan market may add to systematic risk because of the greater funding risk from nonbank participants. Fire sales by nonbanks, facing outflows of their funding, would aggravate the fragility of the financial system (Shleifer and Vishny, 2011).

4.1.2. Bond Mutual Funds: Fragility in the Bond Markets

One of the major recent trends in the corporate bond market is the sharp increase in bond mutual funds (see Figure 10). As discussed before, the capital provision of open-ended mutual funds, where shareholders can purchase and redeem their shares on short notice, is vulnerable and subject to market sentiments (Frazzini and Lamont, 2008). The secondary bond market is highly illiquid, though, creating an apparent liquidity mismatch between assets and liabilities. Therefore, the recent active growth and expansion of bond mutual funds raise serious concerns about the fragility of liquidity transformation in corporate bond market (IMF 2021).

The classical paper by Chevalier and Ellison (1997) documents a convex relation between future flows and current performance in mutual funds. Investors disproportionately reward current star funds and show a modest reaction to underperformance. Chen, Goldstein, and Jiang (2010) distinguish between liquid and illiquid portfolio holdings and show that outflow from mutual funds with illiquid assets is sensitive to recent underperformance, much more so than liquid funds. When illiquid fund underperforms, retail investors react quickly by redeeming their shares, making these funds vulnerable to runs. Goldstein, Jiang, and Ng (2017) further estimate flow-performance relation for bond mutual funds confirming the concave form for underperforming funds. Such sensitivity is explained by NAV pricing practices implemented in the industry. When redeeming

shares, the price of redemption is determined on a daily basis and is not adjusted for trading costs caused by selling illiquid assets. As a result, only the remaining shareholders bear the trading costs caused by the share redemption of leaking shareholders today. This fact creates a "first-mover advantage" (Chen et al., 2010), making bond mutual funds susceptible to runs.

First-mover advantage in bond mutual funds causes a cascade of asset redemptions by shareholders of underperforming funds (see, e.g., Goldstein et al., (2017) and Zeng (2018)).[20] Consistent with the herding behavior of bond mutual funds (Cai et al., 2018), the divesting decision of the affected fund is further exacerbated by the selloff of other mutual funds holding the same bond. Falato, Hortacsu, Li, and Shin (2021) show that flows-driven fire-sales have strong adverse spillover effects on other funds holding the same assets, causing a cascade of further divesting of the asset by other mutual funds.

Jiang, Li, Sun, and Wang (2020) conduct an empirical analysis of whether mutual fund liquidity transformation presents fragility to corporate bond market. They construct a measure of bond-level fragility using the holdings liquidity of the bond's incumbent mutual fund investors. Following the negative shock, the shareholders of mutual funds with illiquid holdings have greater incentives to redeem their shares, triggering higher selling pressure of bonds predominantly held by illiquid funds. Higher fragility bonds demonstrate higher future return volatility. One standard deviation increase in bond fragility is associated with a 1.15% increase in annualized bond return volatility over the next quarter – 16% of median bond volatility.

Why should we care about fund runs? Capital runs from incumbent bondholders jeopardize corporate borrowing on public debt markets, leading to underinvestment (see, e.g., Lemmon and Roberts, 2010; and Harford and Uysal, 2014). The negative liquidity shock on bondholders can propagate on both primary and secondary markets. Divesting the existing bond position in the secondary market puts downward pressure on its market price (Cai et al., 2018) and increases bond return volatility (Jiang et al., 2021), affecting the cost of bond issuance in the short term. Mutual fund families have also been active in the primary market. The liquidity constraints of incumbent bondholders decrease the probability of bond issuance and affect the corporate decisions of the borrowing firm (see, e.g., Massa, Yasuda, and Zhang, 2013; and Zhu, 2021).

[20] Allen and Walther (2021) for a great review of theoretical and empirical findings. The authors also construct a simple theoretical framework of self-fulfilling runs on mutual funds based on classical bank run model of Diamond and Dybvig (1983).

Massa et al. (2013) demonstrate that reliance on bond mutual funds creates capital supply fragility for borrowing firms. The authors consider three measures of supply uncertainty of firm's bondholders: the average portfolio turnover, the average flow volatility of firm's bondholders, and the prevalence of mutual funds among incumbent bondholders. Fund supply uncertainty of a firm's bondholders adversely affects bond issuance and overall leverage of the borrowing firm, leading to higher substitution with bank loans and equity issuance.

The recent work by Zhu (2021) documents the importance of borrower-lender relationships in corporate bond market. Information acquisition costs and connection with underwriter create *stickiness* in issuer-investor relationships – bond mutual funds are five times more likely to invest in new bond issuance of the firm they already hold. Such connection allows for financial shocks on bondholders to propagate on the borrower level. Firms with a higher flow-driven capital supply are more likely to issue bonds, enjoy lower yields, and substitute away from equity financing and bank loans. Exploiting the idiosyncratic shock of asset redemption in PIMCO, following the departure of Bill Gross, the authors show that firms held by PIMCO suffered from the decreased probability of bond issuance.

Overall, flow fluctuations shape the primary bond market, directly affecting the corporate decisions of borrowing firms. On a secondary market, flow-induced fire sales can cause price destabilizing effects, among others disturbing the primary market. For example, in the recent COVID-19 episode, bond mutual funds witnessed an unprecedented outflow leading to widespread price distortions on bond market. Fluctuations in asset redemption induce mutual fund managers to adjust their liquidity provision actively, avoiding adverse price implications from portfolio rebalancing. A more significant threat is coming from correlated decisions of bond mutual funds. Asset redemptions introduce adverse spillover effects on the performance of other funds holding the same assets, leading to further outflow and selling pressure, and triggering the downward price spiral. The effect is concentrated in illiquid funds and during low market liquidity. As a result of such interconnectedness, the bond market price can significantly deviate from fundamentals (Falato, Hortacsu, Li, and Shin, 2021).

4.1.3. Broker-dealers in Corporate Bond Market: Deteriorating Bond Liquidity

In outflow-induced fire-sales, mutual fund demand for liquidity. Recently, we also observe frictions with the supply of liquidity. Corporate bonds have been historically traded on OTC

markets, with broker-dealers providing liquidity in the opaque environment. Dealers served as intermediaries and held significant inventories of corporate bonds – 6% of the total amount outstanding in 2007 (Figure 9). Following the GFC, bank-affiliated dealers suffered from increasing regulatory pressure associated with introducing the Volcker Rule (Bao, O'Hara, and Zhou, 2018). As a result, dealers' total corporate bond inventories dramatically declined – from the top of $464 billion in 2007 to only $63 billion in 2018 (Çelik, Demirtaş, and Isaksson, 2020; see also Figure 9). Notably, primary dealers' net corporate bond positions deteriorated both in investment-grade and high-yield bonds.

The decreasing ability of bank-affiliated dealers to provide liquidity raised serious concerns among academics (Duffie, 2012; Bao, O'Hara, and Zhou, 2018). As discussed above, insurance companies' regulation-induced fire-sale of downgraded corporate bonds can adversely affect market prices (Ellul, Jotikasthira, and Lundblad, 2011). The deteriorating role of bank-affiliated dealers as liquidity providers further exacerbates the fire-sale threat of institutional bondholders. Bao, O'Hara, and Zhou (2018) explore the liquidity supply during fire-sales of downgraded bonds before and after implementing the Volcker Rule in 2014. Results suggest a substantial decline in bond liquidity following the new regulation. Bank-affiliated dealers reduced liquidity provision, while nonbank-affiliated dealers could only partially compensate for reduced liquidity. The paper further rules out the introduction of Basel III and Comprehensive Capital Analysis and Review (CCAR) stress testing as potential reasons for the effect.

A series of papers document the evidence consistent with decreased corporate bond liquidity. Bessembinder, Jacobsen, Maxwell, and Venkataraman (2018) analyze bond liquidity and dealer behavior during the 2006 to 2016 period. The authors confirm a decrease in capital commitment by bank-affiliated dealers following the post-crisis regulation. Bank dealers show a decline in turnover, block trading, and principal volume. Besides introducing Volcker Rule and Basel III requirements, the ongoing shift to electronic trading might have contributed to a decline in a capital commitment by traditional dealers. Dick-Nielsen and Rossi (2019) argue that the cost of liquidity provision for investment-grade bonds has doubled, whereas it has tripled following the GFC for risky bonds.

Deteriorated inventories of bank-affiliated dealers contributed to the liquidity shortage and financial instability in corporate bond markets during the COVID-19 crisis (O'Hara and Zhou,

2021; Haddad, Moreira, and Muir, 2021; Kargar, Lester, Lindsay, Liu, Weill, and Zúñiga, 2021). We will discuss this problem in more detail in the corresponding section below.

4.2. Interconnections with Banks

Another reason why we should care about runs on unregulated nonbanks is their connection to the regulated banks. There is extensive literature discussing the role of interconnections between banks on financial stability. Some papers argued that a more interconnected system increases its resilience to the insolvency of any individual bank (e.g., Allen and Gale (2000) and Freixas, Parigi, and Rochet (2000)). However, others argued that interconnections could lead to systemic crises if the shock is large enough. For example, Acemoglu, Ozdaglar, and Tahbaz Salehi (2015) model a financial system in which different institutions are linked to one another via unsecured debt contracts -i.e., face counterparty risk. They show that a negative shock affecting financial institutions could lead to financial stability if the shock is sufficiently small, but financial instability if the shock is sufficiently large.

The degree of interconnectedness would shape the financial (in)stability. See Figure 13 from the FSB's November 2020 report illustrating how much more complicated is the picture of flow of funds now with the addition of the interconnections with the nonbanks. Shadow banking has also increased the number of steps in the credit intermediation process, which makes evaluation of counterparty risk more challenging and reduces the financial stability of the financial system, as market participants are unlikely to internalize the impact of this change (Greenwood and Scharfstein, 2013). Fire-sales by insurance companies due to regulatory constraints or by mutual funds due to runs could lead to a systemic crisis when they are interconnected to the rest of the financial institutions, including regulated banks.

There is some existent theory work on bank-nonbank interconnections. Luck and Schempp (2014), for example, argue that the fragility of nonbanks would increase with the size of the sector and spread to the commercial banking sector when in crisis. Voellmy (2019) model, on the other hand, implies that shadow banks could protect banks from runs if they can attract uninsured deposits away from the commercial banking sector, but only if the upper limit on deposit insurance is low.

Interconnections happen partially because nonbank lenders often rely on bank loans as a (partial) source of funding for the loans they make. Kim, Plosser, and Santos (2018), who study

the growth of leveraged syndicated loans by nonbank lenders post 2013 Interagency Guidance on Leverage Lending, ask where these nonbanks get their funding. The answer is the regulated banks! They show that nonbanks' reliance on bond issuance declines while their bank loans (both commitments and drawdowns) increase starting in 2014. And this increase is rather substantial: around the time when the guidance became effective, bank loans increased from $8.9 billion to $20.2 billion, while the change for bonds was from $10.1 billion to $10.2 billion. Authors conclude that "some of the risks that left the banking sector with the migration of leveraged lending to nonbanks induced by the guidance came back in the form of a bigger exposure to nonbanks." Moving to the lenders to the small and medium-sized firms: BDCs, for example, which mainly rely on capital markets (both equity and debt) for financing, also borrow from banks through commitments and term loans (Ballock and Gonzalez-Uribe 2021). A large fraction of online FinTech lenders is connected with the banks through loans, as well.

5. COVID-19 Shock and Resilience of Nonbanks

Leading to the recent COVID-19 shock, we observed some important trends in the behavior of nonbanks – i.e., significant increase in high-yield investments and the size of their short-term, demandable liabilities – in addition to ever-growing interconnectedness of regulated and unregulated financial institutions. As Financial Stability Board's "Holistic Review of the March 2020 Turmoil" of November 2020 states, stricter regulation for banks is an important factor in this trend: "... regulatory reforms and market-driven adjustments in the aftermath of the 2008 financial crisis have resulted in credit risk being increasingly intermediated and held outside the banking sector. Interconnectedness has also increased and taken new forms in some areas. With the overall growth of non-bank financial intermediation (NBFI), market liquidity has become more central to financial resilience" (see the Executive Summary). In this section, using the COVID-19 shock as an experiment, we discuss how these vulnerabilities of the nonbank lenders could amplify the effect of the shock both through their direct lending and through interconnections with other institutions. We will start with banks and then discuss nonbanks – i.e., FinTechs as lenders to smaller firms and money managers as investors in the bond and leveraged loan markets.

Banks had a large, unprecedented inflow of deposits, as it is typically the case during economic downturns due to flight to safety (e.g., Kashyap, Rajan, and Stein, 2002; Gatev and Strahan, 2006). The increase in deposits during the initial pandemic shock was from about $13

trillion in January to $16 trillion by the end of December 2020, with most of the jump happening from March to April. As Levine, Lin, Tai, and Xie (2021) show, deposit interest rates at bank branches fell more in counties with higher COVID-19 infection rates. Authors argue, though, that the reason is not flight to safety or any government programs. They provide evidence that these higher infection rates led to more anxiety about future income loss and, therefore, more savings through deposits.

Unlike the Great Financial Crisis, banks performed well during the pandemic-induced recession. The large increase in deposits and stable financial conditions of banks allowed them to provide liquidity to the markets during the Pandemic. Li, Strahan, and Zhang (2020) show that, in the last three weeks of March 2020, banks faced the largest increase in takedowns under existing credit lines *ever* observed. To put numbers to the scale of these takedowns, authors point to a weekly growth in demand for bank commercial and industrial loans that is 50 times the average of the last half-century! Authors find that large banks, which typically serve large customers, did well, met liquidity demands, and pre-COVID financial conditions did not constrain them.

One important concern, though, is the fact that bank loans and bonds both have moved toward riskier customers. For example, we discussed the sharp increase in the lowest quality investment grade (IG) firms –i.e., the BBB-rated ones-- since the financial crisis. This trend raises concerns about possible future downgrades to high yield (HY) status --becoming so-called *fallen angels*-- and hence losing access to financing by banks and by insurance companies in bond markets. Consistently, Acharya and Steffen (2020) show that, during the COVID-19 shock, there was a corporate *dash for cash,* especially by BBB-rated firms, which behaved more similarly to high-yield firms. While some of these BBB-rated firms still had access to public debt, they mainly relied on credit line drawdowns and term loans from banks.

5.1. Nonbank Small Business Loans during the COVID Shock

Although commercial banks carry the regulatory burden, they enjoy having liquidity support from the government during downturns. Nonbanks do not have this liquidity support, a lack of which could lead to credit rationing by nonbanks in crisis. Pandemic-triggered recession was different from the Great Recession in terms of the effect of the shock on banks, as banks could keep their liquidity and provide liquidity to the firms. But their lending concentrated mostly on large firms, as we discussed above. We know from Gopal and Schnabl (2020) that finance

companies and FinTech lenders played an important role in the recovery of small businesses from the 2008 financial crisis, as they substituted for bank lending. Did they help by providing credit during the Pandemic as well?

