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ABSTRACT

Nonbank lenders have been playing an increasing role in supplying debt, especially after the Great Recession. How important are the distortions in the greater regulation of banks that differentially limit risk-taking across alternative providers of credit? How might the growing role of nonbanks in credit markets affect financial stability? This selective review addresses these questions and discusses how banks and nonbanks helped provide liquidity to the nonfinancial sector during the COVID-19 pandemic shock. We argue that tighter bank regulation has created incentives for nonbanks to increase their participation in credit markets, a trend that creates concerns about financial stability.

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I. Introduction

Nonbank financial institutions have gained a substantial market share in both corporate loan and bond markets, especially since the Great Recession.[1] We review selected papers on this growth and discuss the main reasons and the consequences of this shift for the US debt markets.

Why is the change in lender composition important? Primary lenders of corporations have been shifting from regulated financial institutions to unregulated—or lightly regulated—ones.[2] We show that bank regulation has played an essential role in nonbanks becoming increasingly active in credit markets. We argue that the growth of nonbank lending exacerbates financial instability, especially in turmoil periods. In the recent COVID-19 crisis, nonbank lenders contributed to disruptions in corporate borrowing across various debt markets.

We begin by highlighting nonbank participation in the direct and syndicated loan markets. Small business lending by larger commercial banks suffered a 45% drop in volume following the Financial Crisis. Although the total volume has recovered since then, reaching $369 billion in 2021, the total number of small business loans issued by banks still falls behind the pre-crisis levels. Growth in nonbank lending filled this gap, especially in US counties previously dominated by the largest banks. The total market share of nonbank lenders in small business lending secured by non-real estate collateral reached almost 60% by 2016 (Gopal and Schnabl (2022)).

Mid-sized firms also actively borrow from nonbanks. About one-third of these firms borrow directly from finance companies, private equity firms, hedge funds, business development

[1] Nonbanks, also called shadow banks, are nondepository financial institutions. Unlike traditional commercial banks, credit unions, or thrifts, nonbanks cannot issue insured deposits, and, therefore, they are not regulated like traditional banks are. In the rest of the paper, we typically use the word nonbank but may also refer to them as shadow banks.

[2] Our focus in this paper is corporate leverage. The growth of nonbank lenders in the personal loan market is also significant, with Quicken Loans, for example, being the largest mortgage lender as of 2022 (see, e.g., Buchak, Matvos, Piskorski, and Seru (2018) for secured mortgage lending, and De Roure, Pelizzon, and Thakor (2022), who focus on the role of bank regulation on this growth, for unsecured personal loans).

companies, and other nonbank financial institutions (Chernenko, Erel, and Prilmeier (2022)).[3] Unprofitable borrowers with higher leverage are more likely to borrow from nonbanks. However, nonbanks charge higher interest rates than banks, even after controlling for the riskiness of borrowers.

Nonbanks have also increased their participation in syndicated leveraged term loans to medium and large borrowers. The share of nonbank lending in risky term loans increased from about 3% in the early 1990s to about 80% in 2021. These nonbank institutions were initially dominated by finance companies (Carey, Post, and Sharpe (2002)) with the increasing presence of CLOs, hedge funds, private equity firms, and loan mutual funds in recent periods (Irani, Iyer, Meisenzahl, and Peydro (2021)). Nonetheless, traditional commercial banks still dominate loans extended under commitments, also known as revolvers (Paligorova and Santos (2019)).

We argue that the shift in lending from traditional banks to nonbanks is mainly due to regulatory arbitrage and increased bank regulation post-Great Recession.[4] Bank regulation drives nonbank lending to middle-market firms, making it costly for banks to lend to negative EBITDA firms (Chernenko, Erel, and Prilmeier (2022)). Interagency guidance on leveraged lending led to a shift in leveraged lending from regulated commercial banks to nonbanks (Kim, Plosser, and Santos (2018)). Irani, Iyer, Meisenzahl, and Peydro (2021) further emphasize the role of bank regulation in the growth of nonbanks' participation in syndicated loans by documenting a negative relation between nonbank participation and syndicate banks' average regulatory capital ratio.

[3] Block, Jang, Kaplan, and Schulze (2023) provide a survey of private debt funds.
[4] In this paper, the term 'regulatory arbitrage' denotes the provision of credit without incurring the cost of banking regulation.

Banks with a regulatory capital shortfall sold more of their syndicated loans to nonbanks, especially after the adoption of Basel III rules in 2010.[5]

The corporate bond market – the primary source of external funding for the largest public firms in the economy – has also shifted towards less regulated financial institutions. Historically dominated by insurance companies and pension funds, the bond market has recently seen a boom in asset management companies, especially bond mutual funds and ETFs. The market share of bondholding asset management firms has increased from about 5% in 1990 to 37% in 2022.

Institutional investors in the bond market are subject to a specific regulatory treatment and funding structure that affects their demand. Similar to banks, regulators restrict the amount of risk an insurance company can take through minimum capital requirements, making it costly for them to invest in high-yield bonds. As a result, insurance companies (ICs) and mutual funds (MFs) complement each other: while ICs specialize in investment-grade bonds, MFs prefer risky, high-yield instruments. The portfolio choices of ICs and MFs also differ along other dimensions, such as bond maturity and liquidity. Consistent with the volatile nature of fund flows, mutual funds prefer more liquid bonds with a shorter maturity (Bretscher, Schmid, Sen, and Sharma (2022)).

The widespread shift to nonbank lenders with fragile funding structures raises concerns about access to liquidity for borrowing firms, especially in crisis. In small business lending, the financial constraints of FinTech firms lead to a drop in credit funding. For syndicated loans, nonbank lending is more cyclical than bank lending and negatively affects credit availability in a crisis.

[5] Although the role of bank regulation in the growth of nonbank lending is substantial, the role of financial innovation cannot be ignored. Nonbank lenders are generally more efficient and effective at analyzing big data, quickly processing loans, and adopting innovations (see, e.g., Mills and McCarty (2014), Buchak, Matvos, Piskorski, and Seru (2018), Chernenko, Erel, and Prilmeier (2022), Erel and Liebersohn (2022)).

We further describe the funding fragility of both major types of institutional bondholders. Mutual funds are subject to runs, which creates a fire-sale threat and excess volatility in the secondary market. These liquidity shocks propagate in the primary market and directly affect borrowers' corporate decisions. Firms with a higher capital supply from mutual funds are more likely to issue bonds, enjoy lower yields, and substitute away from equity financing and bank loans (Massa, Yasuda, and Zhang (2013), Zhu (2021)). On the other hand, the risk-based capital requirements of insurance companies make investing in risky instruments a costly choice. As a result, recently downgraded borrowers are subject to fire-sale risk (Ellul, Jotikasthira, and Lundablad (2011)). Finally, both types of institutional investors engage in herding behavior that further exacerbates the effect of adverse liquidity shocks (Cai, Han, Li, and Li (2019)).

Finally, we analyze the COVID-19 pandemic, focusing on regulated banks' and unregulated nonbanks' supply of liquidity to nonfinancial firms. We provide evidence on the funding fragility of FinTech lending platforms by showing how small business lending by FinTech lenders dried up in March 2020 (see also Ben-David, Johnson, and Stulz (2021)). At the same time, FinTech lenders helped serve borrowers and regions underserved by banks by allocating Paycheck Protection Program funds during the pandemic (Erel and Liebersohn (2022)). In the leveraged loan market, new issuances dropped to almost zero in March 2020, bouncing back later that year.

Financial fragility of bond mutual funds, subject to runs, also got tested during the initial phase of the COVID-19 shock. In March 2020, US bond mutual funds suffered from an unprecedented net outflow of over $200 billion, which caused a fire sale of relatively liquid fixed-income instruments. Major bank-affiliated dealers were incapable of supplying sufficient inventory, creating a severe liquidity mismatch. As a result, the yield spread on investment-grade and high-yield bonds tripled relative to the pre-pandemic levels, reflecting both credit and liquidity

risks. Only after the Federal Reserve intervened, did these outflows reverse and yield spreads fall, especially for the most fragile funds (Falato, Goldstein, and Hortacsu (2021a), O'Hara and Zhou (2021)). We conclude our review by discussing possible solutions for enhancing financial stability without government intervention in the period of increased reliance on nonbanks for credit.

In this paper, we focus on the US, however, nonbanks have also been rapidly growing in the rest of the world (see Financial Stability Board (2022)). For example, Allen and Gu (2020) show that China has been closely following the US in terms of the size of the nonbanks as a percentage of the gross domestic product (GDP) (74% vs. 61% of the GDP in 2018). The authors argue that regulatory arbitrage has been the main reason for the recent growth of nonbanks in China's credit markets, historically dominated by state-owned banks. They emphasize, though, some important differences between the two countries. For example, China involves smaller institutions backed by larger banks with implicit guarantees, while the US tends to be dominated by larger market-based institutions.

II. Extent and Characteristics of Nonbank Loans

A. Nonbank Loans to Small Businesses

Small businesses typically rely on bank loans for their operations and growth (see Mills and McCarthy (2014)). Mills and McCarthy (2014) show that small businesses experienced declining access to bank credit before the 2008 Financial Crisis but were hit even harder during the crisis, with continued decline afterward. Mills (2018) discusses that the share of small business loans to total business loans of banks in the U.S. dropped from 33% in 1995 to 20% in 2017. Some of this drop happened during the recession, when small businesses were hit harder than larger businesses.

Between 2007 and 2012, small businesses accounted for over 60% of the net job losses in the economy (Mills and Dang (2021)).

Mills and McCarthy (2014) list various factors which contributed to the decline in small business lending, such as: the decline of community banks; mega-mergers in the banking industry; large banks not relying on relationship lending; and small business loans being more expensive due to information and regulatory frictions. According to the Federal Reserve's Small Business Survey, less than half of small businesses that applied for credit received all of it, with at least 20% receiving none during 2016-2018 (Report on Employer Firms (2018)).

Chen, Hanson, and Stein (2017) show that small business lending by commercial banks fell sharply by more than 30% after the 2008 Financial Crisis.[6] The decline was the most significant for the top-four banks—Bank of America, Citigroup, JPMorgan Chase, and Wells Fargo—which had cut their small business loans by almost 60% by 2010. Larger nonperforming loan ratios for these loans, which also have been peripheral to large banks' overall business strategies, led to a reluctance to increase their small business lending even after the crisis. Smaller banks, as well as nonbank lenders, saw an opportunity and started filling the gap. The authors find that, during 2010-2014, nonbank lenders had 47 percentage points higher loan growth rates in those US counties with a 100% share of the top-four banks relative to counties with no top-four presence.

Bord, Ivashina, and Taliaferro (2021) also document a similar withdrawal of large US banks from small business lending over the Financial Crisis. We extend their data and created Figure 1 to show that the drop in small business lending around the crisis by larger banks has not fully recovered.[7] While small business lending amounted to about $158 billion in 1996, it peaked

[6] In their data collected due to the Community Reinvestment Act (CRA), 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 do not include lending by either small community banks or by nonbank lenders.
[7] See also figure 1 of Cortes, Demyanyk, Li, Loutskina, and Strahan (2020).

at $341 billion in 2007, and dropped to about $187 billion in 2010. This 45% drop in small business lending is concerning. In the following years, small business lending by banks has recovered slowly, increasing the total volume to about $369 billion by 2021, slightly surpassing the 2007 volume.[8] The total number of loans, though, is still below the pre-crisis levels.