We have some evidence that FinTechs significantly reduced their loans to small businesses initially. For example, Ben-David, Johnson, and Stulz (2021) show how small business lending by FinTechs dried up in March 2020 (see Figure 14) despite the sharp increase in the number of applications in the same month. Note that the figure presents not only FinTechs that focus on small business lending but also other digital lenders that focus on student loans or personal loans. However, according to the S&P Global Market Intelligence's 2021 U.S. Fintech Market Report, the most significant (61% year over year) drop was in loans to small and mid-size enterprises (SMEs). Ben-David and coauthors use loan-level data from a marketplace lending platform, where they can observe not only the supply of loans but the demand for loans as well. They show that consistent with the general pattern discussed above, the supply of small business loans by the platform declined sharply in March 2020 while there was an increase in demand for the loans, controlling for the ex-ante riskiness of the borrowers. They explore the reasons for this drop in FinTech lending using proprietary data from an online lending platform and find that it was due to FinTech lenders' inability to fund the loans due to their financial constraints.

COVID-19 shock triggered a massive expansion in usage of FinTech in payments and led to record growth of various nonbank payment providers (e.g., PayPal and Square). According to the S&P Market Intelligence's US FinTech Market Report of 2021, PayPal's active new accounts increased from 3.9 million to 7.4 million from March to April 2020. Square had 14 million customers with access to direct deposits and $1.3 billion funds stored in April 2020. One important area that FinTech lenders helped significantly during the shock was processing Paycheck Protection Program (PPP) loans. These loans are potentially forgivable loans guaranteed by the Small Business Administration (SBA) to provide some relief to small businesses during the pandemic. With $669 billion to be disbursed over a period of a few months in 2020, PPP program was unprecedented in speed and scale compared to other small business support programs in the United States. SBA, as the administrator of the program that typically distributes government-supported loans through regulated financial institutions, made the first-ever decision to include FinTechs as lenders in the program.

Erel and Lieberson (2021) compare the response of FinTechs to the financial services demanded by the PPP and find that FinTech is disproportionately used in areas with fewer bank branches, lower incomes, and more minority households, and in industries with fewer banking relationships.[21] Importantly, unlike banks, FinTech lenders also lent in counties where the economic effects of the COVID-19 pandemic were more severe, especially in the first phase of the program. Authors also study whether FinTech substitutes for banks in areas where banks have branches but were not as responsive to the PPP. They find that substitution happens, but it is economically small. Overall, they show that FinTech lenders mostly expand, rather than redistribute, the supply of financial services, reducing disparities in access to finance.

Overall, these findings show that FinTech lenders continue serving borrowers underserved by banks during the economic downturns only when they can maintain their own fragile funding (see also Berg, Fuster, and Puri, 2021).

5.2. Leveraged Loans and Bonds during the COVID Shock

5.2.1. Leveraged Loans

As expected, new leverage loan issuances dropped to almost zero in March 2020; however, they already started bouncing back already in April 2020. See Panel A of the Figure 15 from S&P Global Market Intelligence showing the weighted average bid price of the leveraged loan index plunging in March and then fast recovering afterwards. Debt/EBITDA of outstanding leveraged loans reached record high levels, however, with the average Debt/EBITDA leverage ratio of 6.41% and 35% of borrowers having this leverage ratio greater than 7x in the second quarter of 2020. Naturally, the default rate increased as well despite being smaller than in 2009 (see Panels C and D of the Figure 15).

Overall, we know from Figure 4 that the latest, pandemic-driven crisis was different than the 2008 Financial Crisis. Leveraged loan market amounted to almost $570 billion, with nonbanks participating in 40% of the loans, in 2020. The nonbank share even increased (to 54%) and surpassed the bank share already before the end of 2021. When we concentrate on term loans only

[21] See also Chernenko and Scharfstein (2021) showing that black-owned restaurants are 5.5% more likely to receive PPP loans from nonbanks than banks.

(see Figure 5), the ratio of nonbank participation exceeded 80% in 2021. These numbers show that institutional investors continued funding the leveraged term loans during the pandemic.

5.2.2. Bonds

The first-mover advantage and fragility of illiquid mutual funds were hot topics for regulators and academics in the pre-COVID period. The evidence was mixed, suggesting that bond mutual funds, at least to some extent, can be effective in mitigating asset redemptions. COVID crisis proved it to be wrong. In March 2020, the mutual fund industry faced unprecedented bleeding, suffering from over $200 billion of net outflows from bond mutual funds and another $21 billion from bond ETFs (see SEC report 2020 and also Figure 16). Consistent with high outflow-performance sensitivity (Chen et al., 2010; Goldstein et al., 2017), mutual funds with illiquid bond holdings suffered from more severe withdrawals. Assets redemptions from these funds started far earlier relative to other funds, consistent with the first-mover advantage story (Falato, Goldstein, and Hortaçsu, 2021). Investor complementarity also contributed to massive outflows from prime money market mutual funds leading to a 30% drop in assets in March 2020 (Li, Li, Macchiavelli, and Zhou, 2021).

According to Ma, Xiao, and Zeng (2020), mutual funds followed a pecking order by first liquidating the most liquid assets. Most of the selling pressure took place in Treasuries and investment-grade bonds, causing widespread mispricing. The mutual fund sector alone was responsible for selling $236 billion in Treasuries in the first quarter of 2020 – one-third of total Treasury sales in that quarter. Daily trade volume in the corporate bond market tripled in a matter of several weeks, reaching about $40 billion per day (O'Hara and Zhou, 2021).

Historically unprecedented outflows from bond mutual funds disrupted the corporate bond market. As of March 23, yield spread on investment-grade and high-yield bonds tripled relative to mid-February (see the online appendix Figure OA4). The dynamics of bond CDS spread also demonstrate a granular increase around the peak of uncertainty for both IG and HY bonds, suggesting an increased credit risk of the borrowers. However, the CDS-bond basis declines dramatically for both types of bonds, reflecting the lack of liquidity on the bond market during massive asset redemptions from bond mutual funds. The declining CDS-bond basis for investment-grade bonds exceeded the CDS-bond basis for traditionally illiquid risky securities and reached 280 bps on March 20 (Haddad, Moreira, and Muir, 2021). Similarly, historically liquid bond ETFs

demonstrated a 5% deviation from the market price of the portfolio holdings (Haddad, Moreira, and Muir, 2021). Severe deterioration of liquidity and mispricing of historically liquid instruments is one of the unique features of the COVID-19 crisis.

A series of academic papers document the lack of liquidity provision of corporate bond dealers, traditionally responsible for absorbing excess selloffs (see e.g., O'Hara and Zhou, 2021; Haddad, Moreira, and Muir, 2021; Kargar, Lester, Lindsay, Liu, Weill, and Zúñiga, 2021). Following the post-financial crisis regulation and introduction of the Volcker Rule, as we discussed before, bank-affiliated dealers' ability and incentives to hold risky inventories vanished (Bao, O'Hara, Zhou, 2018). Unfortunately, most of the largest dealers during the COVID-19 crisis were affiliated with depository institutions and were subject to restrictive regulation, contributing to their unwillingness to provide liquidity (Bao, O'Hara, and Zhou, 2018; O'Hara and Zhou, 2021). The mismatch between selling pressure and the dealer's capacity to absorb these shocks led to a sharp increase in trading costs for both investment-grade and high-yield bonds, making them comparable in the middle of March. Duffie (2020) and He, Nagel, and Song (2020) further document that inventory constraints of bond dealers significantly limited their participation in mitigating Treasury bond selloff. Consistently, Kargar et al. (2021) show a sharp increase in transaction costs of "risky-principal" trades, in which dealers execute deals immediately and store the securities on their balance sheet. Research shows that about one-fourth of bond price decline in March 2020 is attributed to dealers' reduced balance sheet capacity (Chikis and Goldberg, 2021).

To stabilize the markets and resolve the mismatch between liquidity supply and demand, on March 23, Federal Reserve introduced the Primary Dealer Credit Facility (PDCF) and the Secondary Market Corporate Credit Facility (SMCCF). The PDCF provides short-term funding to primary dealers at a discount rate. Under the SMCCF, the Federal Reserve offers loans to special-purpose vehicles to directly purchase eligible investment-grade bonds and bond ETFs at the market price (O'Hara and Zhou, 2021). On April 9, Fed relaxed rating-based restrictions and expanded the program to include recent fallen angels.

Fed's intervention had an immediate effect on the bond market. First, bond dealers started accumulating their inventories and effectively mitigating selling pressure. Second, the announcements of the facilities significantly reduced the net outflows from bond mutual funds, and, following the April 9 announcement, flows fully reversed (see the Online Appendix Figure OA5) (see e.g., Falato et al., 2021; Ma et al., 2020). Flows continued to rebound, showing a

cumulative inflow of 9% between April and August of 2020 (Falato et al., 2021). Importantly, those mutual funds holding more SMCCF-eligible bonds demonstrated a more substantial recovery following the announcement. Consistently, the seller's demand for immediacy dropped following the announcements (Kargar et al., 2021). Thus, Fed intervention can be treated as an effective financial stability tool in reducing the fragility of bond mutual funds (Falato et al., 2021).

As a result, transaction costs for investment-grade and high-yield bonds declined, almost reaching the February levels as of mid-May. Yield spreads and CDS-bond basis show the tendency for further recovery (see Figure OA4). By mitigating the financial fragility of bondholders, Fed's intervention further affected the primary market for corporate bonds. Firms with bondholders being more exposed to Fed's programs demonstrated higher bond issuance volume and lower spreads for newly issued bonds (Falato et al., 2021). Becker and Benmelech (2021) show Fed's intervention significantly increased both bond and loan issuance, with the effect being more substantial for bonds. The authors conclude that the US bond market is a resilient source of external funding (see Figure 17 we created following their paper). It is important to note that the issuance activity is driven by investment-grade bonds; and, therefore, we see differences in the recovery of loan and bond issuance volumes as the fraction of investment grade issuance is significantly larger in the bond markets than in the syndicated loan markets.

To sum up, a mismatch between liquidity supply and demand on the corporate bond market during March 2020 (see Online Appendix Figure OA6) created enormous credit market instability. Jiang et al. (2021) show that more fragile bonds in the pre-COVID period suffered from more negative returns and consecutive reversal around March 2020.

Overall, the March 2020 recession, triggered by the COVID-19 pandemic, has proved the need to strengthen the resilience of nonbanks to economic and financial shocks. FSB's November 2020 report summarizes our views on what happened well: "Absent central bank intervention, it is highly likely that the stress in the financial system would have worsened significantly. This would have had a major impact on the ability of financial and non-financial firms to raise funds. The need to intervene in such a substantial way has meant that central banks had to take on material financial risk. This could lead to moral hazard issues in the future, to the extent that markets do not fully internalize their own liquidity risk in anticipation of future central bank interventions in times of stress." In other words, vulnerabilities in the financial system, with the growth in the

extent of nonbank lending, their interconnectedness with the rest of the financial system, and susceptibility to investor runs, remain and will likely increase over time.

6. Discussion and Conclusion

This review shows that the extent of nonbank lending is large and growing fast. The evidence in the U.S. documents that much substitution into shadow banking is an unintended consequence of financial regulation (see also Allen and Walther, 2021). Therefore, the role of bank and insurance company regulation is crucial in understanding the financial (in)stability implications of nonbank lending.

This structural changes in the credit markets with more lenders being subject to runs on short-term debt and invested in riskier and illiquid securities have further increased the importance of liquidity risk management in financial intermediation. Through their interconnections with the nonbank lenders, banks will also need to leverage financial markets' increasing dependence on short-term liquidity. What to do about the possibility of runs on nonbanks and the consequent threat of fire-sales is the critical question.

Mutual fund asset managers realize the potential threat of asset redemption and conduct dynamic liquidity management. A battery of empirical studies explored the effectiveness of their tools. Chernenko and Sunderam (2016) show that mutual funds use a substantial amount of cash and cash equivalents, sometimes financed via bank loans, to withstand potential outflow. 23-33 cents of one dollar of inflows and outflows in a given month is accommodated by using cash. In the cross-section, funds with more illiquid assets or more volatile flows accumulate cash more. However, the authors also show that their cash is not enough to fully mitigate any price impact externalities that funds may exert on other market participants. Morris, Shim, and Shin (2017) also show that mutual funds with more illiquid holdings tend to hoard cash.

Jiang et al. (2020) further explore the dynamic properties of liquidity management in mutual funds. In quiet times, mutual funds use cash to manage asset redemptions. In times of high aggregate uncertainty, managers sell both liquid and illiquid instruments and preserve the share of cash holdings in the portfolio. In contrast, Ma et al. (2020) document that bond mutual funds followed pecking-order in liquidating assets during COVID-19 chaos. Treasuries and high-quality

corporate bonds were sold first, creating massive downward pressure on these historically liquid instruments.

Given that the first-mover advantage leads to a cascade of asset redemptions by shareholders of underperforming funds, a recent study by Jin, Kacperczyk, Kahraman, and Suntheim (2021) explores the effectiveness of *swing pricing* schemes in eliminating the first-mover advantage in funds with illiquid holdings. Remember that NAV price of shares is not adjusted for the trading costs caused by transacting shareholders. Typically, the portfolio manager adjusts the assets with some delay, so all the associated costs dilute the value of the remaining shareholders. *Swing pricing*, which takes into account the portfolio adjusting costs caused by leaving investors, is suggested as an effective solution. This alternative pricing rule has a long history of implementation in European countries and has only recently been adopted in the US, taking voluntary form. Jin et al. (2021) document the effectiveness of swing pricing on the sample of UK bond mutual funds. This alternative pricing rule significantly reduces the sensitivity of outflows to poor performance, especially for funds with illiquid holdings. Capponi, Glasserman, and Weber (2020) provide a theoretical justification for these empirical findings. Consistently, the Global Financial Stability Report by the IMF (2020) shows lower outflow-induced price pressure in countries with swing pricing during March of 2020.

Overall, the effectiveness of cash management during periods of high uncertainty or low liquidity is still questionable and subject to further debate. However, introducing an alternative *swing pricing* scheme for mutual fund shares could mitigate the concerns of flow-induced fire-sales of underperforming bond funds.[22]

It is also important to note that regulation itself can create a threat of fire-sales and overall financial instability, as it is the case for insurance companies. As Ellul et al. (2015) discuss, fire sales are unintended consequences of regulatory capital requirements. Authors prose that mark-to-market (MTM) accounting rules should apply to both sides of the balance sheet. Moreover, given the incentives for reaching-for-yield and regulatory capital arbitrage, capital requirements considering tail risk rather than assigning risk weights to categories of assets could be preferred.