<Figure 1 is about here>

Gopal and Schnabl (2022) study the growth of nonbank lenders in secured (but non-real estate collateral) loans to small businesses post Financial Crisis. Nonbank lenders—mainly finance companies that became the dominant issuer of these types of small business loans before the crisis—reduced their lending less than other lenders during 2006-2010 and expanded their lending significantly more after 2010. By 2016, the total market share of nonbank lenders in small business lending reached almost 60%. The nonbank lending share increased in areas with a larger market share of nonbank lending before the crisis, consistent with nonbanks substituting for a reduction in bank lending post-crisis. They also find that firm-level investment, employment, wages, and growth recovered post-crisis, driven by the expansion of nonbank lending.

1. Digital Lending

Investment in FinTech has been growing rapidly in the past decade. According to CB Insights (2023), their top FinTech 250 cohort raised more than $73.8 billion in aggregate funding between 2016 and 2021. Some of this large investment in FinTech is in digital banking or lending.[9] 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, they moved into direct small

[8] Note that the numbers over the 2020–2021 period likely also reflect the effect of government subsidies on the loan market due to the COVID-19 shock.

[9] See also Cornelli, Frost, Gambacorta, Rau, Wardrop, and Ziegler (2020), who provide empirical evidence on the growth of digital lending worldwide.

business lending through a funding bank partner (Stulz (2019)) and increased their presence before the COVID-19 pandemic. However, the quarterly global FinTech funding dropped after 2021, reaching $7.8 billion in the second quarter of 2023 – its lowest level since 2017.

New nonbank lenders entirely relying on FinTech in their lending have been changing the landscape of small business lending. The Federal Reserve's 2020 Small Business Survey (Report on Employer Firms (2020)) shows that 32% of small businesses applying for a loan from an online lender chose 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 (2017) show that a lack of local access to bank lending explains why small businesses shifted to borrowing from FinTechs over 2008–2010. Barkley and Schweizer (2020) further document 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. Thus, online lenders lower barriers to capital access for very small businesses.

What about the role of banking relationships? Balyuk, Berger, and Hackney (2020) argue that FinTech lending competes with hard-information-based rather than soft-information-based relationship lending (see, e.g., Petersen and Rajan (1994)) and, consistently, find that digital lending is higher in counties with larger and out-of-market banks. Allen, Peng, and Shan (2020) show that increased awareness of these lending platforms through social networks increases both the demand and supply of consumer and commercial loans through these platforms.

Overall, FinTech credit has become an important source of loans for small businesses and makes loans accessible to companies that otherwise would not be able to receive bank credit. The future of FinTech lenders as unregulated institutions is vague, though. As their market share grows,

they look for cheaper and more stable access to funds (e.g., through insured deposits) and opportunities to provide a wider range of financial services. Recently, some FinTech lenders acquired a bank charter, either directly through state and federal regulators or indirectly through acquisitions. For example, Lending Club, one of the very first digital lending platforms in the US, became a bank by acquiring Radius Bank in 2021. Both state and federal regulators have recognized the growth in FinTech lending and started competing, for example, in granting a special FinTech charter to these institutions.[10] While deposits are a much cheaper source of financing for these institutions, they also bring expensive regulation for them and exacerbate concerns related to the interconnectedness of regulated and unregulated financial institutions. The real implications of this changing landscape of lending under different regulatory regimes call for more future work when the data becomes available.

B. Nonbank Loans to Medium-Sized and Large Businesses

1. Direct Loans

Commercial banks typically have been the main purveyors of direct commercial and industrial (C&I) lending. These experts in due diligence and monitoring are an essential component of the loan relationship (see, e.g., Diamond (1984), Fama (1985), Diamond (1991)). Since the Financial Crisis, nonbank financial intermediaries have entered the direct lending market, where lenders negotiate directly with borrowers, resulting in substantial growth in their presence.

One of the prominent players in the direct lending market is private debt funds. According to Preqin Global Private Debt Report (2019), global assets under management of private debt funds, which are primarily structured like closed-end private equity funds investing in non-syndicated direct loans, grew to almost $800 billion before the pandemic (see also European Direct

[10] State of New York and the OCC even carried this issue of who should grant the FinTech charter to the courts.

Lending Review and Outlook (2021)). During historically low interest rates, the reaching-for-yield incentives drive the growth in investors' interest in private debt funds.

Private debt funds are only a part of the nonbank universe. Chernenko, Erel, and Prilmeier (2022) study direct loans to publicly traded middle market firms, with sales between $10 million and $1 billion, during 2010-2015. The authors show that about *one-third* of middle firms borrow from nonbanks. This number is surprisingly large, as one might assume commercial banks almost exclusively lend to these firms. Top nonbank lenders are unaffiliated FCOs, with 23% of the nonbank lending share, to which FCOs affiliated with banks add another 13%, PE and VC firms with 19%, and hedge funds with 17%. Investment banks (10%), investment managers (8%), insurance companies (5%), and Business Development Companies (BDCs, 4%) follow them.

What are the main characteristics of firms borrowing from nonbanks? Compared to bank borrowers, nonbank borrowers are riskier with lower (even negative) profitability and higher leverage (see also Denis and Mihov (2003)). Chernenko, Erel, and Prilmeier (2022) find that firms with a small negative EBITDA are about 34% more likely to borrow from a nonbank than firms with a small positive EBITDA. While the unconditional probability of default is (about 8%) higher for nonbank borrowers than for bank borrowers, controlling for firm and loan characteristics, nonbank borrowers are *not* more likely to default or show worse accounting or stock price performance within the next five years.

Business Development Companies (BDCs), specific types of closed-end funds designed to offer loans directly to small and mid-sized businesses, are also emerging as prominent lenders in the direct loan market. In the late 2000s, especially after the Financial Crisis, BDCs grew rapidly with total assets almost reaching $100 billion in 2017 (see figure 1 of Davydiuk, Marchuk, and Rosen (2020)) and $120 billion in 2019 (Balloch and Gonzalez-Uribe (2021)). Davydiuk,

Marchuk, and Rosen (2020) identify the causal effect of BDC lending, as a substitute for traditional financing, and show that an improved access to BDC funds has spurred economic growth and innovations. Importantly, the authors argue that BDCs lending increased in counties where banks reduced their lending, facing a regulatory shock.

2. Syndicated Loans

The majority of loans to large corporations are syndicated. Even though the lead arranger is typically a bank, lightly regulated nonbanks have been playing an increasing role in this market. These lenders, except for finance companies, typically invest in term loans B . . . K, also referred to as *institutional* tranches, while commercial banks provide the revolvers and amortizing term A loans, also known as pro-rata 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), in 2006, more than 250 nonbanks were already participating in syndicated loan deals, with about 60% of high-yield loans held by these institutional investors.

Nonbanks typically invest in term loans of risky borrowers, also known as *leveraged loans*. Figure 2 shows nonbank participation in leveraged loans covering 30 years between 1991 and 2021. We use Thompson Reuter's LPC (Dealscan) to classify leveraged loans as syndicated senior loans to nonfinancial firms in the US with all in spread margins (over LIBOR) of 150 basis points or larger. We flag these loans as nonbank loans if they are term loan B to term loan K, following the prior literature (Ivashina and Sun (2011a)).[11] We only include the first tranche deal and, therefore, exclude amendments from the sample.

[11] We get similar results if we use the *Market Segment* variable containing the word "Institutional" as a flag for nonbank lending.

<Figure 2 is about here>

While nonbanks' participation in syndicated leveraged loans was almost zero in the early 1990s, the volume increased to about $440 billion, or 51% of the total volume of leveraged loans, in 2007. During the Financial Crisis, we saw a significant drop in all leveraged loans (to about half of the 2007 volume), especially in the ones extended by nonbanks, which amounted to about $77 billion in 2008 and $47 billion in 2009. Recovery was fast, though. Already in 2013, the total leveraged loan volume exceeded the 2007 level with a total of $875 billion in lending, and nonbanks provided 38% of that volume.

Interestingly, the drop during the COVID-19 crisis differs from the one during the Financial Crisis. The 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. Figure 3 presents the time series of participation by nonbank lenders in leveraged term loans only, again covering 1991–2021. When we concentrate on risky term loans, we see even more impressive participation of nonbank lenders: since 2003, institutional lenders issued more than half of the volume of leveraged term loans, dropping to slightly below 50% only during the Financial Crisis and reaching more than 80% in 2021.

<Figure 3 is about here>

Figure 4 uses 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).[12] Classified commitments include those rated substandard, doubtful, and loss. The

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

classified loan volume peaked in 2009 (Panel B), of which nonbanks held about half. Since then, the ratio of nonbank loans within the universe of classified loans has increased, peaking at about 70% in 2014 and staying relatively stable at 65% since then (Panel A). These ratios provide evidence of the appetite of nonbanks for riskier loans.

<Figure 4 is about here>

Irani, Iyer, Meisenzahl, and Peydró (2021) distinguish different nonbank lender types in syndicated term loans. CLOs became the largest nonbank investor by 2002. By 2014, however, hedge funds, private equity firms, and loan mutual funds, in total, caught up with CLO lenders. Nonbanks started dominating secondary market purchases of syndicated loans after 2002, with the total volume of sales and purchases increasing from well under $50 billion in the early 2000s to well above $100 billion in the early 2010s.

Despite the growing share of nonbanks in the syndicated loan markets, banks retain their unique role in monitoring borrowers (Gande and Saunders (2012)). They are also still the primary suppliers of revolvers to mid-size and larger borrowers, and this dominance persists across economic cycles (see Paligorova and Santos (2019)). For instance, during the Financial Crisis of 2008, there was a run on undrawn loan commitments at banks (Ivashina and Scharfstein (2010)).

C. How Different Are Nonbank Loans from Bank Loans?

To assess the effects of nonbank loans on borrowers, we consider both price and nonprice terms that borrowers get from nonbanks compared to banks.

Mills and McCarty (2014) show that online nonbank lenders, compared with traditional banks, make lending accessible for customers electronically, leading to faster turnarounds and better data utilization. The average small business borrower spends more than 25 hours on paperwork for bank loans and typically has to approach multiple banks (Mills (2018)). However,

the increase in the number of nonbanks that offer rapid online vetting for loans based on not only credit scores but also other personal data, helps increase the average speed of loan approval.

The Federal Reserve's 2020 Report on Employer Firms lists "speed of decision or funding" (54%) and "chance of being funded" (46%) as the top two reasons for loan applications from online lenders. 44% of finance company borrowers chose an online lender for speed, while this percentage drops to 23%–26% for banks. The "flexibility of the product" and "no collateral required" are also important reasons stated for loan applications to online lenders and finance companies.

Chernenko, Erel, and Prilmeier (2022) study how price and nonprice terms differ for nonbank loans compared with bank loans. They find that nonbanks charge almost 170 basis points higher interest rates than bank loans, ceteris paribus. The unconditional difference is 435 basis points. Nonbanks are also 37% less likely to include financial covenants in their loan contracts. They instead use warrants, for example, unlike banks. Nonbanks are also more likely to provide unsecured loans. Overall, nonbank lenders seem to be more innovative and flexible in their loan contracts. Davyduk et al. (2020) show that BDCs charge 4% - 5% higher rates on their direct loans to middle-market firms than banks. However, compared with banks, BDCs offer significant flexibility to their borrowers—loan tailoring, quick deal execution, and loose covenants.

When it comes to larger loans, the benefits of nonbank lenders include not only increased liquidity and improved information gathering but also a lower cost of funding. 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 a 18- to 32-basis-points lower spread in syndicated loans. They attribute this finding to the incentive alignment between creditors and owners that this dual ownership creates.

Ivashina and Sun (2011a) study the increased demand for nonbank lending of syndicated loans over the 2001–2007 period and document the reduction in loan spreads. Nadauld and

Weisbach (2012) focus on term loan B loans to B-rated firms – syndicated loans securitized to CLOs. They show that securitization is associated with 17-basis-point lower loan spreads – that is, CLOs' participation reduces the cost of capital. These findings are rather important, given the increase in the CLO market not only before the Financial Crisis but also afterward (see Panel A of Figure OA.1 in the Online Appendix and the findings of Benmelech, Dlugozs, and Ivashina (2012)). Nadauld and Weisbach (2012) find that securitized loans through CLOs do not perform worse than comparable unsecuritized loans originated by the same bank, which also helps reduce adverse selection with respect to the collateral underlying the CLOs.

Nonbank lenders are also more likely to offer covenant-lite (cov-lite) contracts (see Panel B of Figure OA.1 and also Becker and Ivashina (2016)). However, banks still monitor borrowers through covenants included in commitments they offer within the same syndication deal as cov-lite tranches (Berlin, Nini, and Yu (2020)).

1. Concerns About Nonbank Loans

Several papers document the adverse effects of nonbank participation. For example, Lim, Minton, and Weisbach (2014) find that loan facilities, which include nonbank lenders, especially a hedge fund or a PE firm, in their syndicates have higher spreads than otherwise identical bank-only facilities. Biswas, Ozkan, and Yin (2020) study the operating performance and investment behavior of nonbank borrowers and show that these borrowers perform worse than similar bank borrowers due to less intense monitoring by nonbanks in the syndicated loan market.

Many nonbanks, especially FinTechs, rely on big data and artificial intelligence. Ownership of confidential data outside of the regulated financial system, however, creates concerns. As Mills and Dang (2021, p. 20) 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." As the interest in FinTech (and also lately in BigTech) lenders continues to increase, data privacy issues will be even more binding.

Another related issue is whether nonbank lending may involve more fraud. Griffin, Kruger, and Mahajan (2022) argue that a fraudulent loan application is easier to place online and by borrowers with no prior banking relationship. They show that fraudulent reporting to get Paycheck Protection Program (PPP) loans was larger when borrowing from FinTech lenders.

Lastly, 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 outperform in these trades (by 5.4% annually), compared with other traders of the same stock.

D. The Effects of Bank Regulation on Nonbank Lending

Unlike nonbank financial institutions, banks face tighter regulations, such as regulatory capital ratios, liquidity ratios, and leverage-lending guidelines.[13] Since the Financial Crisis, bank regulators have further tightened regulatory constraints by increasing core capital requirements, implementing stress tests, and issuing interagency guidance on risky loans. Next, we discuss whether tighter bank regulation explains the increase in nonbank lending.

1. Substandard Loans

Bank regulators often flag riskier loans as *substandard*, making them more expensive for commercial banks. A typical measure of loan riskiness is the riskiness of the borrower as measured by their profitability or leverage (see the Comptroller of the Currency (OCC) Handbook on Rating

[13] 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 discussions of bank regulatory capital arbitrage and the growth of shadow banking.

Credit Risk (2001) referring to profitability to classify substandard loans).[14] Being flagged as substandard would lead to larger loan loss allowances for these loans and lower regulatory ratings—for example, CAMELS ratings—for regulated commercial bank lenders.

Chernenko, Erel, and Prilmeier (2022) show that banking regulation makes it costly for banks to make cash-flow loans to negative EBITDA firms and drives nonbanks to fill the loan gap to middle-market firms.[15] 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 (Agarwal, Lucca, Seru, and Trebbi (2014)). Moreover, they explore the banking markets and show that firms with negative EBITDA are significantly more likely to borrow from a nonbank if OCC-supervised banks dominate their banking markets, an effect once again driven by cash flow loans.

Chernenko, Erel, and Prilmeier (2022) also explore the effect of borrowers having a total debt/EBITDA ratio greater than six.[16] The OCC, the Federal Reserve System, and the FDIC all issued this guidance in response to an increase in leveraged lending. The aim is to ensure that federally regulated banks reduce their leveraged lending activities and, hence, risk in the banking system. The authors find that firms in this category are about 15% more likely to borrow from a nonbank lender. After bank regulators issued the 2013 Interagency Guidance on Leveraged Lending, firms with negative EBITDA and a debt/EBITDA ratio greater than six became even less likely to borrow from OCC-supervised banks. In a related paper, Kim, Plosser, and Santos (2018)

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

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

[16] The 2013 Interagency Guidance on Leveraged Lending uses this threshold to flag loans issued to highly leveraged borrowers: "… 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" (p. 7, https://www.federalreserve.gov/supervisionreg/srletters/sr1303a1.pdf).

study the effect of interagency guidance on leveraged lending and document a reduction of (closely supervised) banks' leveraged lending activity, shifting the leveraged lending to nonbanks.

Overall, the existing evidence suggests that bank supervision through guidance on lending standards is an important driver of nonbank lending. Bank regulation has an indirect effect on the price that nonbank borrowers pay for their loans – negative EBITDA firms that borrow from nonbanks pay 254 basis points more than bank borrowers. Chernenko, Erel, and Prilmeier (2022) also show that firms with negative EBITDA and a debt/EBITDA ratio greater than six pay 89 and 183 basis points more after the revised leveraged loan guidance became effective.

2. Capital Requirements for a Safer Banking System

Why have nonbanks become more active in syndicated loans after the Financial Crisis? Irani, Iyer, Meisenzahl, and Peydró (2021) argue that the increase in regulatory capital for commercial banks has contributed to this increase.[17] The authors show a positive relation between banks' regulatory capital cushions and loan retention. They further document a negative and significant relation between the nonbank share in the loan syndicate and syndicate member banks' average core capital. The effect is economically significant: about 2% (a one-standard-deviation) decline in average bank capital leads to about a 14% increase in the average nonbank share (of 23%). Begenau and Landvoigt (2022) propose a quantitative general equilibrium model with regulated banks and unregulated nonbanks. They show that tighter capital requirements for banks lead to a larger shadow banking sector with higher leverage.

Undercapitalized banks are more likely to sell their loans. Irani et al. (2021) find that a significant fraction of syndicated loans removed from undercapitalized banks' balance sheets are

[17] For a brief history of capital requirements in the US, see Haubrich (2020). See also Aiyar, Calomiris, and Wiedlak (2014) for evidence from the United Kingdom.

sold to nonbanks. Banks cherry-pick more credit-risky loans to sell. Thus, higher capital requirements lead to concerns about financial fragility, which we will discuss later.

3. Stress Tests

In the aftermath of the Financial Crisis, the Dodd-Frank Act (DFA) requires stress tests to be implemented by the Federal Reserve. Stress tests aim to ensure that regulated financial institutions are well-capitalized in the face of future economic downturns.

Cortes, Demyanyk, Li, Loutskina, and Strahan (2020) show that stress tests have affected small business lending by large banks. They find that large commercial banks most affected by stress tests—those with a larger potential decline in capital under the stress test—reallocate their loans away from riskier markets, where stress-tested banks own no branches. These banks also raise interest rates on small loans where they have branches. The authors argue that, in this way, banks loosen their capital requirements and concentrate on areas in which they have local knowledge. Banks not subject to stress tests seem to "pick up the slack" so that overall credit availability does not change. Larger banks pulling back from these lending opportunities has allowed nonbanks to gain a market share in riskier markets (Chen, Hanson, and Stein (2017)). Chen and coauthors show a significant increase in nonbank lending in counties dominated by the top-four banks, which reduced their small business lending in the 2010s.

Davydiuk et al. (2020) 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 the accounting change FAS 166/167, which requires banks to consolidate their off-balance sheet items into their on-balance sheet items, thereby reducing their regulatory capital ratios. Following the capital supply shock, exposed counties experienced a significantly higher presence of BDCs in loan markets for mid-sized firms.

Overall, all this work provides strong empirical evidence that the increased regulation of commercial banks, especially post-financial crisis, has led to the growth of nonbank lending.

III. Extent and Characteristics of Nonbank Lending in Bond Markets

A. Recent Trends in the Landscape of Institutional Bondholders

The corporate bond market is the primary source of external funding for public firms. The dominance of corporate bonds as a form of borrowing has been increasing since the early 1990s (see Figure OA.2 in the Online Appendix from FDIC Quarterly Banking Profile (2019)). As of 2022, the total amount outstanding in corporate bonds of nonfinancial US firms reached $7.5 trillion, more than double bank lending and leveraged loans taken together.[18] Corporate bond issuance has also been growing relative to equity issuance, starting with twice the equity issuance in 2000 and reaching an almost fourteen-fold difference in 2022, with the 2022 total value of bonds and equity issued being $1,361 billion and $99 billion, respectively.[19]

A change in the landscape of institutional bondholders has accompanied this rapid growth. Historically, insurance companies and pension funds have been the dominant holders of corporate bonds. Back in the 1980s, they held about 75% of the amount outstanding. The rapid development of the asset management industry dramatically reshaped the ownership structure. Following regulatory changes in capital requirements for insurance companies in the early 1990s,[20] asset management companies increased their presence from about 5% in 1990 to 37% in 2022 (Figure 5). The ongoing increase in bond holdings of investment funds is also partially attributed to the

[18] See Table 2.1 of the Financial Stability Report (https://www.federalreserve.gov/publications/2023-may-financial-stability-report-purpose-and-framework.htm).
[19] The average ratio of gross bond and equity issuance was 6.6 over the last ten years, with 2022 being an exceptionally depressing year for the equity market. The data comes from SIFMA.
[20] https://content.naic.org/cipr_topics/topic_riskbased_capital.htm

decreasing direct bond ownership of households and the recent boom of liquid exchange-traded funds (ETFs). As of 2022, the total value of bonds in ETF portfolios reached $754 billion, compared with only $27 billion during the Financial Crisis. Meanwhile, open-ended mutual funds—the largest player among asset managers—increased corporate bond holdings from $0.6 trillion in 2008 to $2.1 trillion as of 2022 (Figure OA.3 in the Online Appendix).