As discussed above, unintended consequences of capital requirements for banks and insurance companies led many researchers to propose a macroprudential regulation – i.e., regulators should impose similar capital requirements for all the players in the market (see, e.g.,

[22] Falato, Goldstein, and Hortaçsu (2021) make a similar suggestion.

Hanson, Kashyap, and Stein, 2011; and Martinez-Miera and Repullo, 2019). Also, as argued by Farhi and Tirole (2020), prudential regulation must adjust to the emergence of shadow banking and should create ways to avoid financial contagion. The literature on macroprudential regulation would require more extensive space and discussion than we can allocate in our paper. How to design a macroprudential regulation involving nonbank lenders is a fruitful area for future research.

We would like to end with a quote from Stein's 2013 speech as the Governor of the Board of Governors of the Federal Reserve System: "Since credit decisions are almost always delegated to agents inside banks, mutual funds, insurance companies, pension funds, hedge funds, and so forth, any effort to analyze the pricing of credit has to take into account not only household preferences and beliefs, but also the incentives facing the agents actually making the decisions. And these incentives are in turn shaped by the rules of the game, which include regulations, accounting standards, and a range of performance-measurement, governance, and compensation structures."

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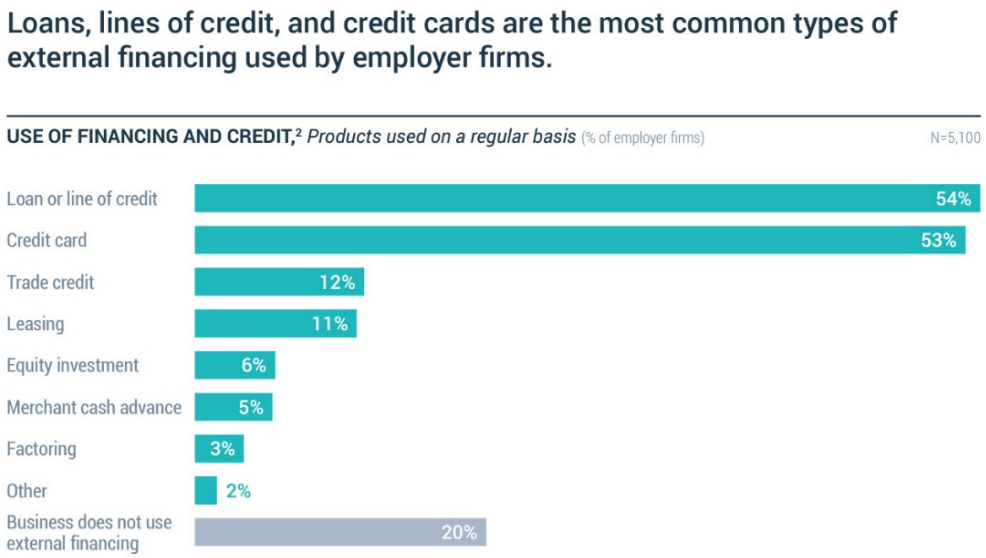
Panel A: Small Business Finances



Panel B: Small Business Lending by Banks with Total Assets Larger than $1 billion

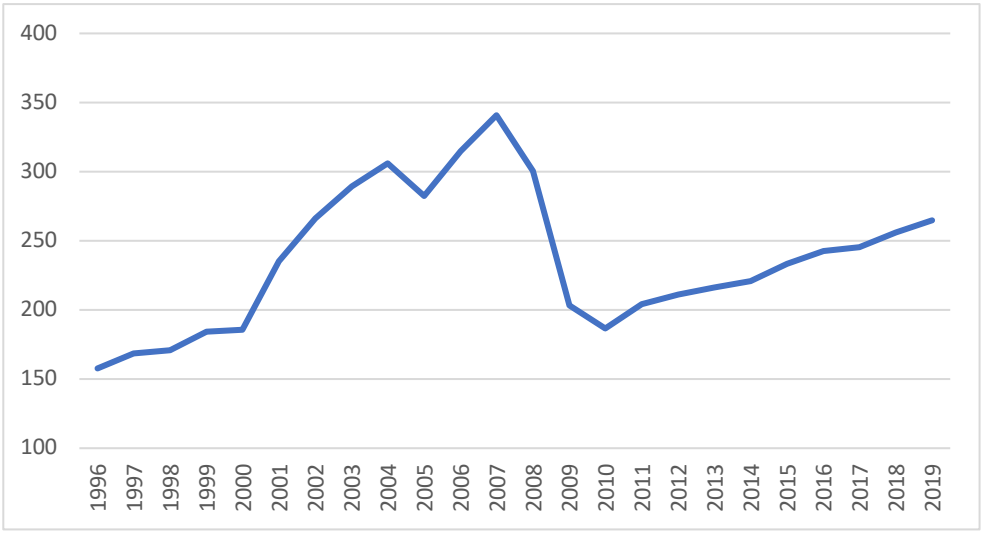


Figure 1: Smal Business Finances and Small Business Lending in the U.S.
Panel A presents results of the 2020 Small Business Survey (conducted in Q3-Q4 of 2019) on which resources small businesses use for funding. Panel Panel B shows originations of small loans to businesses and farms (in $ billions) by medium and large-sized banks (with assets larger than $1 billion) in the U.S. The data is from the Community Reinvesmnet Act (CRA) data, which do not include lending by small banks or nonbanks. Small business loans are loans with sizes of less than $1 million.

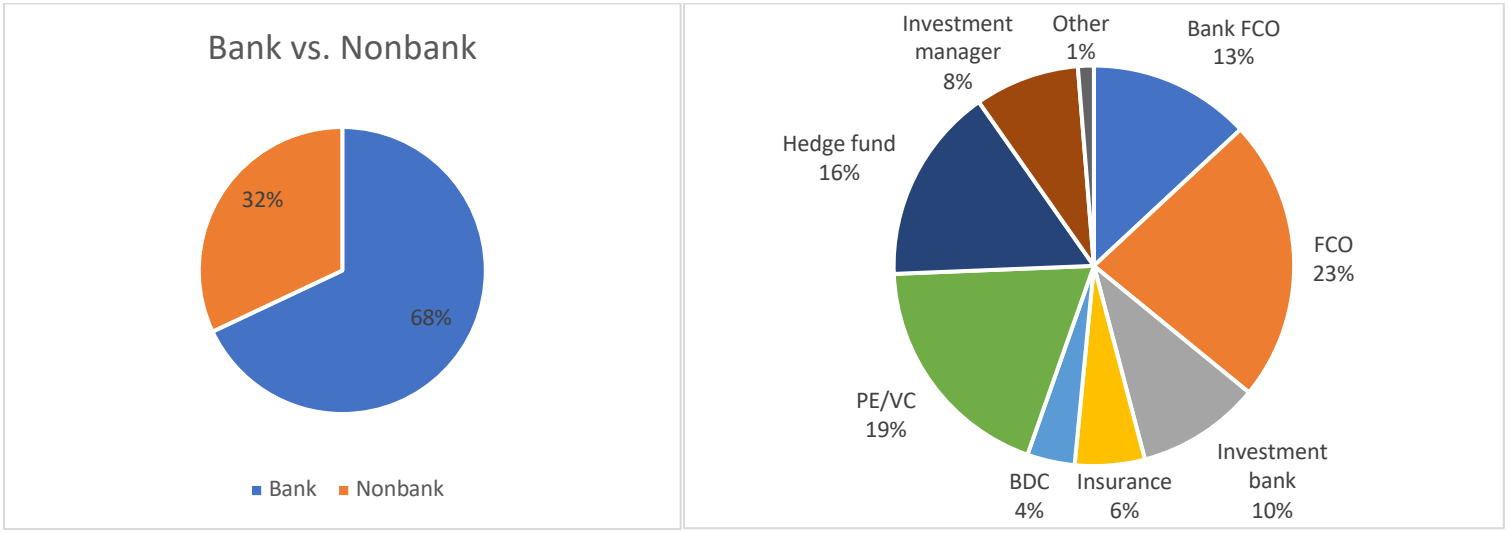


Figure 2: Direct Lending by Banks vs. Nonbank Lenders to Publicly Traded Middle Market Firms (2010-2015)
This figure is constructed using data from Table 1 of Chernenko, Erel, and Prilmeier (2020). Fractions are based on total number of direct loans originated by banks vs. nonbank lenders. The data is hand collected by Chernenko and coauthors from credit agreements for 750 firms from publicly traded mid-sized Compustat firms - with sales between $10 million and $1 billion.

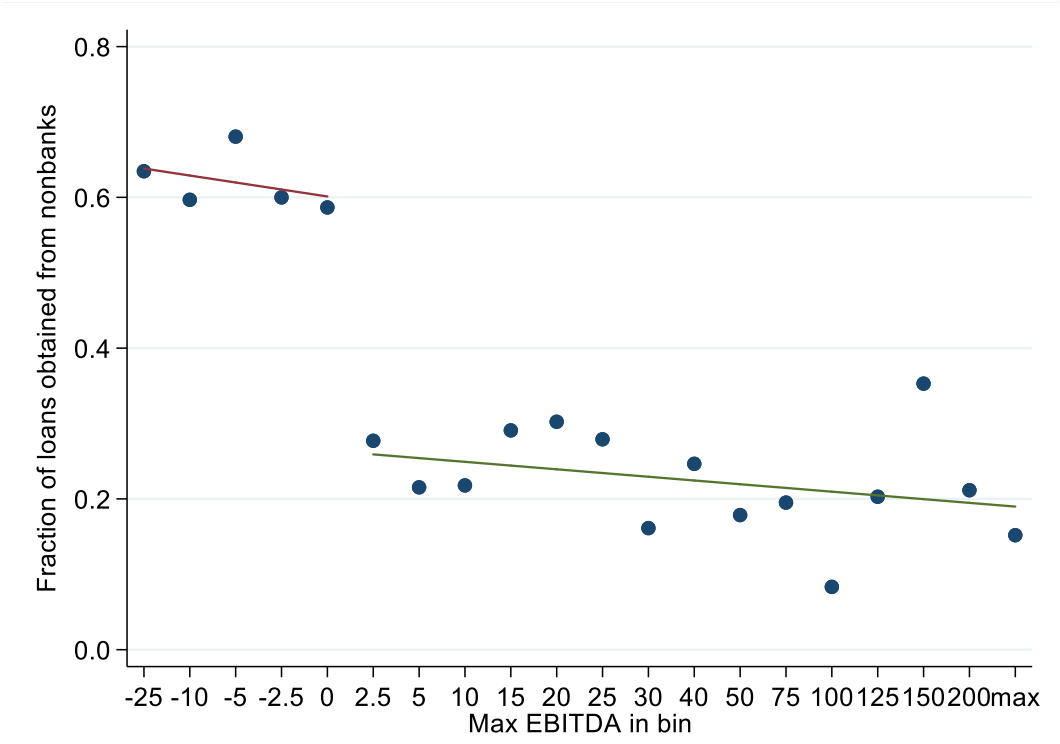
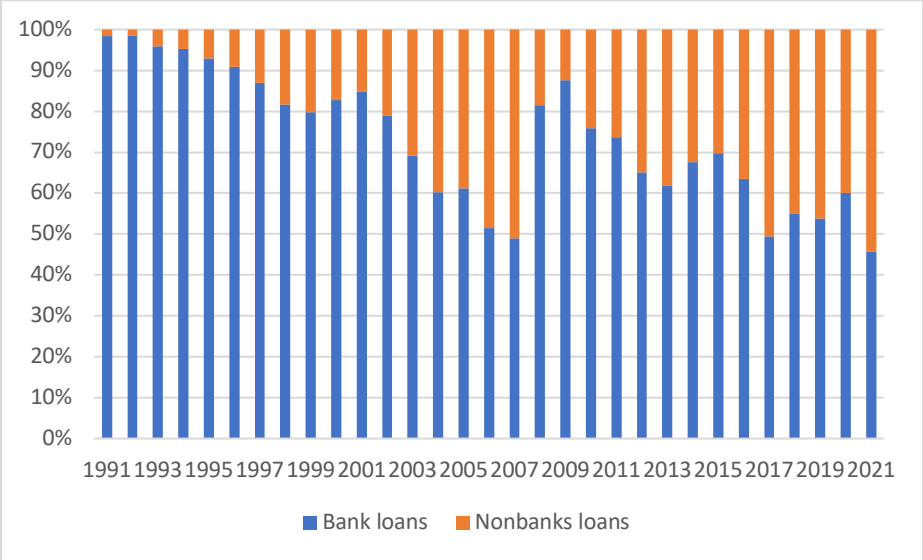


Figure 3: "Fraction of loans obtained from nonbanks by EBITDA bin" (Figure 1 of Chernenko, Erel, and Prilmeier, 2020)
This figure shows the fraction of direct loans obtained by publicly traded middle market firms from nonbank lenders across EBITDA bins. Middle-market firms are defined as firms with sales between $10 million and $1 billion. The data is hand collected from credit agreements for 750 firms from publicly traded mid-sized Compustat firms during the period of 2010-2015. Loans are allocated into twenty bins based on borrower's trailing twelve months EBITDA at loan origination, with the x-axis showing the upper limit of EBITDA for each bin.