Since the Financial Crisis, the bond holdings of insurance companies have also been growing, although at a much slower pace than the asset management industry. In 2007, life and P&C insurance companies held 26% of the outstanding bonds, evolving to almost 33% as of 2022 (Figure 5). In 2010, the National Association of Insurance Commissioners (NAIC) relaxed the capital requirements for holding securitized CLO instruments, making CLOs more profitable than corporate bonds. As a result, insurance companies shifted the focus of their investment toward CLOs (Fringuellotti and Santos (2021)).

Commercial banks and broker-dealers had significant bond holdings before the Great Recession, with 11% and 6% of the amount outstanding, respectively, in 2007. The introduction of Basel III and, especially, the Volcker Rule in the series of post-Financial Crisis regulations have affected their incentives to hold risky bonds in the recent decade. As of 2022, depositary institutions and broker-dealers hold only 9% of the amount outstanding in total (Figure 5).

<Figure 5 is about here>

B. Institutional Demand for Bonds

Insurance companies specialize in investment-grade (IG) bonds, while mutual funds prefer high-yield (HY) instruments (see Figure 6). The reason is that insurance companies are subject to higher risk-based capital requirements for bonds with lower credit ratings. Compared to regulated

insurance companies, mutual fund managers have more flexibility in choosing securities along the whole credit rating spectrum.

<Figure 6 is about here>

Insurance companies and mutual funds also differ in terms of bond maturities, liquidity, and size. Consistent with the volatile nature of fund flows, mutual funds prefer more liquid bonds with a shorter maturity, and insurance companies tilt their investments toward illiquid bonds with a longer maturity. Also, mutual funds tend to invest in large bonds, and insurance companies prefer smaller bonds (Bretscher, Schmid, Sen, and Sharma (2022)).

The rapid growth of the public debt market is partially attributed to low interest rates, high market valuation, and, as a result, the increased debt capacity of public firms. Although IG bond issuance has grown faster than the HY category (Figure OA.4 in the Online Appendix), the overall credit quality has deteriorated over the years. The composition of credit quality within the IG category shifted toward BBB-rated bonds. 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 (Çelik, Demirtaş, and Isaksson (2020)).

In the low-interest-rate environment, the deteriorating credit quality of borrowers might be attributed to the "reaching for yield" phenomenon: the tendency of lenders to invest in higher-yield bonds. Both insurance companies and asset managers are prone to this behavior (see, e.g., Becker and Ivashina (2015), Choi and Kronlund (2018)). Insurance companies, subject to risk-based capital requirements, often prefer higher-yield bonds within the NAIC rating groups, effectively engaging in a form of 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 a total of 70% of the market as of 2022 (Figure 5) – shifts the overall supply of funds toward riskier borrowers and securities.

The deteriorating credit quality of IG bonds and shift toward the borderline BBB rating raise concerns about a potential increase in the number of fallen angels, that is, firms downgraded from the IG to HY rating (SEC report 2020, Çelik, Demirtaş and Isaksson (2020)). Losing an IG rating leads to divestment by various investors with rating-based regulations and investment mandates, which we will discuss next.

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

Similar to banks, regulators restrict the amount of risk an insurance company can take on their balance sheet 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, until the 2021 changes in NAIC regulation, life insurance's capital requirement for holding BBB bonds was 1.3% of the bond value held; for BB bonds, it was 4.6%, and all the way to 23% for CCC bonds (Becker (2017)). Risk-based regulations turn out to have several unintended adverse consequences.

Ellul, Jotikasthira, and Lundblad (2011) consider regulation-induced fire sales of downgraded corporate bonds, which become costlier to hold because of higher capital requirements. Tighter capital requirements mean capital-constrained insurance companies might not be willing to buy these bonds, leading to temporary underpricing, especially when liquidity from outside the insurance industry is scarce. Ellul, Jotikasthira, Lundblad, and Wang (2015) further document the fragility of the historical cost accounting (HCA) rule. Unlike HCA, the mark-to-market (MTM) rule has been criticized for causing excessive volatility during tumultuous times. With the MTM rule, any downward pressure on portfolio holdings adversely affects capital

requirements, leading to an asset sale and a further downward spiral in price. Considered to be a solution, the HCA rule, however, is subject to its own problems. When an asset is downgraded, insurers using the HCA rule have incentives to sell unaffected securities to restore capital reserves, potentially causing price distortions on illiquid markets.

Insurance firms may herd even outside of downgrade-related fire sales (see, e.g., Cai, Han, Li, and Li (2019), 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. The results are driven by high-risk securities, consistent with the reaching-for-yield story (Becker and Ivashina (2015)).

In 2021, the NAIC finally adopted new risk-based capital requirements for corporate bond holdings.[21] Under the previous regulation, all credit ratings were divided into six NAIC designations, and corporate bonds with different credit ratings within a group received the same capital treatment. The new regulation introduces more granular risk weights, expanding the number of NAIC designations to twenty. Within the old NAIC groups, capital weights for riskier bonds increased, transferring some of the weights away from the safest securities. Although its consequences are yet to be studied, the reaching-for-yield strategy (Becker and Ivashina (2015)) is likely to be less appealing under the new regulatory regime.

1. The Consequences of Bond Fire Sales

Several papers explore the consequences of bond fire sales by insurance companies. Massa and Zhang (2021) show that the bond fire sale following Hurricane Katrina led to a price decline and forced affected firms to switch to bank financing, decreasing their overall debt maturity. Liu, Rossi, and Yun (2021) consider insurance companies' sell-off of unaffected municipal bonds

[21] https://content.naic.org/capital_adequacy_task_force.htm

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. Because of the fire-sale risk, bonds with larger insurance ownership demonstrate a 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 (2022) document the underpricing of bonds with a rating close to noninvestment grade due to a low demand from insurance companies. Notably, there were no price effects before introducing the ratings-based regulation in 1993.

IV. Concerns over Interconnected Nonbanks Subject to Runs

The Great Recession underlined the importance of financial stability, which collapsed because of the troubled interconnections between the highly leveraged shadow banking system and banks (e.g., Gorton and Metrick (2012)). The recession of March 2020 created another test of financial stability. In between these two recessions, nonbank lending witnessed significant shifts in all the corporate debt markets. As a result, credit risk, especially in high-yield borrowing, has been increasingly held by nonbanks rather than banks. Thus, it is natural to wonder about the potential effects of this shift on credit market stability or financial stability in general.

A. Funding Fragility of Nonbanks

As argued by Greenwood and Scharfstein (2013), the Financial Crisis revealed significant costs to the financial stability of unregulated shadow banking, which extensively relies on short-term

financial claims without explicit government guarantees and, therefore, was subject to runs when investors became concerned about the entities' solvency (see, e.g., Gorton and Metrick (2012), Stein (2012), Covitz, Liang, and Suarez (2013)).

Starting with Diamond and Dybvig (1983), banking literature has considered the effect of runs on banks' survival and financial stability.[22] Similarly, mutual funds might be subject to self-fulfilling runs by their investors, as Allen and Walter (2021) argue. The authors develop a simple model of fund fragility to show that traditional banks are not necessary to generate a run like in Diamond and Dybvig (1983); nonbanks—that is, mutual funds—facing even small frictions can be subject to a run. The authors discuss the implications of these results for financial stability.

Then-Governor Jeremy C. Stein, in his 2013 speech entitled "Overheating in Credit Markets: Origins, Measurement, and Policy Responses" at the Governor of the Board of Governors of the Federal Reserve System, also emphasizes the financial fragility that lenders with short-term demandable funds create. He points out the surge in junk bond issuance and leveraged loans in the early 2010s. He emphasizes the importance of understanding what fraction of these instruments are financed by investors whose funds are vulnerable to runs, as these claims can lead to systemic spillovers in the form of deleveraging and fire sales (à la Shleifer and Vishny (2011)).

1. Fragility in the Loan Markets

Both banks and a 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.[23]

[22] For a review of this literature, see Allen and Gale (2009).
[23] Sunderam (2015) shows that investors treat shadow bank debt as a money-like claim.

Chretien and Lyonnet (2021) model the symbiotic relationship between traditional and shadow banks. They argue that regulated banks and unregulated shadow banks coexist through their mutual reliance on a crisis. In bad times, nonbanks, which cannot roll over their short-term financing, stop lending and sell their assets to banks at discounted prices (aka fire sales). Banks fund these purchases with insured deposits, benefiting from the flight to quality in crisis.

Irani et al. (2021) find a strong negative relation between banks' capital ratios and their sales of syndicated loans to nonbanks in the secondary market. The relation is stronger in bad times, when marketwide uncertainty is higher, and when banks' profitability is lower. They further show that the nonbank share had a negative effect on credit availability during the Financial Crisis. These nonbank borrowers could not substitute for other syndicated loans either. Moreover, syndicated loans with a greater share of nonbank participation are associated with larger downward pressure on secondary market prices during the crisis. Both these effects are stronger for nonbanks with more fragile funding (e.g., hedge funds and broker-dealers). Lastly, the authors show that loan price volatility during the crisis increases with the share of nonbank participants.

Beyhaghi, Nguyen, and Wald (2019) show that nonbank participants are more likely than commercial banks to exit the syndicate before or at renegotiations of the loans. 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 than banks. Consistent with Stein (2013), net mutual fund outflows lead to a greater likelihood of exit, thereby contributing to greater systemic risk.

Fire sales by nonbanks, facing outflows of their funding, aggravate the fragility of the financial system (Shleifer and Vishny (2011)). Kundu (2021) shows that CLOs face idiosyncratic credit shocks. For example, a negative shock to the oil & gas industry can lead to the fire sales of

loans unrelated to this industry in the secondary loan markets. Consequently, these fire sales exert price pressure on the securities of other firms, creating financial instability in other industries.

Finally, Fleckenstein, Gopal, Gallardo, and Hillenbrand (2020) argue that nonbank lending is significantly more cyclical than bank lending. The authors show that the decline in syndicated lending during the Great Recession or the first quarter of the COVID-19 crisis is driven by declines in nonbank lending. This larger cyclicality in nonbank lending is due to the larger cyclicality in nonbank funding flows.

2. Bond Mutual Funds: Fragility in the Bond Markets

The growth of open-end mutual funds in the bond market raises concerns about the fragility of the nonfinancial corporate sector (IMF (2021)). 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. This structure is vulnerable and subject to market sentiment (Frazzini and Lamont (2008)).

The classical paper by Chevalier and Ellison (1997) documents a convex relation between future flows and current performance in mutual funds. Investors disproportionately reward star funds and show a modest reaction to underperformance. Chen, Goldstein, and Jiang (2010) show that outflow from mutual funds with illiquid assets is sensitive to underperformance, much more so than liquid funds. Goldstein, Jiang, and Ng (2017) estimate the flow-performance relation for bond mutual funds, confirming the concave form for underperforming funds. NAV pricing practices implemented in the industry can explain the documented sensitivity. When redeeming shares, the redemption price is determined daily and is not adjusted for trading costs of 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.

The first-mover advantage in bond mutual funds unleashes a cascade of asset redemptions from underperforming funds (see, e.g., Goldstein et al. (2017), Zeng (2017)).[24] Consistent with the herding behavior (Cai et al. (2019)), the divesting decision of the affected fund is further exacerbated by the selloff of other mutual funds holding the same bond. Falato, Hortaçsu, Li, and Shin (2021b) show that flows-driven fire sales have strong adverse spillover effects on other funds holding the same assets, prompting other mutual funds to divest the asset in a cascade effect.

Jiang, Li, Sun, and Wang (2022) test whether mutual fund liquidity transformation leads to fragility in corporate bond markets. They construct a measure of bond-level fragility using the holdings liquidity of the bond's incumbent mutual funds. Following a negative shock, the shareholders of mutual funds with illiquid holdings have greater incentives to redeem their shares, triggering higher selling pressure. As a result, fragile bonds demonstrate higher future return volatility. A one-standard-deviation increase in bond fragility is associated with a 1.15% increase in annualized bond return volatility over the next quarter, or 16% of median bond volatility.

3. Why Should We Care About Fund Runs?

The negative liquidity shock on bondholders can propagate to both primary and secondary markets. Divesting the existing bond position puts downward pressure on its market price (Cai et al. (2019)) and increases bond return volatility (Jiang et al. (2022)), affecting the cost of bond issuance in the short run. As mutual fund families are active players in the primary market, capital runs from incumbent bondholders jeopardize corporate borrowing on public debt markets and

[24] See Allen and Walther (2021) for a review of the theoretical and empirical findings. The authors also construct a simple theoretical framework of self-fulfilling runs on mutual funds based on Diamond and Dybvig (1983).

affect the corporate decisions of the borrowing firm (see, e.g., Massa, Yasuda, and Zhang (2013), Zhu (2021)), among other things leading to underinvestment (see, e.g., Lemmon and Roberts (2010), Harford and Uysal (2014)).

Massa et al. (2013) demonstrate that reliance on bond mutual funds creates capital supply fragility for borrowing firms. Zhu (2021) argues that information acquisition costs and connection with the 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 a connection allows for financial shocks to bondholders to propagate to 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.

4. Broker-Dealers in the Corporate Bond Market: Deteriorating Bond Liquidity

Along with the growing demand for liquidity among bond mutual funds, we observe the frictions with the supply of liquidity. Corporate bonds historically have been traded on over-the-counter (OTC) markets. Dealers served as intermediaries and held significant inventories of corporate bonds: 6% of the total amount outstanding in 2007 (Figure 5). Following the Financial Crisis, bank-affiliated dealers suffered from increasing regulatory pressure associated with the introduction of the Volcker Rule (Bao, O'Hara, and Zhou (2018)). As a result, dealers' bond inventories dramatically declined from $464 billion in 2007 to only $63 billion in 2018 (Çelik, Demirtaş, and Isaksson (2020), see also Figure 5).

The decreasing ability of bank-affiliated dealers to provide liquidity raised serious concerns among academics (Duffie (2012), Bao, O'Hara, and Zhou (2018)). Bessembinder, Jacobsen, Maxwell, and Venkataraman (2018) document a decrease in capital commitment by bank-affiliated dealers following the post-crisis regulation. A series of papers provides evidence

consistent with decreased corporate bond liquidity, which 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 the drop. Following the Financial Crisis, the cost of liquidity provision for investment-grade bonds has doubled, whereas it has tripled for risky bonds (Dick-Nielsen and Rossi (2019)).

B. Interconnections with Banks

Runs on unregulated nonbanks may also harm regulated banks. Extensive literature discusses the role of interconnections between banks. Some papers argue that a more interconnected system increases a bank's resilience to the insolvency of any individual bank (e.g., Allen and Gale (2000), Freixas, Parigi, and Rochet (2000)). However, others argue 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; that is, they face counterparty risk. They show that a large enough negative shock affecting financial institutions could lead to financial instability.

Nonbanks increase the number of steps in the credit intermediation process, which makes the 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 these institutions are interconnected with other financial institutions, including regulated banks.

Some existing theoretical work tackles 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. On the other hand, Voellmy's (2019) model implies that nonbanks could protect banks from runs if they can attract uninsured deposits away from the banking sector, but only if the upper limit on deposit insurance is low.

Interconnections partially occur because nonbank lenders often rely on bank loans as a (partial) source of funding for the loans they make. Kim, Plosser, and Santos (2018) show that nonbanks' reliance on bond issuance declined, while their bank loans increased after the 2013 Interagency Guidance on Leverage Lending. The 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." For example, BDCs, which mainly rely on capital markets for financing, also borrow from banks through commitments and term loans (Ballock and Gonzalez-Uribe (2021)).

V. COVID-19 Shock and Fragility of Nonbanks

Leading to the COVID-19 shock, nonbanks increased high-yield investments and the size of their short-term, demandable liabilities. In addition, the interconnectedness of regulated and unregulated financial institutions increased. As Financial Stability Board's "Holistic Review of the March 2020 Turmoil" states: ". . . 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 nonbank financial intermediation (NBFI), market liquidity has become more central to financial resilience".

In this section, using the COVID-19 shock as an experiment, we discuss how the vulnerabilities of nonbank lenders could amplify the shock's effect, both through direct lending and through interconnections with other institutions. We start with banks and then proceed with nonbanks, covering FinTech lending to smaller firms and money managers as investors in the bond and leveraged loan markets.

A. Banks during the COVID-19 Shock

Banks experienced a large, unprecedented inflow of deposits, as is typically the case during economic downturns due to a flight to safety (e.g., Kashyap, Rajan, and Stein (2002), Gatev and Strahan (2006)). The deposits increased 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 fell more in counties with higher COVID-19 infection rates. Authors argue, though, that the reason is not a flight to safety or any government programs, but rather an increased anxiety about future income loss, leading to more savings through deposits.

Unlike in the Financial Crisis, in the pandemic-induced recession, banks performed well. 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 in perspective, the 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. Large banks, which typically serve large customers, did well, met liquidity demands, and were unconstrained by pre-COVID-19 financial conditions.

Bank lending is mostly concentrated on large firms. 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.

B. Nonbank Small Business Loans during the COVID-19 Shock

What about small firms that rely on unregulated nonbanks, which do not have the liquidity support from the government? For example, finance companies and FinTech lenders played an essential role in the recovery of small businesses from the Financial Crisis (Gopal and Schnabl (2022)), as they substituted for bank lending. Did FinTech lenders help during the pandemic as well?

FinTechs significantly reduced their loans to small businesses at the beginning of the pandemic. Ben-David, Johnson, and Stulz (2021) show that the supply of small business loans by FinTechs dried up in March 2020, despite the increase in the number of applications. They argue that the main reason behind this drop was FinTech lenders' inability to fund the loans due to their own financial constraints. Figure 7 presents the dynamics of loan originations by US digital lenders, covering small business lending as well as student and personal loans. According to the S&P Global Market Intelligence's 2022 US Digital Lending Report, the most significant (94% year over year) drop was in loans to small and mid-size enterprises (SMEs). This decline in new loans by FinTech lenders occurred solely in 2020, with a particularly steep drop in the second quarter. New loan origination across all three FinTech lending categories—student and personal loans, and small business loans—returned to pre-pandemic levels by the second quarter of 2021.

<Figure 7 is about here>

The COVID-19 shock triggered a massive expansion in the 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 by 3.9 million (7% growth) in March and by 7.4 million (22% growth) in

April 2020. Square had 14 million customers with access to direct deposits and $1.3 billion funds stored in April 2020.

FinTech lenders also helped significantly with processing Paycheck Protection Program (PPP) loans during the crisis. These loans are potentially forgivable loans guaranteed by the Small Business Administration (SBA) to provide relief to small businesses during the pandemic. With $669 billion to be disbursed over a few months in 2020, the PPP was unprecedented in speed and scale compared to other small business support programs in the US. The SBA, as the program's administrator 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 (2022) 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 industries with fewer banking relationships.[25] Importantly, unlike banks, FinTech lenders lend in counties where the economic effects of the COVID-19 pandemic were more severe. The authors find that the substitution between FinTech and banks is economically small. Thus, 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 economic downturns only when they can maintain their own fragile funding (see also Berg, Fuster, and Puri (2022)). An important caveat with the PPP experiment is that loans that FinTechs passed to underserved borrowers were, in fact, government subsidies rather than loans with credit provision.

[25] See also Chernenko and Scharfstein (2022), who show that Black-owned restaurants are 5.5% more likely to receive PPP loans from nonbanks than banks.

C. Leveraged Loans and Bonds during the COVID-19 Shock

1. Leveraged Loans

The year 2020 proved challenging for syndicated term loans. Becker and Benmelech (2021) demonstrate that new loan origination in each month, except April, was below the 2010–2019 average, in both the number of loans and the total amounts originated. Leverage loan issuance dropped to almost zero in March, however, it started bouncing back already in April. See panel A of Figure OA.5 (taken from S&P Global Market Intelligence and presented in the Online Appendix), which shows the weighted average bid price of the leveraged loan index plunging in March and quickly recovering afterward. Panel B shows the monthly new issuance volume fluctuating over 2020 before fully recovering in early 2021.

Overall, we know from Figure 2, which presents the total outstanding volume rather than new issuances, that the pandemic-driven crisis was different from the Financial Crisis. The 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 (see Figure 3), the ratio of nonbank participation exceeded 80% in 2021. These numbers show that institutional investors continued funding leveraged term loans during the pandemic.

2. Bonds

In March 2020, the mutual fund industry faced unprecedented bleeding, suffering from over $200 billion in net outflows from bond mutual funds and another $21 billion from bond ETFs (see SEC report 2020 and Figure OA.6 in the Online Appendix). Mutual funds with illiquid bond holdings were the first to be hit and suffered from more severe withdrawals, consistent with high outflow-performance sensitivity and first-mover advantage (Goldstein et al. (2017), Falato, Goldstein, and

Hortaçsu (2021a)). 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)).[26]

According to Ma, Xiao, and Zeng (2022), mutual funds followed a pecking order by first liquidating the most liquid assets. Most of the selling pressure occurred in Treasuries and investment-grade bonds, causing widespread mispricing. The mutual fund sector alone sold $236 billion in Treasuries in the first quarter of 2020, or one-third of the 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 (IG) and high-yield (HY) bonds tripled relative to mid-February (see O'Hara and Zhou (2021)). Both IG and HY bonds showed a dramatic decline in CDS-bond basis, reflecting the lack of liquidity in the markets. CDS-bond basis for IG bonds exceeded that of traditionally illiquid risky securities and reached 280 bps on March 20. Similarly, historically liquid bond ETFs demonstrated a 5% deviation from the market price of the portfolio holdings (Haddad, Moreira, and Muir (2021)). The severe deterioration of liquidity and mispricing of historically liquid instruments is one of the unique features of the COVID-19 crisis.