Panel A: % of Nonbank Lenders in Leveraged Loans



Panel B: Total Volume of Leveraged Loans

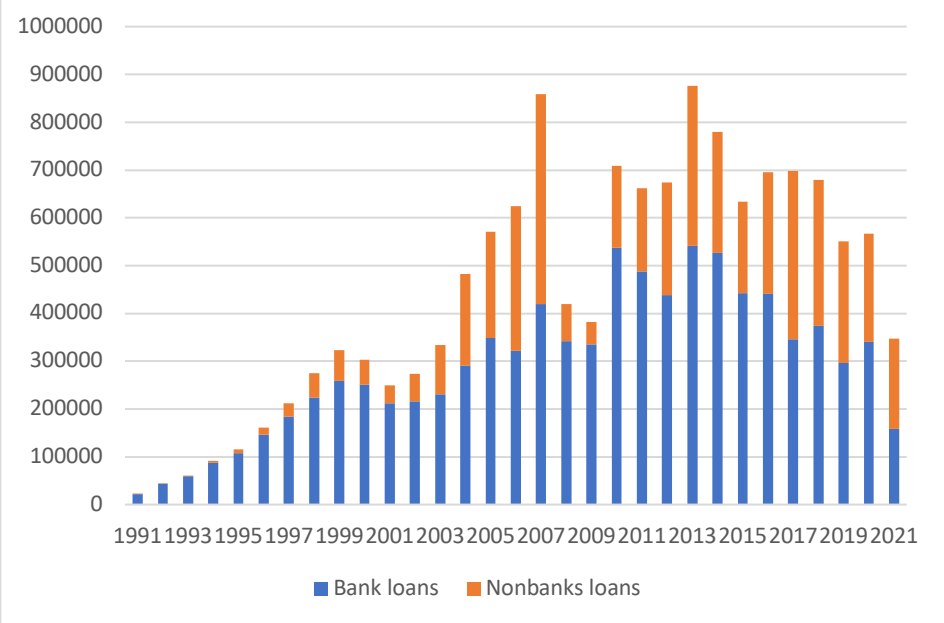
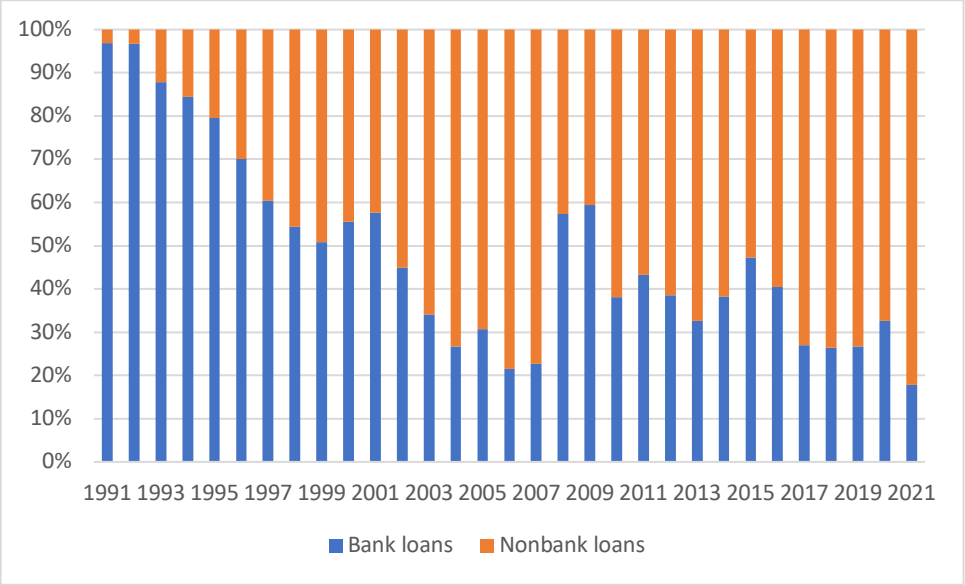


Figure 4: Nonbank Participation in Leveraged Loans

Leveraged loans are identified as syndicated senior loans to nonfinancial firms in U.S. currency with the spread margin (over LIBOR) of 150 basis points or larger. Loans are flagged as Nonbank loans if they are term loan B-K loans. We get similar results if we use whether the Market Segment variable contains words "Institutional" as a flag. Data source is Thompson Reuter's LPC (Dealscan). We include only new loans, not renegotiations. Various initial filters are used: non-missing margin; base rate of LIBOR; no financial industries; tranche currency of US Dollars; closed deal; senior as type; and syndication as the method of distribution

Panel A: % of Nonbank Lenders in Leveraged Term Loans



Panel B: Total Volume of Leveraged Term Loans

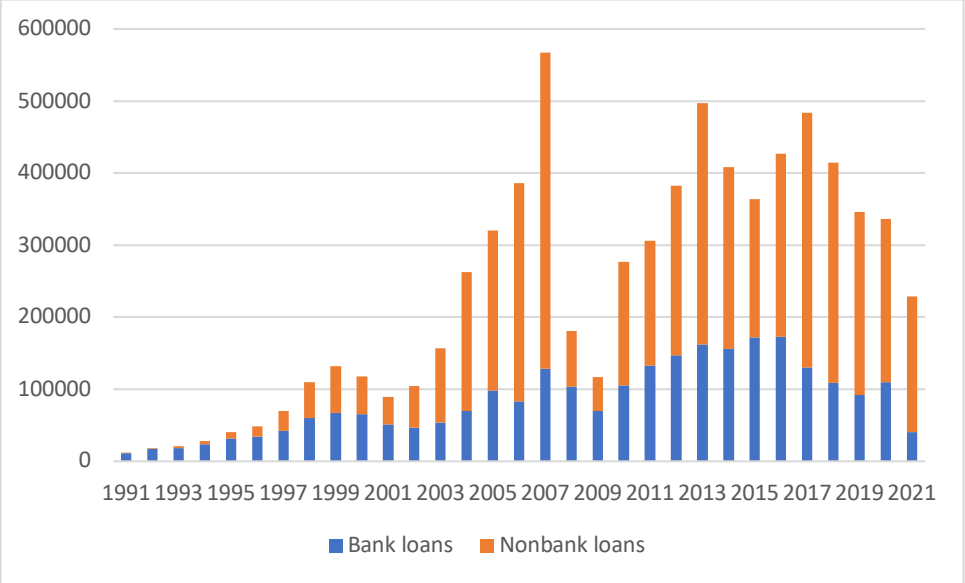
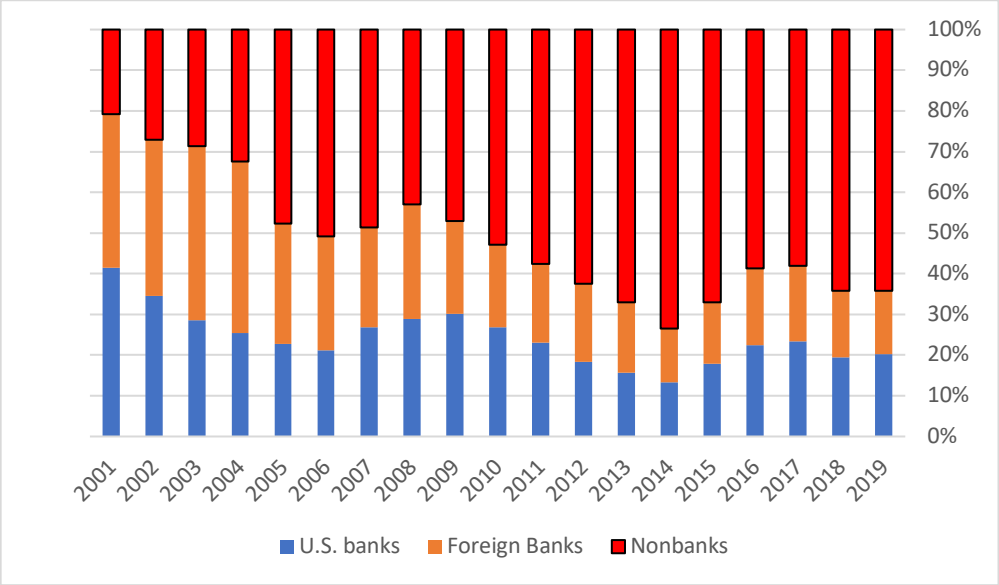


Figure 5: Nonbank Participation in Leveraged Term Loans
These figures present the time series of average nonbank participation in the total volume of syndicated senior TERM loans to nonfinancial firms in U.S. currency. Loans are flagged as Nonbank loans if the Market Segment variable contains words "Institutional" as a flag. Data source is Thompson Reuter's LPC (Dealscan). We include only new loans, not renegotiations. Various initial filters are used: non-missing margin; base rate of LIBOR; no financial industries; tranche currency of US Dollars; closed deal; senior as type; and syndication as the method of distribution.

Panel A: % of Nonbank Lenders in Classified Loan Commitments



Panel B: Total Volume of Classified Loan Commitments

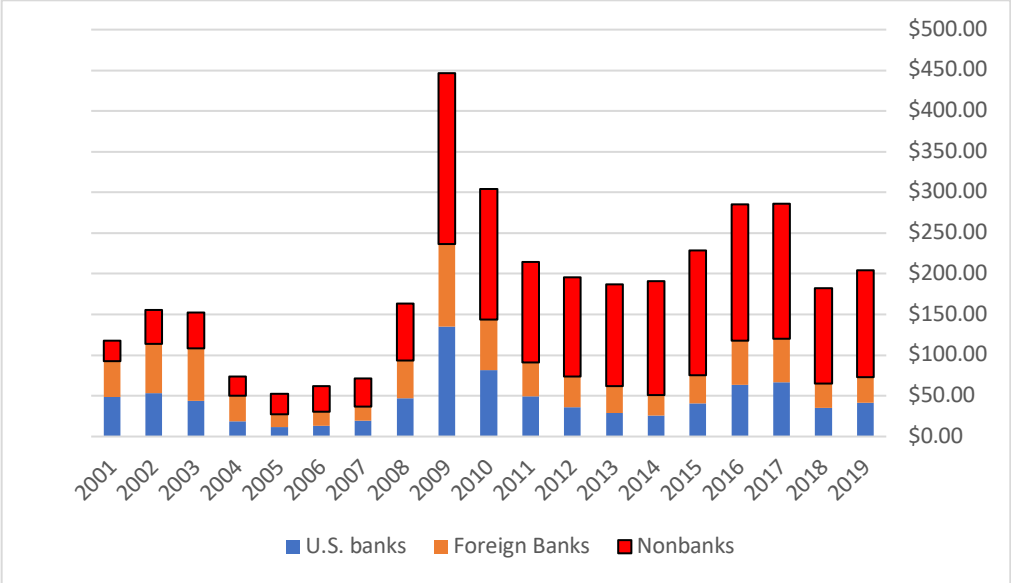


Figure 6: Nonbank Participation in Classified Loans (in SNC Data)
These figures present time series of the shares of US banks, foreign banks, and nonbanks in all (drawn and undrawn) loan commitments that are classified using the SNC data, with minimum aggregate loan commitments totaling $20 million ($100 million after 2018) or more that were shared by two or more regulated financial institutions (banks). Classified commitments include commitments rated substandard, doubtful, and loss.

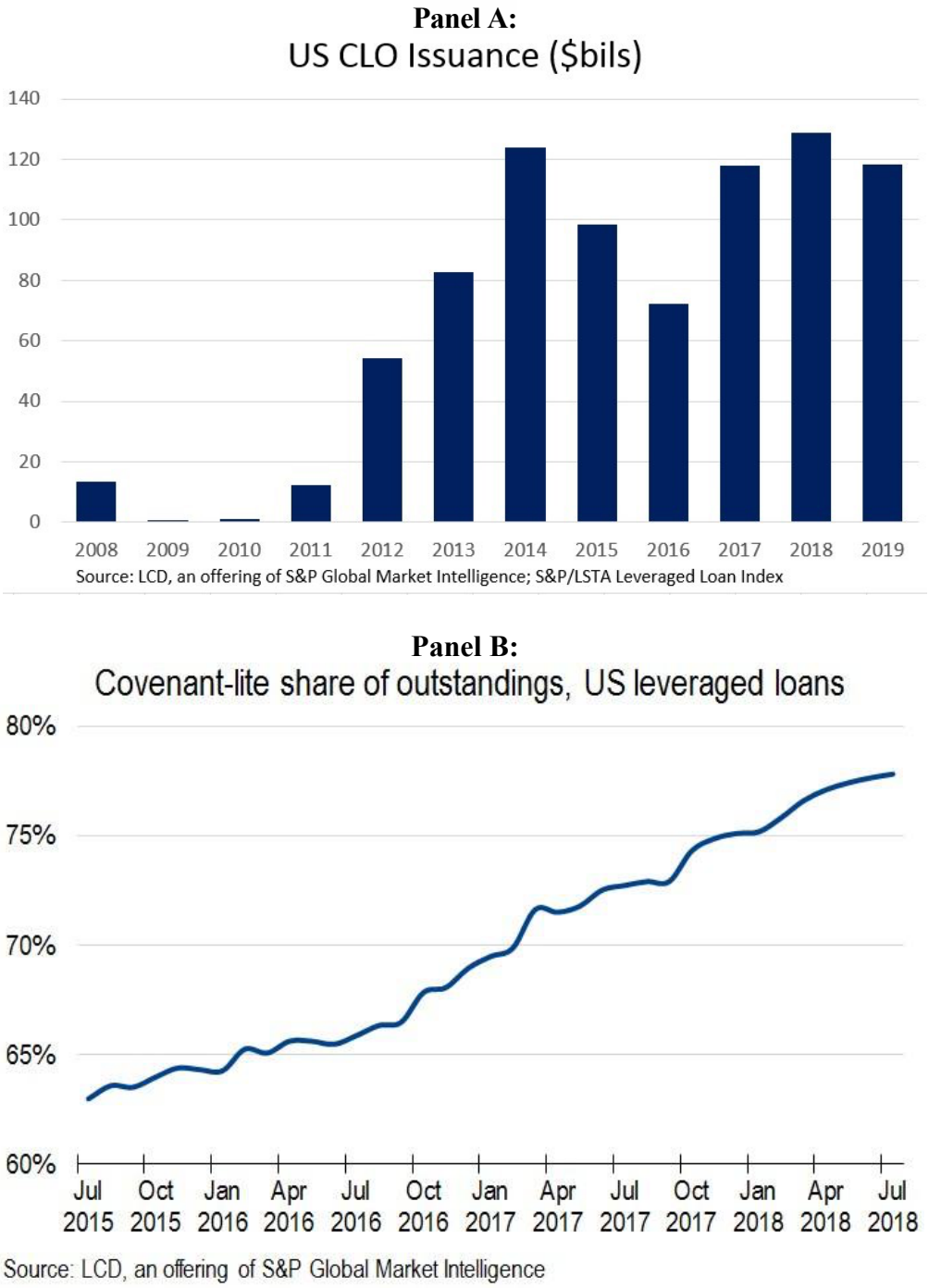


Figure 7: CLO Issuance and Cov-Lite Leveraged Loans
Panel A shows the growth of the CLOs. Panel B shows the time series of covenant-lite loans as a percentage of the leveraged syndicated loans in the U.S. S&P classifies loan as leveraged if they are non-investment grade rated or carry spreads of LIBOR +125 or higher.
Source: https://www.spglobal.com/marketintelligence/en/pages/toc-primer/lcd-primer#sec15