[26] In this paper, we focus on corporate bonds and bank loans, but not shorter-term commercial paper, where money-market mutual funds (MMMFs) are the predominant investors. They are prone to the same fragility concerns as bond mutual funds holding illiquid instruments, namely, the first-mover advantage. Kacperczyk and Schnabl (2013) argue that MMMFs have incentives to make risky investments during good times, leading to massive asset redemptions once asset quality deteriorates. For example, the bankruptcy of Lehman Brothers in September 2008 triggered a massive outflow from MMMFs, forcing portfolio managers to reduce their holdings in commercial papers. Exploiting the turmoil in eurozone banks in 2011, Chernenko and Sunderam (2014) show that outflow from money-market mutual funds leads to further disruptions in short-term debt borrowing for otherwise financially healthy firms. Lewis (2016) surveys the literature on the fragility of MMMFs in the pre-COVID-19 period. Finally, according to work by Li, Li, Macchiavelli, and Zhou (2021), the post-GFC regulation of MMMFs was ineffective in mitigating the fragility and, as a matter of fact, exacerbated the run on MMMFs during the COVID-19 crisis.

Corporate bond dealers failed to absorb the sell-off during March 2020 (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, bank-affiliated dealers' incentives to hold risky inventories declined. Unfortunately, most of the largest dealers during the COVID-19 crisis were affiliated with banks (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 all bonds.[27] About one-fourth of the bond price decline in March 2020 is attributed to dealers' reduced balance sheet capacity (Chikis and Goldberg (2021)).[28]

To stabilize the markets and resolve the mismatch between liquidity supply and demand (see figure 6 of Chikis and Goldberg (2021)), on March 17 and March 23, the Federal Reserve introduced a number of liquidity facilities, such as the Primary Dealer Credit Facility (PDCF), Primary Market Corporate Credit Facility (PMCCF), and the Secondary Market Corporate Credit Facility (SMCCF). [29] The PDCF provides short-term funding to primary dealers at a discount rate. Under the PMCCF and the SMCCF, the Federal Reserve offers loans to special-purpose vehicles to directly purchase eligible IG bonds and bond ETFs on primary and secondary markets correspondingly (O'Hara and Zhou (2021)). On April 9, the Fed relaxed rating-based restrictions and expanded the program to include recent fallen angels.

The Fed's intervention changed the behavior of major players in the bond markets. 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

[27] Duffie (2020) and He, Nagel, and Song (2022) further document that inventory constraints of bond dealers significantly limited their participation in mitigating Treasury bond sell-offs.
[28] See the recent survey paper by O'Hara and Zhou (2023) for a more detailed discussion of the reasons behind the liquidity mismatch in the bond markets during the COVID-19 crisis.
[29] On April 1, 2020, regulators also temporarily excluded liquid US Treasuries and deposits at Federal Reserve Banks from the calculation of the Supplementary Leverage Ratio (SLR), which is a risk-insensitive capital requirement.

mutual funds, and following the April 9 announcement, flows fully reversed (see figure 2 of Falato, Goldstein, and Hortaçsu (2021a), Ma et al. (2022)). Flows continued to rebound, showing a cumulative inflow of 9% between April and August of 2020 (Falato et al. (2021a)). Mutual funds holding more SMCCF-eligible bonds demonstrated a more substantial recovery. The seller's demand for immediacy dropped following the announcements (Kargar et al. (2021)).

The announcement of liquidity facilities had an immediate effect on all corporate bond prices. Boyarchenko, Kovner, and Shachar (2022) find that, during the first three days, the credit spread decreased by 155 and 92 bps for SMCCF-eligible and non-eligible corporate bonds, respectively. Transaction costs declined by 20 bps (from the height of 90 bps) within the first week and continued dropping, reaching 40 bps by mid-May, comparable with the February levels (O'Hara and Zhou (2021)). Haddad, Moreira, and Muir (2023) argue that at least half of the bond price reaction is attributed to the market expectations on the Fed's future interventions had the economic conditions deteriorated rather than the actual bond purchases by the liquidity facilities. Thus, the Fed's intervention can be treated as an effective financial stability tool in reducing the fragility of bond mutual funds (Falato et al. (2021)).

By mitigating the financial fragility of bondholders, the Fed's intervention further affected the primary market for corporate bonds. Firms with bondholders more exposed to the Fed's programs demonstrated higher bond issuance volume and lower spreads for newly issued bonds (Falato et al. (2021a)). Becker and Benmelech (2021) and Boyarchenko, Kovner, and Shachar (2022) show that the Fed's intervention significantly increased both bond and loan issuance, with the effect being more substantial for bonds. Becker and Benmelech (2021) conclude that the US bond market is a resilient source of external funding.

The turmoil of COVID-19 revealed an intriguing distinction between corporate bond mutual funds and ETFs. Although both types of investment vehicles suffered from massive asset redemptions, bond ETFs showed significantly lower outflow, suggesting that ETF is a more resilient structure than mutual funds (Falato et al. (2021)). Moreover, unlike bond mutual funds, where illiquid funds suffered the most, investment-grade ETFs demonstrated a higher price discount relative to NAV than high-yield ETFs. Haddad, Moreira, and Muir (2021) explain the massive sell-off of investment-grade ETFs by excess demand for liquidity as investors sold the most liquid instruments first during the crisis (Ma, Xiao, and Zeng (2022)).

The relative resiliency of ETFs is attributed to the difference in asset redemption mechanism. Contrary to mutual funds, only a subset of investors, known as authorized participants (APs), are allowed to exchange the ETF shares for portfolio bonds. The ETF-AP connections are very concentrated, with a median ETF being serviced by only four active APs (Gorbatikov and Sikorskaya (2022)). As a result, the ETF share mispricing and the magnitude of outflow crucially depend on the willingness of a small set of APs to engage in ETF arbitrage. When the bond market is illiquid, as it was the case during the COVID-19 crisis, purchasing underlying bonds from ETFs without the ability to quickly sell them can be costly for APs. Consistent with this argument, Pan and Zeng (2017) show that ETF arbitrage declines with bond market illiquidity, leading to continuous mispricing. Shim and Todorov (2023) further argue that only a part of the ETF's selling pressure propagates to the underlying portfolio bonds, as APs have incentives to protect the mark-to-market value of their inventories and avoid fire sales.[30]

In sum, a mismatch between liquidity supply and demand in the corporate bond market during March 2020 created enormous credit market instability. Corporate bond mutual funds with

[30] Unlike the COVID-19 crisis, during the Taper Tantrum of 2013, arbitragers engaged in ETF arbitrage, leading to flow-induced price pressure and temporary mispricing of the underlying bonds (Dannhauser and Hoseinzade (2022)).

more illiquid holdings suffered from larger asset redemptions, propagating to portfolio corporate bonds. According to Jiang et al. (2022), bonds predominantly held by fragile mutual funds in the pre-COVID-19 period suffered from more negative returns and consecutive reversal around March 2020. The historically unprecedented Fed intervention was effective in mitigating the liquidity mismatch and hence reducing the incentives for mutual investors to run (Falato et al. (2021)).

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. The 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 majorly affected the ability of financial and nonfinancial 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.

VI. Discussion and Conclusion

Nonbank lending in the US is growing fast across all the debt markets, ranging from small direct loans to corporate bond markets. This growth has been an unintended consequence of tighter bank regulation (see also Allen and Walther (2021)). The increasing reliance on nonbank lenders raises concerns about financial fragility in corporate debt markets, though. Nonbank lenders suffer from the excess volatility of their capital supply, which worsens during bad times, especially for those

institutions subject to runs. As a result, the capital constraints of nonbank lenders adversely affect the access to liquidity for borrowing firms, as was the case during the COVID-19 episode. On the other hand, nonbanks are faster and more efficient, leading to more convenient access to funds. Furthermore, these nonbanks often include more innovative features in their loan contracts. Thus, financial innovation has also played a substantial role in the increasing influence of FinTech in credit markets.

Structural changes in the credit markets, with more lenders subject to runs and invested in riskier and illiquid securities, have further increased the importance of liquidity risk management in financial intermediation. Through their interconnections with nonbank lenders, banks will also need to leverage financial markets' increasing dependence on short-term liquidity. The critical questions are what should be done about the possibility of runs on nonbanks, such as mutual funds, and the consequent threat of fire sales. Another concern is who will lend to smaller and riskier firms, which shifted their borrowing toward nonbank lenders, if these lenders disappear or become traditional lenders over time.

Mutual fund families realize the potential threat of runs and implement a variety of strategies to prevent them.[31] The academic literature explores the effectiveness of such tools. For instance, Chernenko and Sunderam (2016) show that mutual funds manage every dollar of inflows and outflows using 23–33 cents of cash instead of trading securities. In the cross-section, funds with more illiquid assets or volatile flows accumulate more cash. However, the authors argue that their cash holdings are insufficient to fully mitigate any price impact externalities that funds may exert on other market participants. Jiang et al. (2020) explore the dynamic properties of liquidity

[31] The list of strategies includes *dynamic liquidity management* (Chernenko and Sunderam (2016), Morris, Shim, and Shin (2017), Chernenko and Sunderam (2020), Jiang, Li, and Wang (2020)), liquidity provision by *affiliated funds of mutual funds* (Bhattacharya, Lee, and Pool (2012)), *interfund lending* (Agarwal and Zhao (2019)), and *redemption in kind* (Agarwal, Ren, Shen, and Zhao (2023)).

management and show that mutual funds use cash to manage asset redemptions in quiet times. In turmoil, managers sell both liquid and illiquid instruments and preserve the share of cash holdings in the portfolio. In contrast, Ma et al. (2022) show that bond mutual funds sold the most liquid instruments first during the COVID-19 chaos.

Acknowledging the vulnerability of mutual funds, the SEC adopted a new regulatory framework in 2016 requiring mutual funds and ETFs to classify and monitor the liquidity of individual portfolio holdings (Park (2021)). The SEC also permitted open-ended funds to use "*swing pricing*," which is an adjustment to a fund NAV allowing to pass on the trading cost to purchasing or redeeming shareholders. This pricing rule has a long history of implementation in European countries and is voluntary in the US. Jin, Kacperczyk, Kahraman, and Suntheim (2022) document the effectiveness of swing pricing on a sample of UK bond mutual funds. They show that it significantly reduces the sensitivity of outflows to poor performance, especially for funds with illiquid holdings.[32] The IMF's (2020) Global Financial Stability Report documents a lower outflow-induced price pressure in countries with swing pricing during March 2020.

Following the consequences of the COVID-19 crisis, in 2022, the SEC proposed to significantly tighten the regulation of open-ended funds regarding liquidity risk management.[33] Among the proposed changes are the mandatory implementation of swing pricing and maintaining a minimum cash reserve equal to 10% of their net assets for all mutual funds, except for money-market funds and ETFs. The effectiveness of current liquidity management during periods of high uncertainty or low liquidity raises many questions. An introduction of an alternative swing pricing scheme, along with the other proposed changes, could mitigate the concerns of flow-induced fire

[32] Capponi, Glasserman, and Weber (2020) provide a theoretical justification for these empirical findings. See also Capponi, Glasserman, and Weber (2022) for a detailed survey of the theoretical and empirical literature on swing pricing and the difficulties in the practical implementation of the pricing rule.
[33] For more details, see https://www.sec.gov/files/rules/proposed/2022/33-11130.pdf.

sales of underperforming bond funds.[34] The proposed changes sparked heated debate and strong pushback from the major asset management firms.[35]

The increasing role of nonbanks in loan market also raises concerns on financial stability. For example, Fleckenstein, Gopal, Gallardo, and Hillenbrand (2020) study the cyclicality of nonbank loans and show that it is the main driver of the decline in syndicated loan originations (and increase in loan spreads) during the credit tightening of both the Financial Crisis and the COVID-19 pandemic. They also show that, unlike in banking, where cyclicality is generally driven by banks' financial health and capitalization, nonbank lending cyclicality is driven by changes in inflows from their investors. For example, frictions in CLOs and mutual funds significantly contribute to the instability of nonbank funding and, hence, nonbank lending.

The unintended consequences of capital requirements for banks and insurance companies led many researchers to propose a macroprudential regulation, that is, regulators should impose similar capital requirements on a given type of credit exposure regardless of who holds it, a bank or a nonbank (see, e.g., Hanson, Kashyap, and Stein (2011), Plantin (2015), Martinez-Miera and Repullo (2019)). For example, Farhi and Tirole (2021) argue that prudential regulation should adjust to the emergence of nonbanks and 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. Designing macroprudential regulation that encompasses nonbank lenders presents a promising area for future research. We want to conclude our discussion with a quote from Stein's (2013) speech: "Since credit decisions are almost always

[34] Falato, Goldstein, and Hortaçsu (2021a) make a similar suggestion regarding swing pricing. Ma, Xiao, and Zeng (2022) further support the SEC's proposal for mandate swing pricing, arguing that mutual funds can hold less cash under the new pricing rule. See also their official letter to SEC https://www.sec.gov/comments/s7-26-22/s72622-20153065-320629.pdf.

[35] See the open letters from BlackRock (2023) and Vanguard (2023).

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."

Examining not only the short-term funding constraints of nonbank lenders operating under different regulatory regimes and their interconnections but also how they would behave when their typical high-yield borrower is in distress would be fruitful topics for further research.

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Figure 1: Small Business Lending by Banks with Total Assets Larger than $1 billion in the United States

This figure shows originations of small loans, with sizes of less than $1 million, to businesses and farms, both the number and dollar amount (in $ billions), by medium and large-sized banks (with assets larger than $1 billion) in the United States (updated versions of the figures from Bord, Ivashina, and Taliaferro (2021) and Cortes, Demyanyk, Li, Loutskina, and Strahan (2020)). The data set, which is from the Community Reinvestment Act (CRA), does not include lending by small banks or nonbanks.

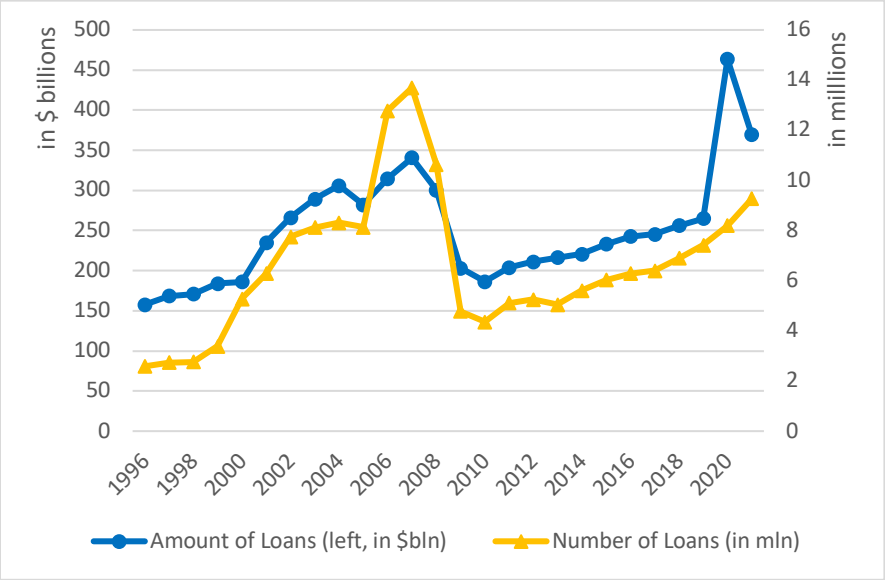
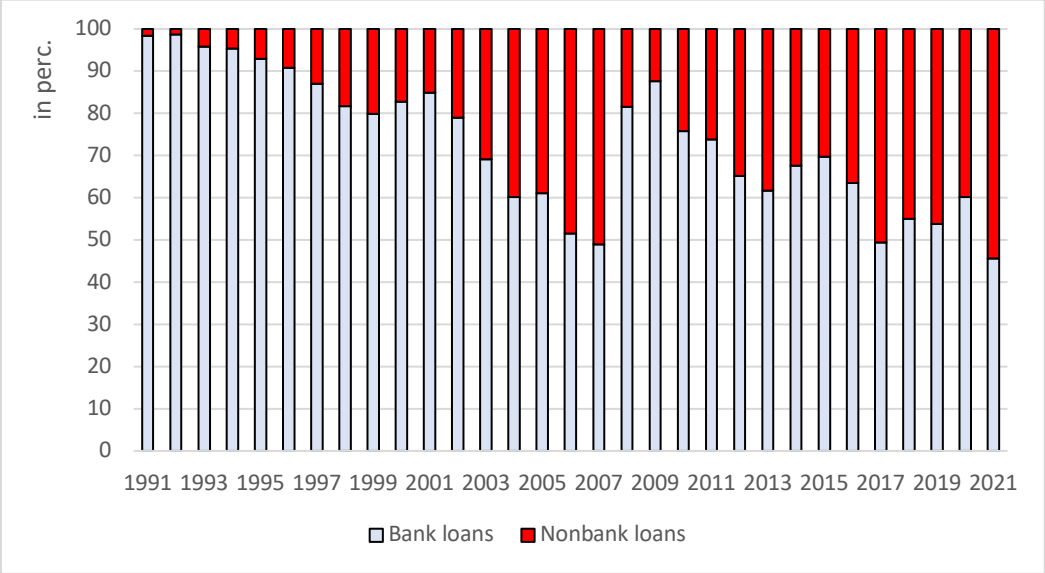


Figure 2: Nonbank Participation in Leveraged Loans

These figures present the time series of nonbank participation in the total volume of syndicated senior leveraged loans to nonfinancial firms in US currency. Leveraged loans are identified as syndicated senior loans to nonfinancial firms in US currency with a spread margin (over LIBOR) of 150 basis points or larger. Loans are flagged as Nonbank loans if they are term B-K loans. We get similar results if we use whether the Market Segment variable contains the words "Institutional" as a flag. The data source is Thompson Reuter's LPC (Dealscan). We include only new loans, not renegotiations. Various initial filters are used: nonmissing 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 Loans



Panel B: Total Volume of Leveraged Loans

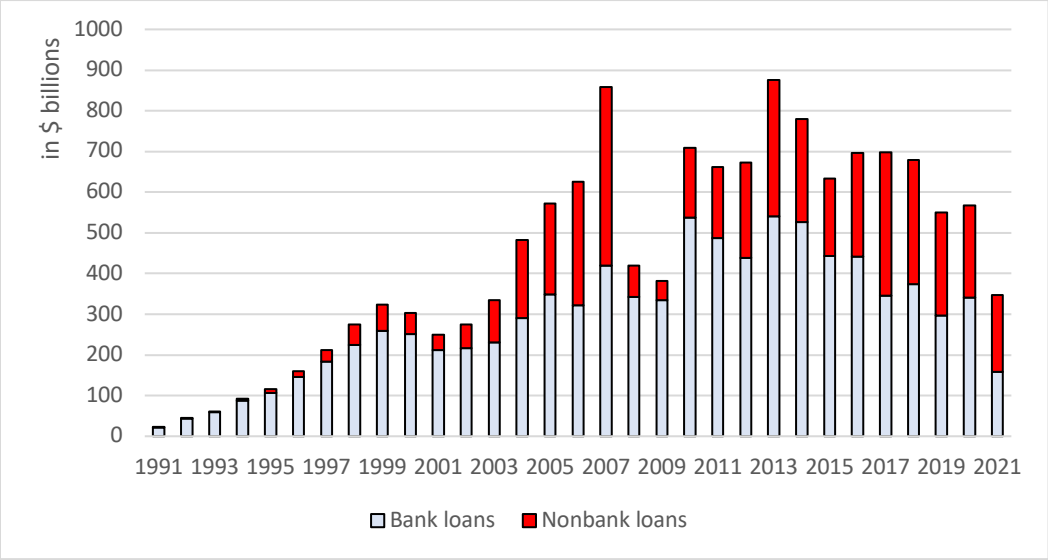
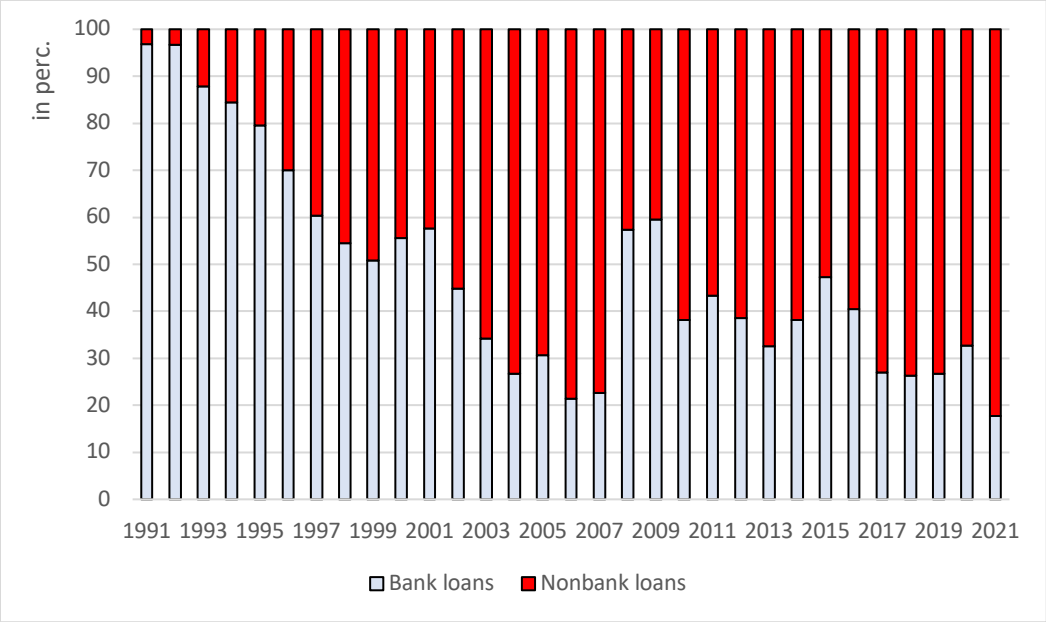