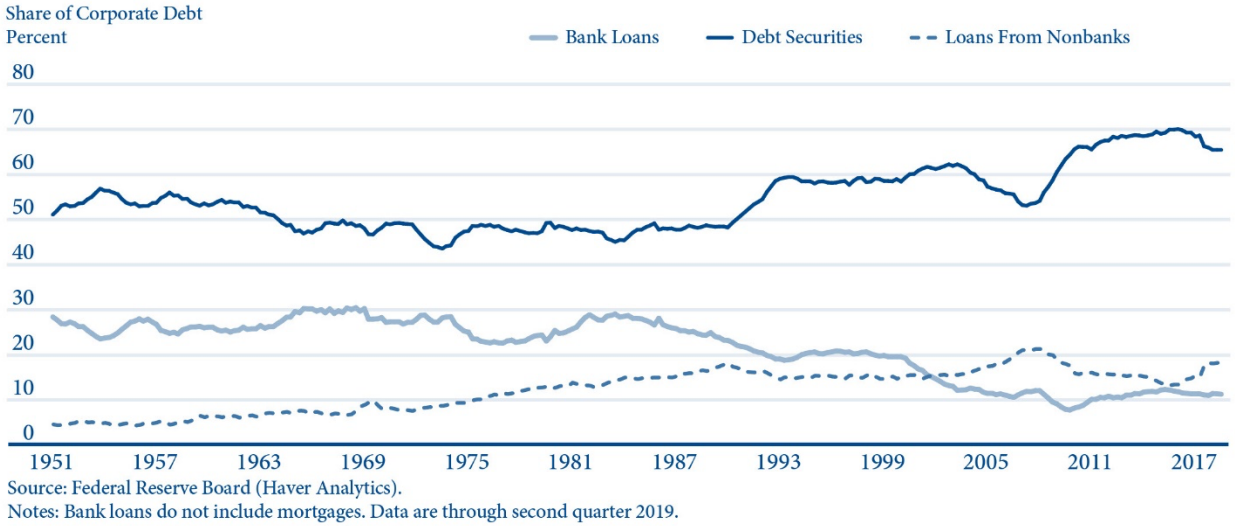


Figure 8: Corporate Borrowings in the U.S.
This figure presents time series of the shares of different forms of corporate borrowings --debt securities, bank, and nonbank loans-- in 1951-2018 period.
Source: FDIC Quarterly, 2019, Volume 13, Number 4, https://www.fdic.gov/analysis/quarterly-banking-profile/fdic-quarterly/2019-vol13-4/fdic-v13n4-3q2019.pdf

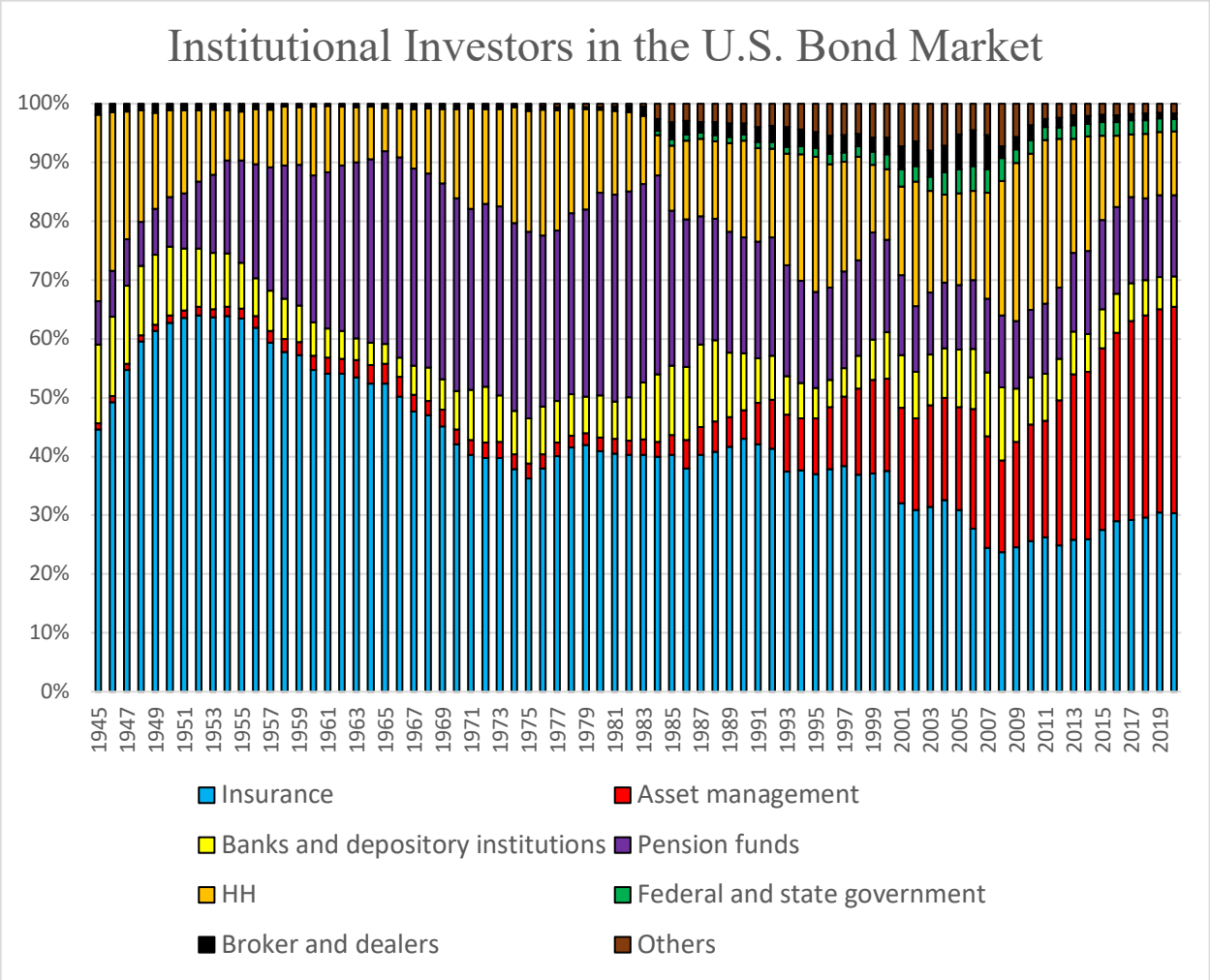


Figure 9: Institutional Investors in the U.S. Bond Market
This figure shows the time series of institutional holdings in the U.S. bond market. The data is from the U.S. federal flow of funds account. Asset management category includes MMFs, MFs, CEFs, ETFs, HFs, and REITs. Insurance category includes Life and P&C insurance companies. HH corresponds to households.

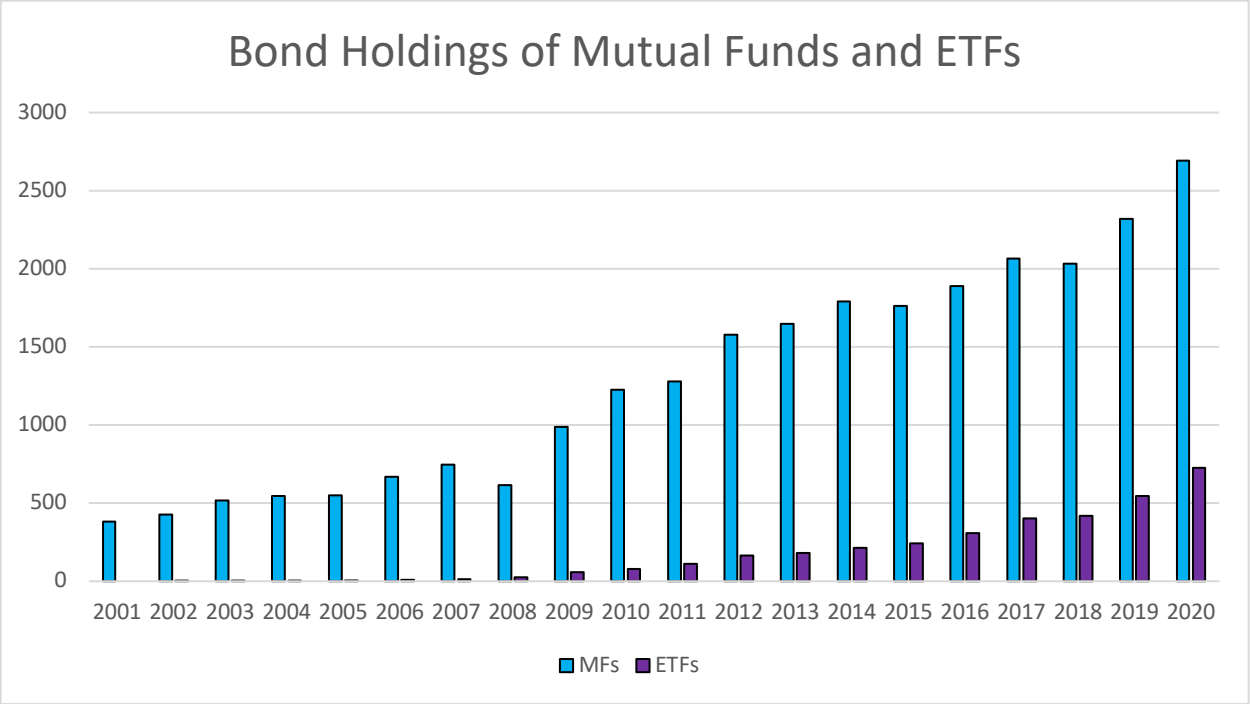


Figure 10: Bond Holdings of Mutual Funds and ETFs in the U.S.
This figure shows the time series of bond holdings of mutual funds and ETFs in $ billion. The data is from the U.S. federal flow of funds account.

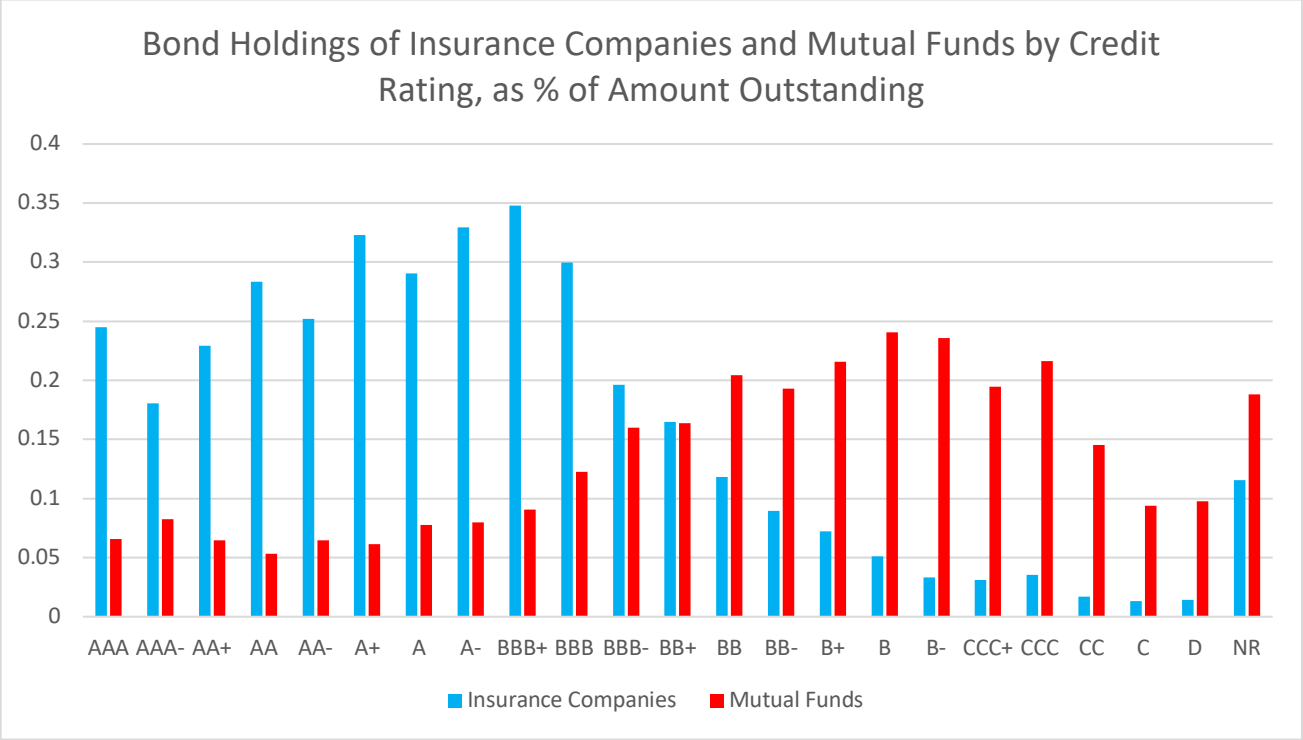


Figure 11: Bond holdings of insurance companies and mutual funds by credit rating
This figure shows the share of institutional ownership of corporate bonds by insurance companies and mutual funds for different credit rating, as % of amount outstanding. Bond holdings for insurance companies is from NAIC, for mutual funds is from CRSP Mutual Fund Database. Time range 2010q2-2018q2. Bond amount outstanding is from Thompson Reuters Eikon. Bond rating is from Mergent FISD and calculated as the worst rating among available credit rating agencies. For each rating and quarter, we calculate the % ownership by insurance companies and mutual funds, and then take the average across time. Only US nonfinancial borrowers are considered.

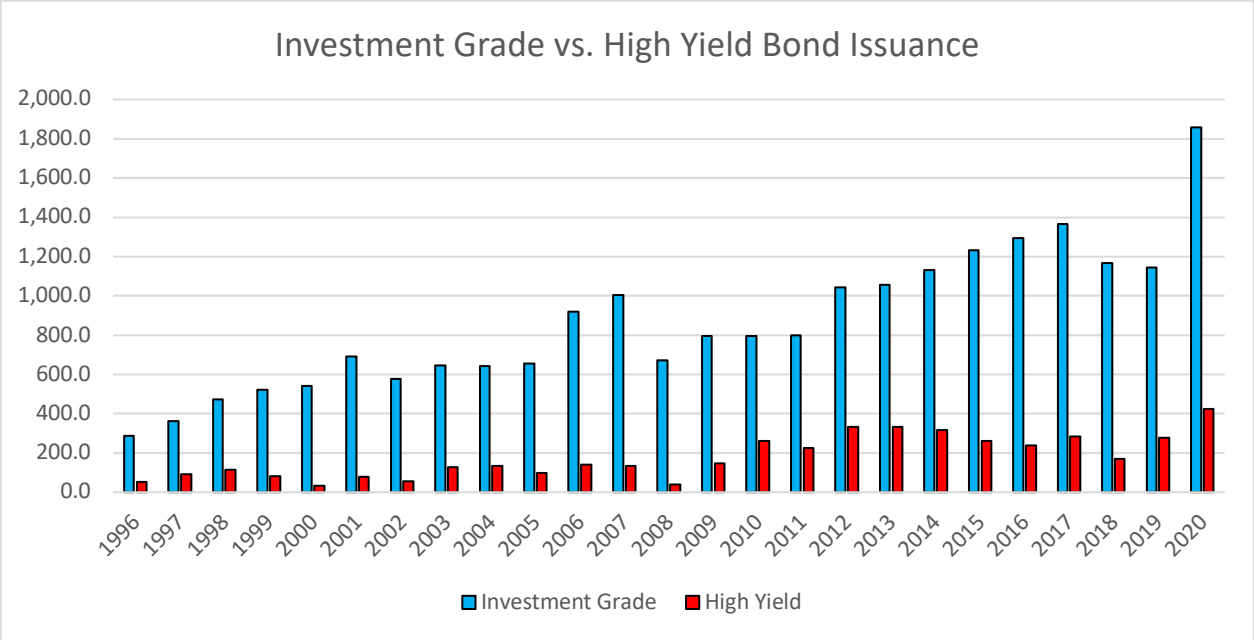


Figure 12: Volume of Bond Issuance across time
This figure shows the time series of the investment-grade (IG) and high-yield (HY) bond issuance (in $ billion) in the U.S. Data is from Sifma.

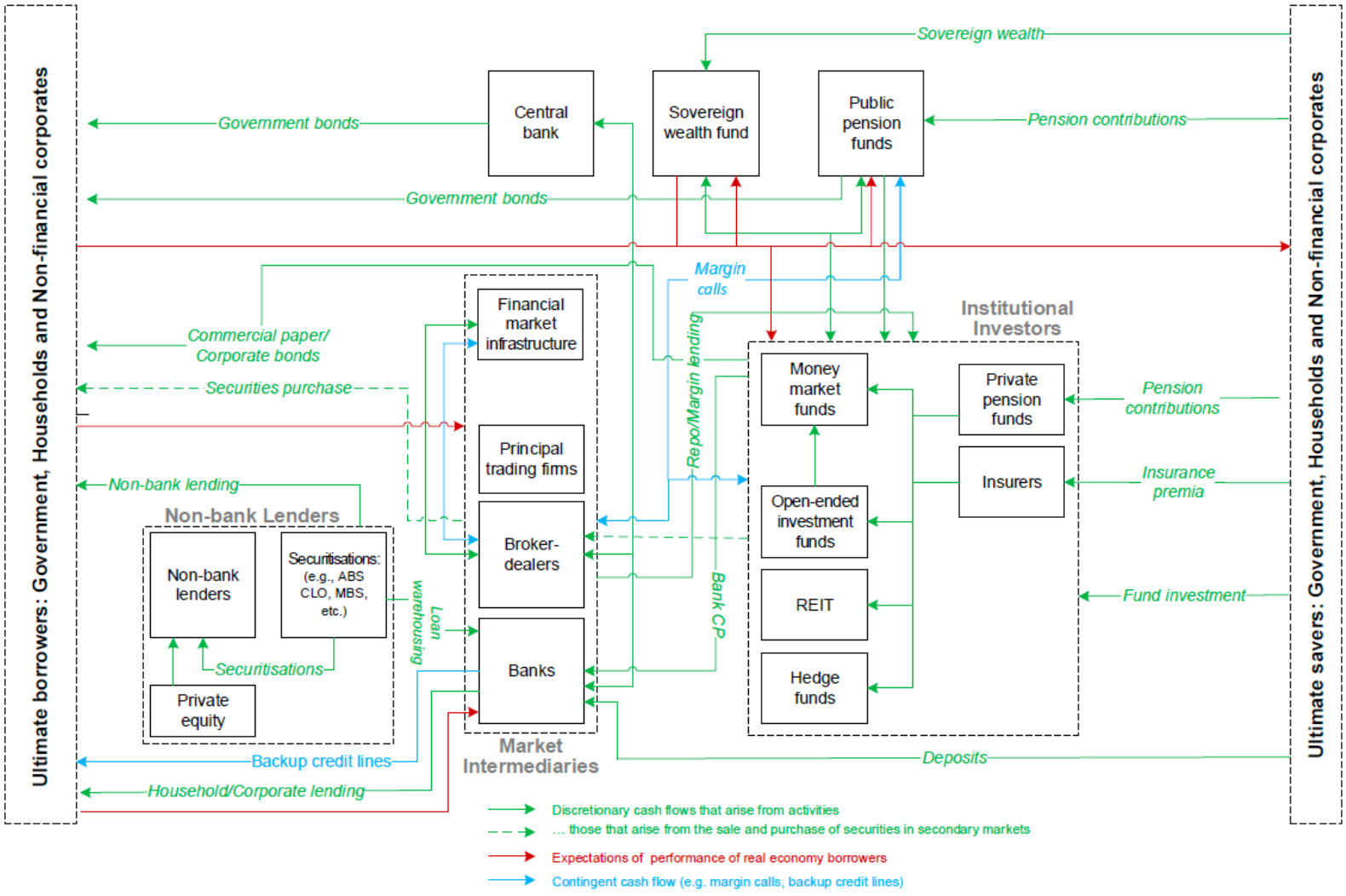


Figure 13: Interconnections
Graph 3.3. of Financial Stability Board's "Holistic Review of the March 2020 Turmoil" of 17 November 2020.

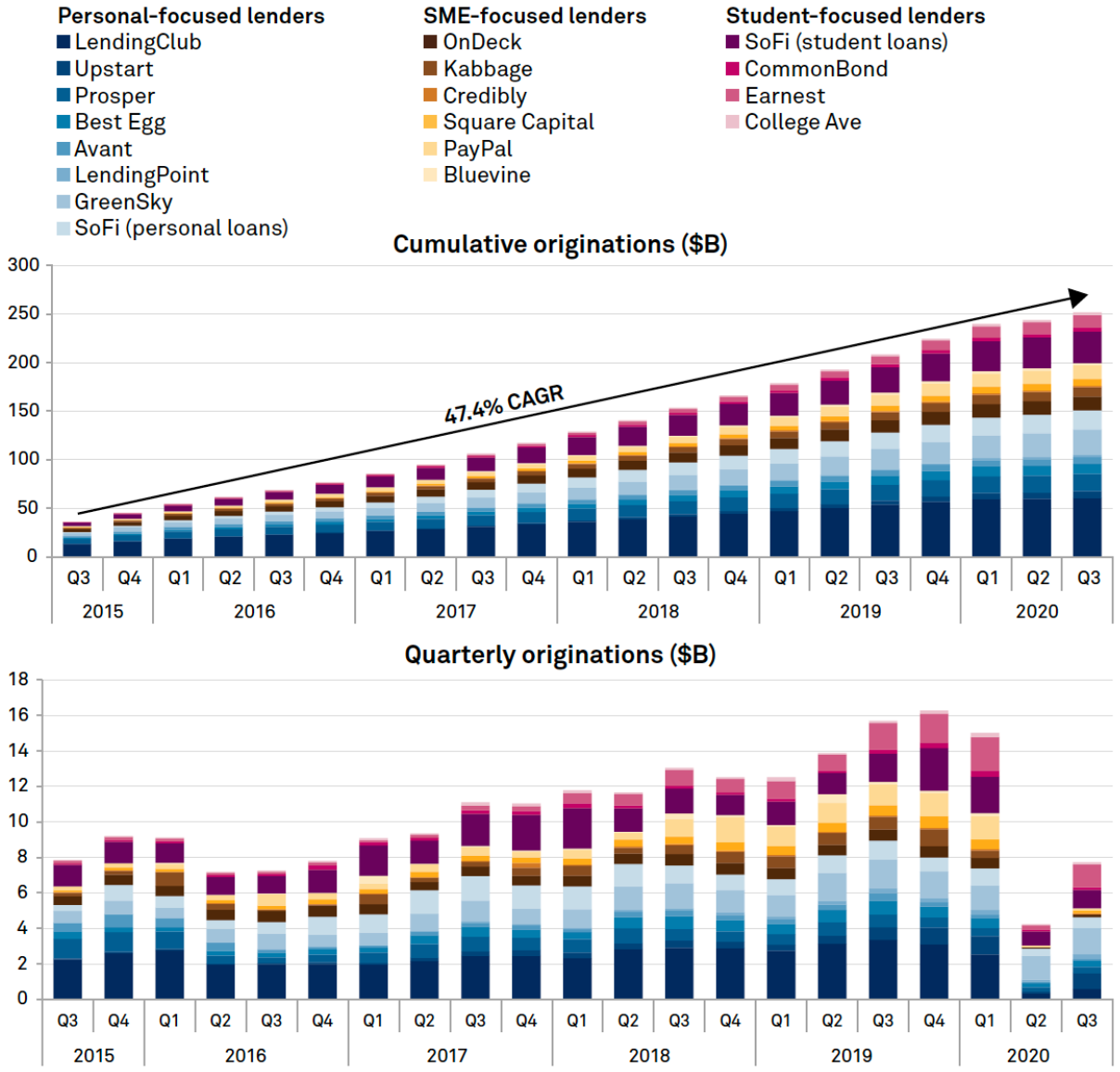
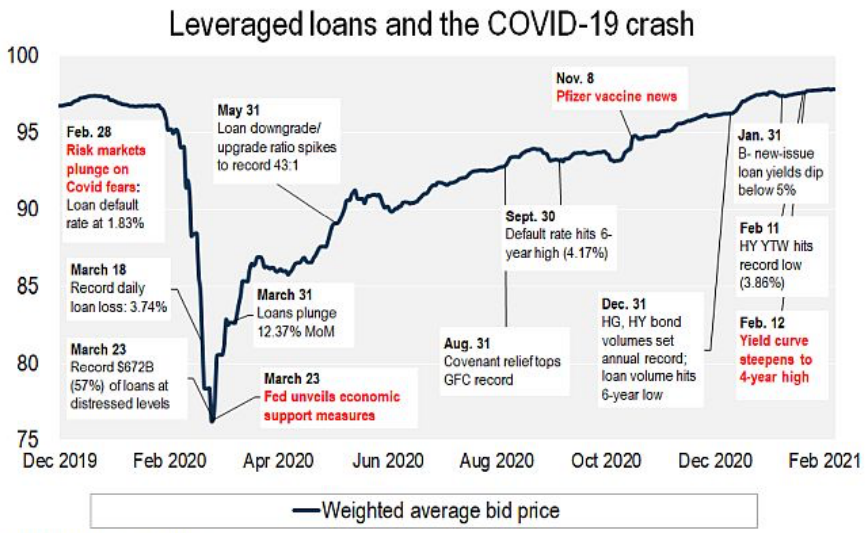


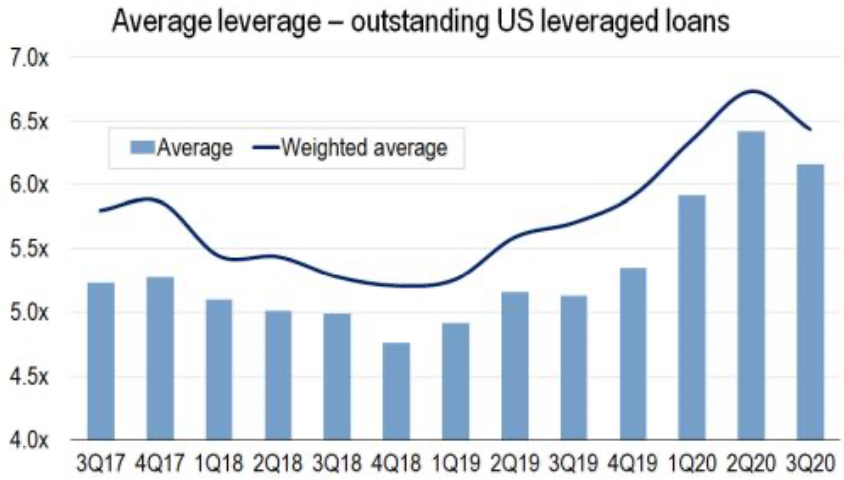
Figure 14: Collapse of Fintech Lending in March 2020
Source: S&P Global Market Intelligence's US Fintech Market Report, February 2021.

Panel A:



Data through Feb. 28, 2021.
Sources: LCD, an offering of S&P Global Market Intelligence; S&P/LSTA Leveraged Loan Index

Panel B:



Data through Sept. 30, 2020.
Source: LCD, an offering of S&P Global Market Intelligence

Panel C:

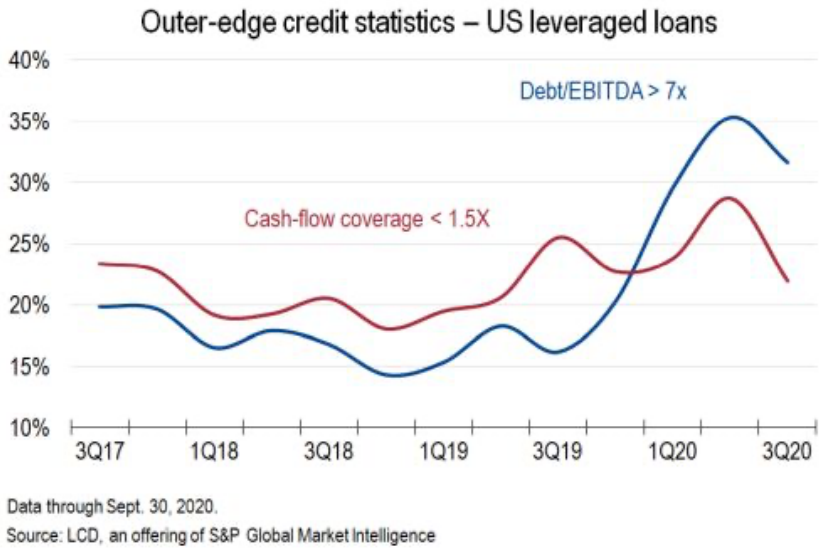


Figure 15: Leveraged Lending in the COVID-19 Era
These figures plot the dynamics of loan issuance around and during COVID-19 crash. See below or Kakauris (2021) for the full report:
https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/from-trough-to-froth-us-leveraged-loan-market-a-year-after-the-covid-19-crash-63204895

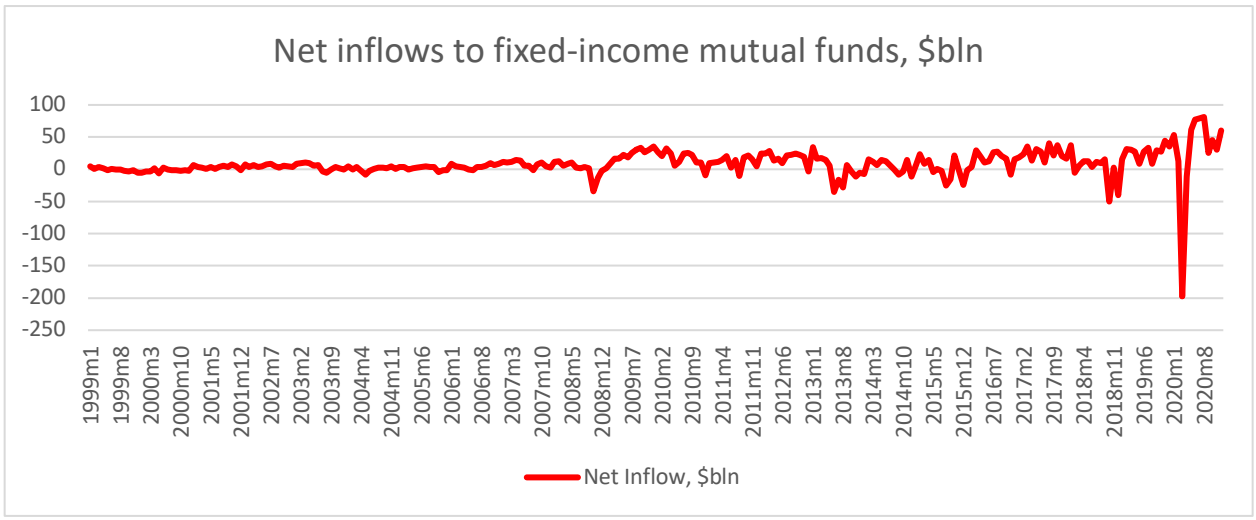
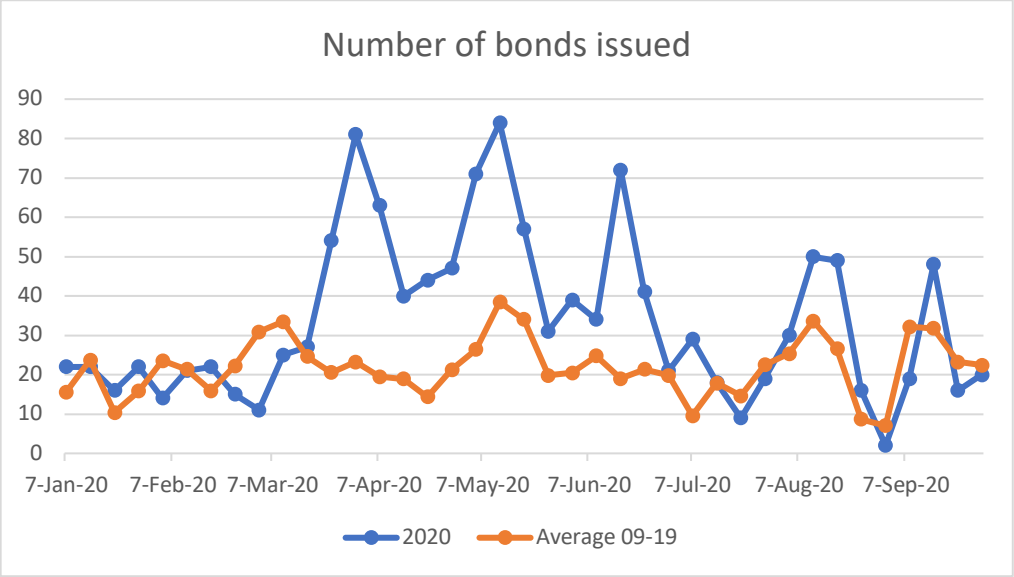


Figure 16: Net inflows to fixed-income mutual funds over time, in $ billions.
This figure shows the time series of monthly net inflow to domestic and foreign fixed-income mutual funds. Graphs is constructed using CRSP Mutual Fund Database. The sample is restricted to the following investment styles defined via crsp_obj_cd variable: I, ICQ, and IF.

Panel A: Total number of bonds issued during the Pandemic



Panel B: Total amount of bonds issued during the Pandemic

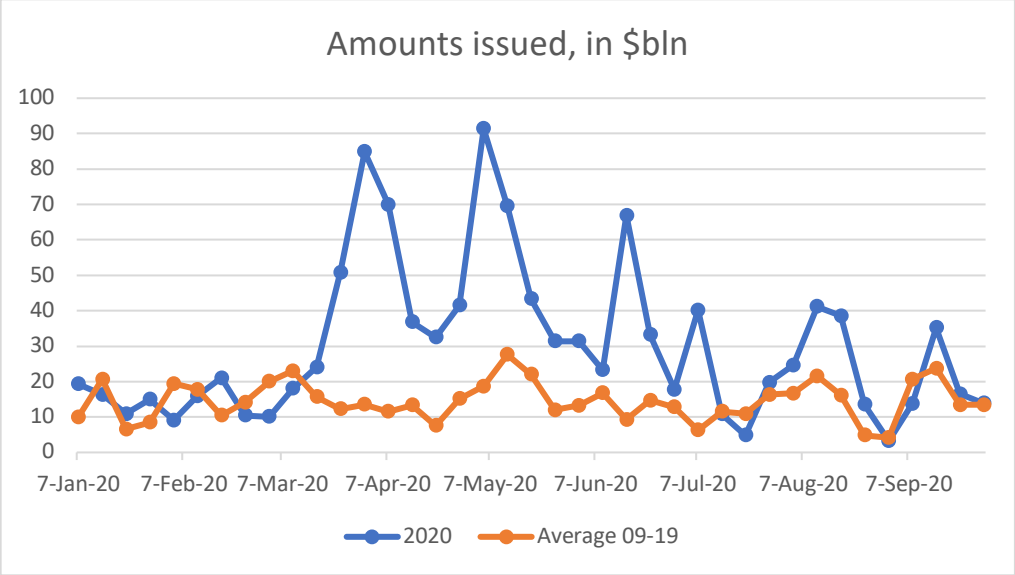
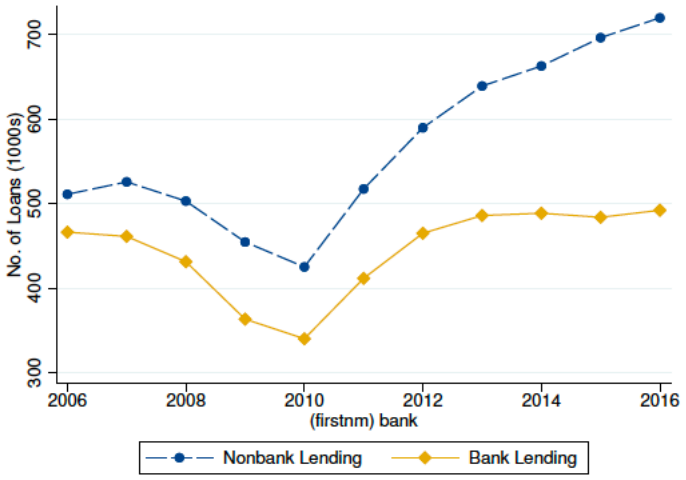


Figure 17: Bond issuance in 2020

These figures plot the time series of number of issued bonds (Panel A) and amounts issued (Panel B) in 2020. Weekly frequency. Data source is Mergent FISD as of May 2021. Only corporate debentures (CDEB) of US nonfinancial firms were considered. Following Becker & Efraim Benmelech (2021), we provide average issuance per week in 2009-2019 period.

ONLINE APPENDIX

Panel A: Bank vs. nonbank loan origination



Panel B: Loan origination by nonbank lender type

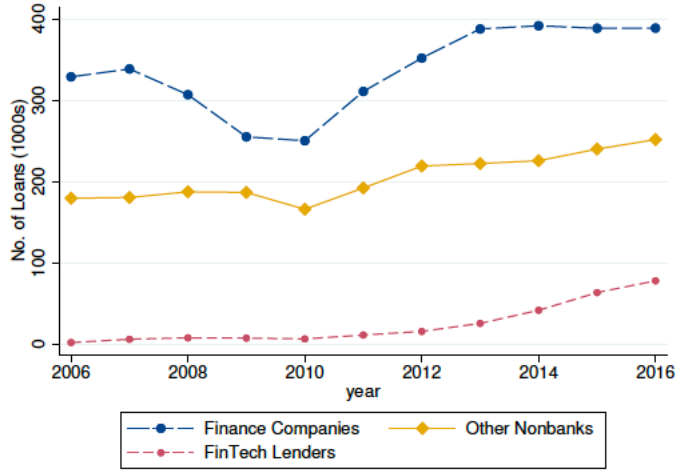


Figure OA1: Bank vs. Nonbank Loan Originations (Figure 1 of Gopal and Schnabl, 2020)
"This figure plots the number of loans originated annually between 2006 and 2016. Panel A shows total bank and nonbank lending. Bank lending captures loans originated by depository institutions (commercial banks, credit unions, thrifts, and nonbank subsidiaries of bank holding companies). Nonbank Lending captures loans originated by all non-depository institutions. Panel B shows total lending for finance companies (sum of captive finance companies and independent finance companies), FinTech lenders, and Other nonbanks (sum of cooperatives, investment companies and non-financials). Data on loan originations is obtained from UCC filings" (Gopal and Schnabl, 2020).

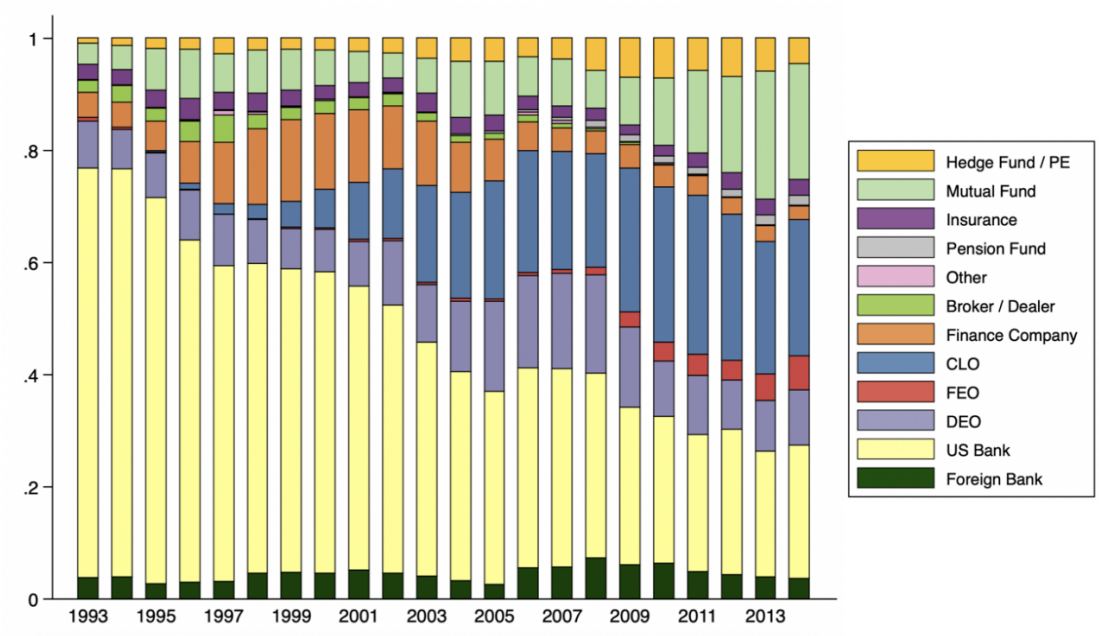
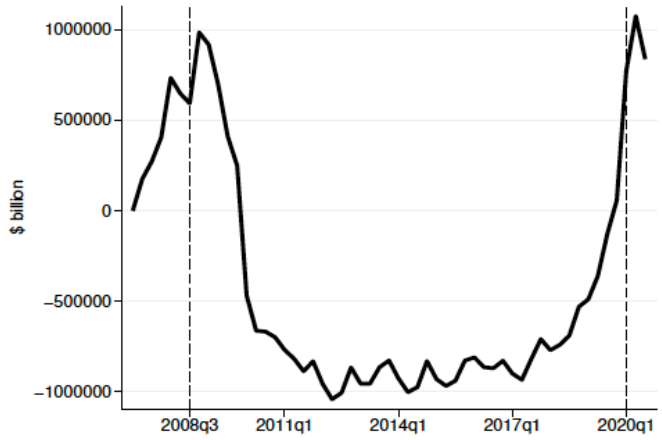


Figure OA2: "U.S. syndicated term loan funding market share by entity type (1993–2014)" (Figure 1 of Irani et al., 2021)

"The categories in the figure refer to groups of financial firms and, to ensure confidentiality, data for no individual firm are disclosed. "DEO," "FEO," and "Other" denote nonbank entities with a domestic, foreign, and unknown origin, respectively. These nonbank lenders could not be classified (into any of the other categories) based on our lender lists" (Irani et al., 2021).

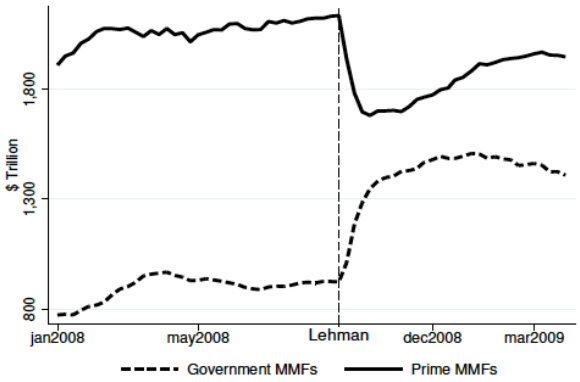
Figure OA3, Panel A: "Shadow Banks' Short-term Debt Cumulative Flows" (Figure 1 of Chretien and Lyonnet, 2021)



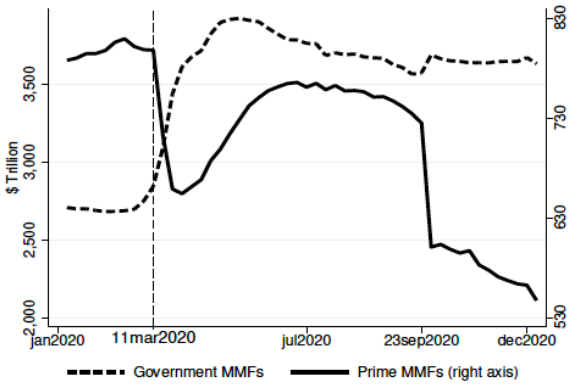
Data Source: Financial Accounts of the Unites States

Figure OA3, Panel B: "Run on MMMFs in 2008 and 2020" (Figure 2 of Chretien and Lyonnet, 2021)

(a) 2007 financial crisis



(b) 2020 COVID-19 crisis



Data Source: Investment Company Institute

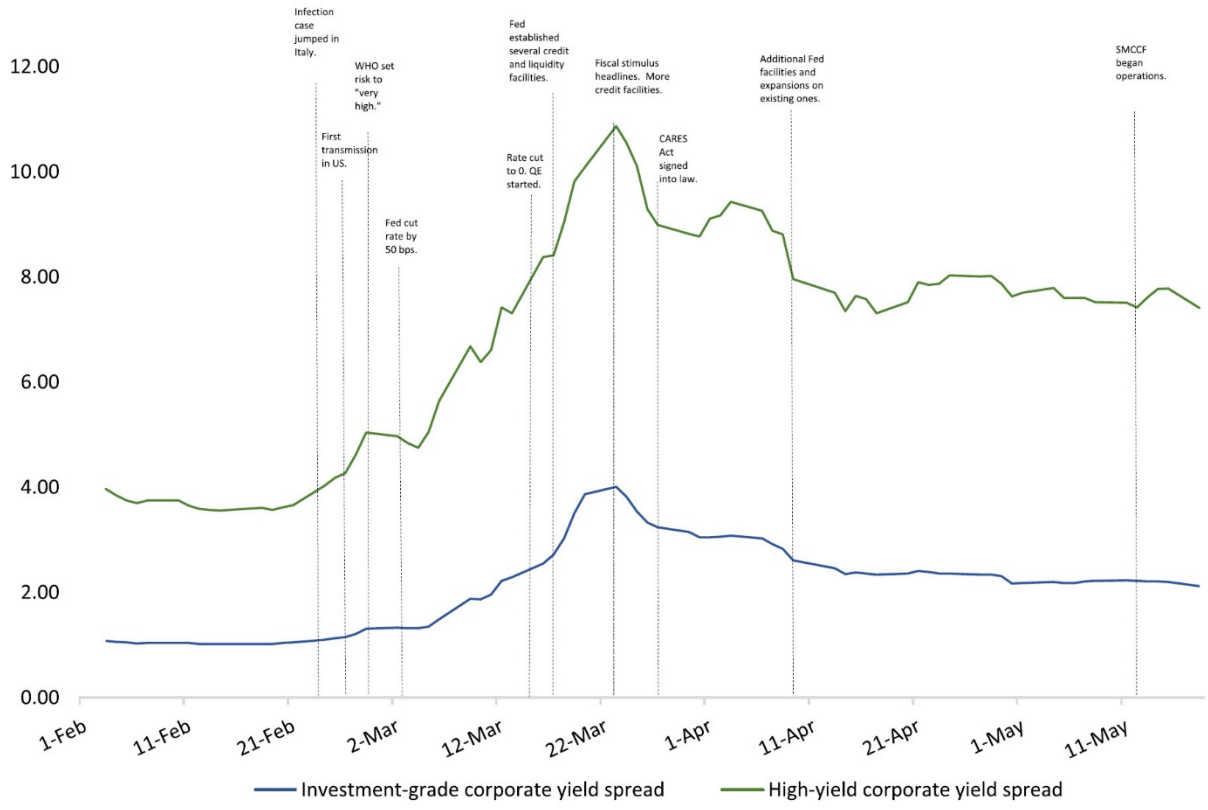


Figure OA4: Yield spread for investment-grade and high-yield bonds during COVID-19 (Figure 1 of O'Hara and Zhou 2021).
"Timeline of the COVID-19 crisis evolution and macro policy responses, 2020. This figure shows movements in ICE BofA option-adjusted yield spreads for US investment-grade and high-yield bonds around the COVID-19 crisis period. Data are obtained through Federal Reserve Bank of St. Louis, Missouri. The figure also presents the timeline of the COVID-19 pandemic and macro policy responses in the US. "

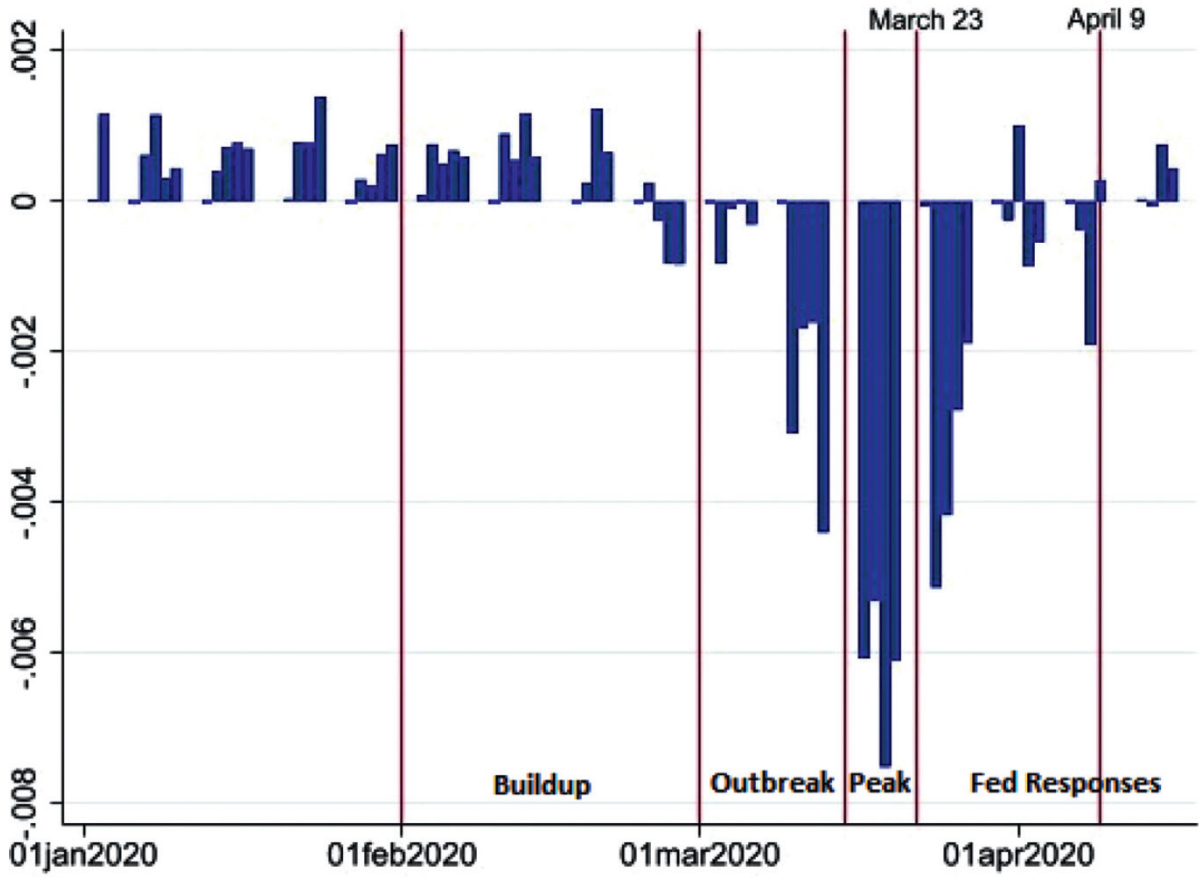


Figure OA5: Daily net inflows to corporate bond funds in the COVID-19 crisis (Figure 2 of Falato, Goldstein, and Hortaçsu, 2021).

"Fund Fragility in the COVID-19 Crisis. This figure plots the daily (Panel B) time-series of aggregate net flows of corporate bond funds as a percentage of their aggregate net assets. The numerator is the aggregate dollar growth of new assets of bond funds, which is calculated by aggregating over individual funds' growth of new assets. The denominator is the aggregate dollar value of their net assets at the beginning of each period (day), which is calculated by aggregating over individual funds' net assets. Time period is January 2020 to April 2020. Data Source: Morningstar. "

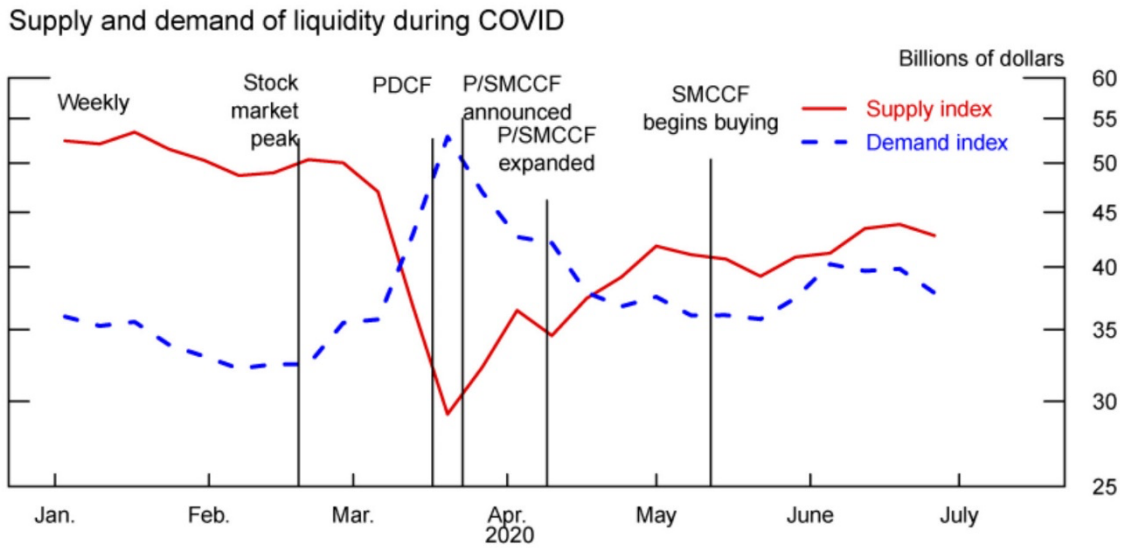


Figure OA6: Liquidity Supply and Demand Index during COVID-19 Shock (Figure 6 of Chikis and Goldberg, 2021)

"The liquidity supply index is defined as the quantity of liquidity that (according to the model) dealers would provide if the price of liquidity were 20 basis points. The liquidity demand index is the quantity of liquidity that investors would demand if the price of liquidity were 20 basis points. An increase in the liquidity supply index thus captures an outward shift in liquidity supply. Vertical lines mark the "Stock market peak" on Feb. 19. The "PDCF" corresponds to the announcement of the Primary Dealer Credit Facility on March 17. The PDCF began operations on March 20. The "P/SMCCF announced" vertical line is marked at March 23, the "P/SMCCF expanded" vertical line is marked at April 9, and the "SMCCF begins buying" vertical line is marked at May 12."

https://www.federalreserve.gov/econres/notes/feds-notes/dealer-inventory-constraints-in-the-corporate-bond-market-during-the-covid-crisis-20210715.htm

Table OA1: "Probability of borrowing from a nonbank lender" (Table 3 of Chernenko, Erel, and Prilmeier, 2020)

This table presents linear probability models of borrowing from a nonbank lender for a middle market firm. The data is hand collected from credit agreements for 750 firms from publicly traded mid-sized Compustat firms during the period of 2010-2015. Observations are aggregated to the deal level using the average value of each variable across the tranches in a deal. Industry fixed effects are based on Fama-French 12 industries. *t*-statistics adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)
EBITDA < 0	0.39***	0.32***	0.47***
	(7.78)	(5.99)	(7.59)
Debt/EBITDA	0.01	0.00	0.01
	(1.06)	(0.07)	(1.05)
Debt/EBITDA > 6x	0.14*	0.15*	0.14
	(1.75)	(1.86)	(1.36)
EBITDA	-0.00	-0.00	-0.00
	(-0.92)	(-0.73)	(-0.65)
Ln(Assets)	0.01	0.01	0.01
	(0.49)	(0.92)	(0.83)
Leverage	0.22***	0.24***	0.17**
	(3.40)	(3.33)	(2.45)
ΔLeverage	0.37***	0.29***	0.24**
	(4.20)	(2.79)	(2.53)
|Asset growth|	0.16***	0.16***	0.13***
	(5.20)	(4.67)	(3.81)
(EBITDA < 0) * ABL			-0.35***
			(-5.09)
ABL			-0.08**
			(-2.04)
Debt/EBITDA * Post guidance			-0.02
			(-1.15)
(Debt/EBITDA > 6x) * Post guidance			-0.02
			(-0.13)
Post guidance			0.02
			(0.22)
Constant	0.16	0.10	0.14
	(1.59)	(0.76)	(1.10)
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Other Controls	Research expense, PP&E, Current Ratio, Ln(Firm age)	Research expense, PP&E, Current Ratio, Ln(Firm age), Market-to-book, Sales Growth, Volatility, Past Return	
N	1193	1121	1121
R^2	0.25	0.25	0.30

Table OA2: "Nonbank lending and leniency of regulators supervising local banks" (Table 5 of Chernenko, Erel, and Prilmeier, 2020)

This table presents linear probability models of borrowing from a nonbank lender for a middle market firm on the share of OCC-supervised banks in the firm's local banking market (MSA or non-MSA county). The data is hand collected from credit agreements for 750 firms from publicly traded mid-sized Compustat firms during the period of 2010-2015. Industry fixed effects are based on Fama-French 12 industries. The sample of banks consists of banks whose primary asset specialization according to the Summary of Deposits is commercial lending. *t*-statistics adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

	Cash flow loans		Asset based loans	
	(1)	(2)	(3)	(4)
EBITDA < 0	0.19	0.17	0.31**	0.29**
	(1.64)	(1.55)	(2.48)	(2.24)
EBITDA < 0 *	0.60***	0.60***	-0.25	-0.22
OCC share	(2.80)	(2.91)	(-0.93)	(-0.79)
OCC share	-0.09	-0.04	0.26	0.30
	(-0.89)	(-0.39)	(1.21)	(1.38)
Debt/EBITDA > 6x	0.24	0.25	-0.45	-0.47
	(1.15)	(1.18)	(-1.19)	(-1.17)
Debt/EBITDA > 6x *	-0.07	-0.08	0.82	0.88
OCC share	(-0.15)	(-0.17)	(1.13)	(1.14)
Debt/EBITDA	-0.01	-0.01	0.10**	0.10**
	(-0.67)	(-0.55)	(2.30)	(2.25)
Debt/EBITDA *	0.03	0.03	-0.17*	-0.18*
OCC share	(0.76)	(0.60)	(-1.91)	(-1.92)
Unemployment		-0.01		0.01
		(-0.50)		(0.28)
Per capita income growth		-0.01		0.40
		(-0.01)		(0.39)
Ln(Per capita income)		0.03		0.02
		(0.23)		(0.13)
Ln(Population)		0.11**		-0.06
		(2.14)		(-0.81)
Tier 1 Leverage Ratio		-0.03		-0.04
		(-0.83)		(-0.84)
Ln(Deposits)		-0.11**		0.06
		(-2.57)		(0.85)
Constant	0.25	-0.21	-0.05	0.20
	(1.49)	(-0.12)	(-0.26)	(0.09)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Other Controls	EBITDA, Ln(Assets), Leverage, ΔLeverage, |Asset growth|, Research expense, PP&E, Current Ratio, Ln(Firm age), Market-to-book, Sales Growth, Volatility, Past Return			
N	775	775	343	343
R^2	0.36	0.37	0.24	0.25