Figure 3: Nonbank Participation in Leveraged Term Loans

These figures present the time series of nonbank participation in the total volume of syndicated senior leveraged term loans to nonfinancial firms in US currency. Leveraged loans are identified as syndicated senior term loans to nonfinancial firms in US currency with a spread margin (over LIBOR) of 150 basis points or larger. Loans are flagged as Nonbank loans if they are term B-K loans. The data source is Thompson Reuter's LPC (Dealscan). We include only new loans, not renegotiations. Various initial filters are used: nonmissing 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

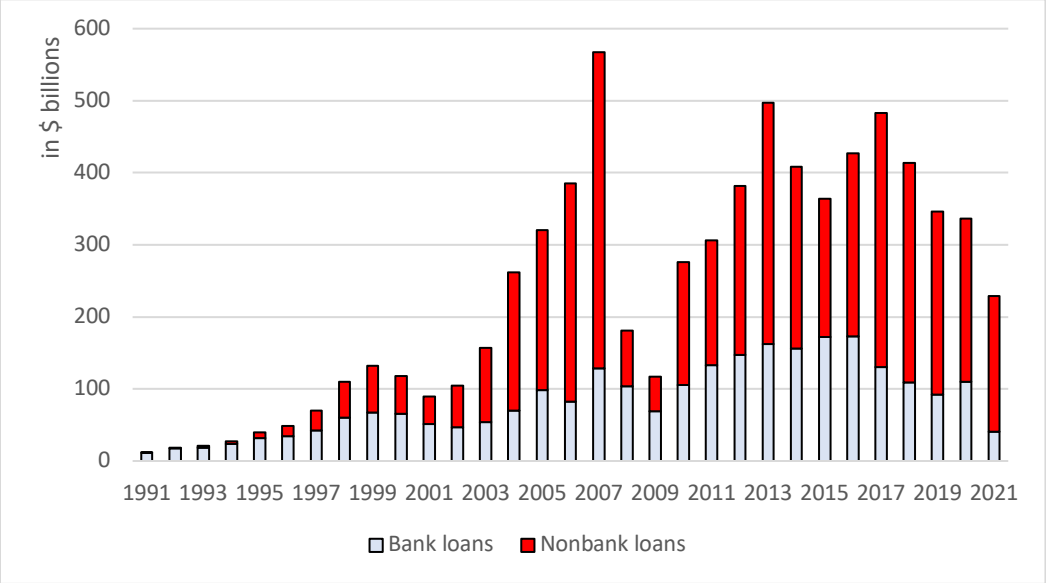
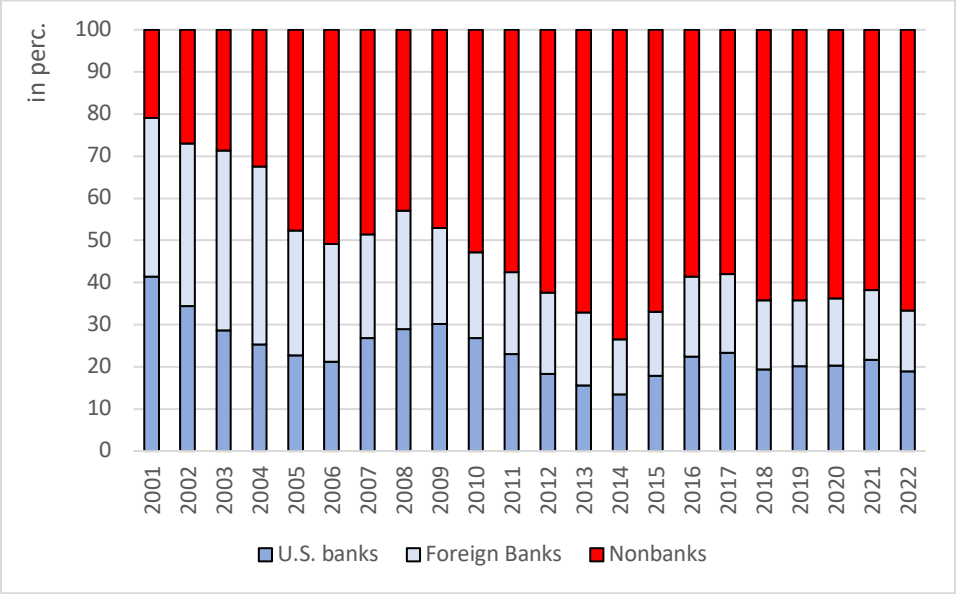


Figure 4: Nonbank Participation in Classified Loans (in SNC Data)

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.

Panel A: % of Nonbank Lenders in Classified Loan Commitments



Panel B: Total Volume of Classified Loan Commitments

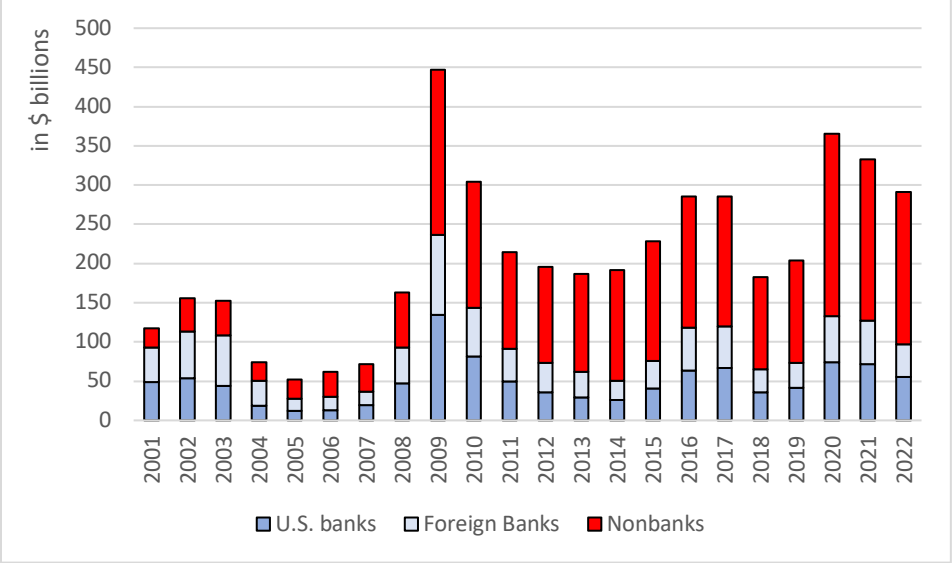


Figure 5: US Institutional Investors in the Corporate Bond Market
This figure shows the snapshots of US institutional holdings in the corporate bond market in 1990, 2001, 2007, and 2022. The data is from the US federal flow of funds account. Asset management category includes mutual funds, hedge funds, money market funds, exchange-traded funds, real estate investment trusts, and closed-end funds. Insurance category includes Life and P&C insurance companies. Households include households and nonprofit organizations. Depository institutions include banks, credit unions, and US-chartered depository institutions. Pension funds include private defined benefit and defined contribution pension funds, federal government retirement funds, and state and local government retirement funds.

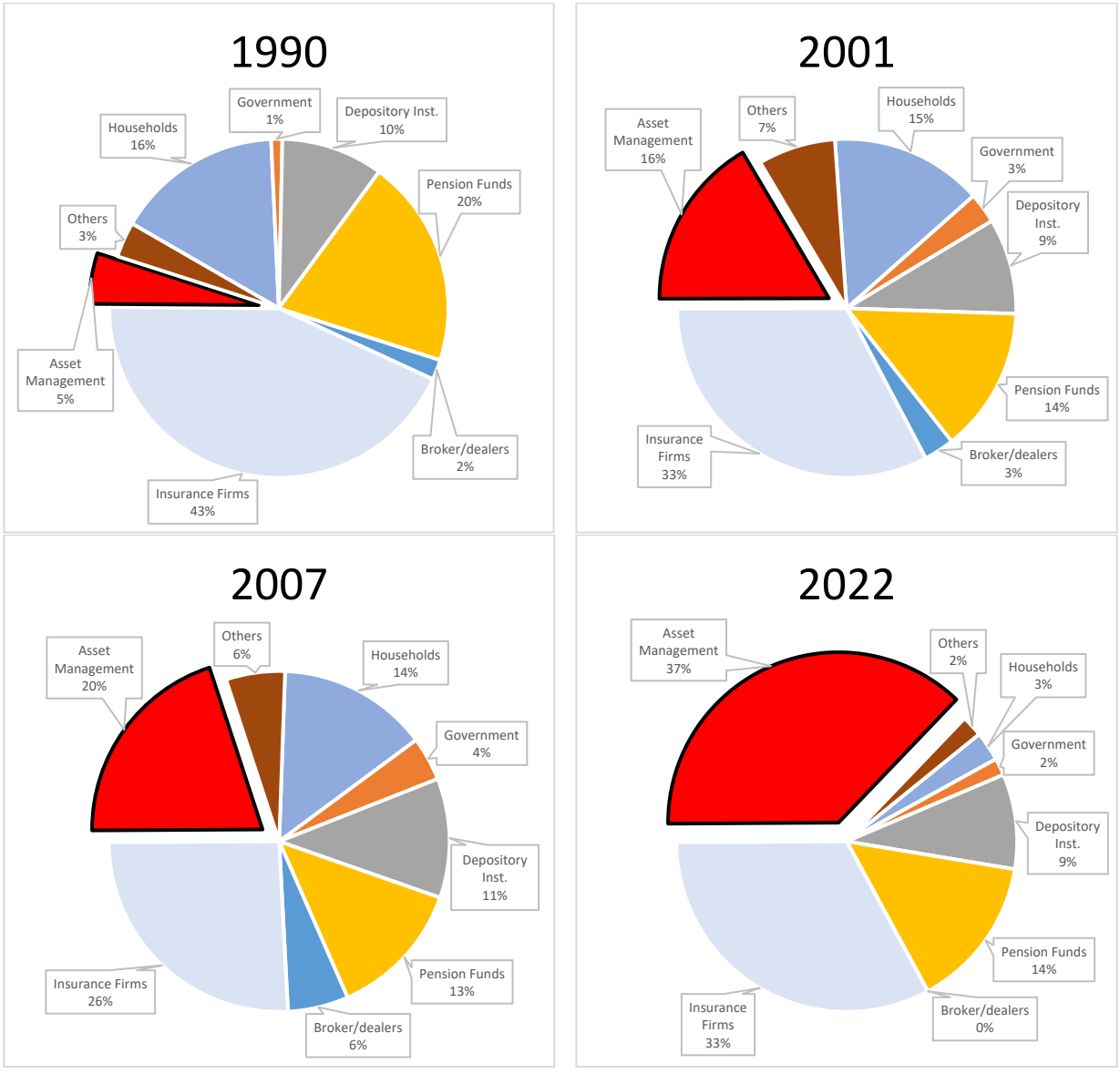


Figure 6: Bond Holdings of Insurance Companies and Mutual Funds by Credit Rating
This figure shows the share of institutional ownership of corporate bonds by insurance companies and mutual funds for different credit ratings as % of the amount outstanding. Insurance company bond holdings are from NAIC, and mutual funds are from the CRSP Mutual Fund Database. The time range is 2010q2-2020q2. Bond amount outstanding is from Thompson Reuters Eikon. Bond rating is from Mergent FISD and is calculated as the median 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.

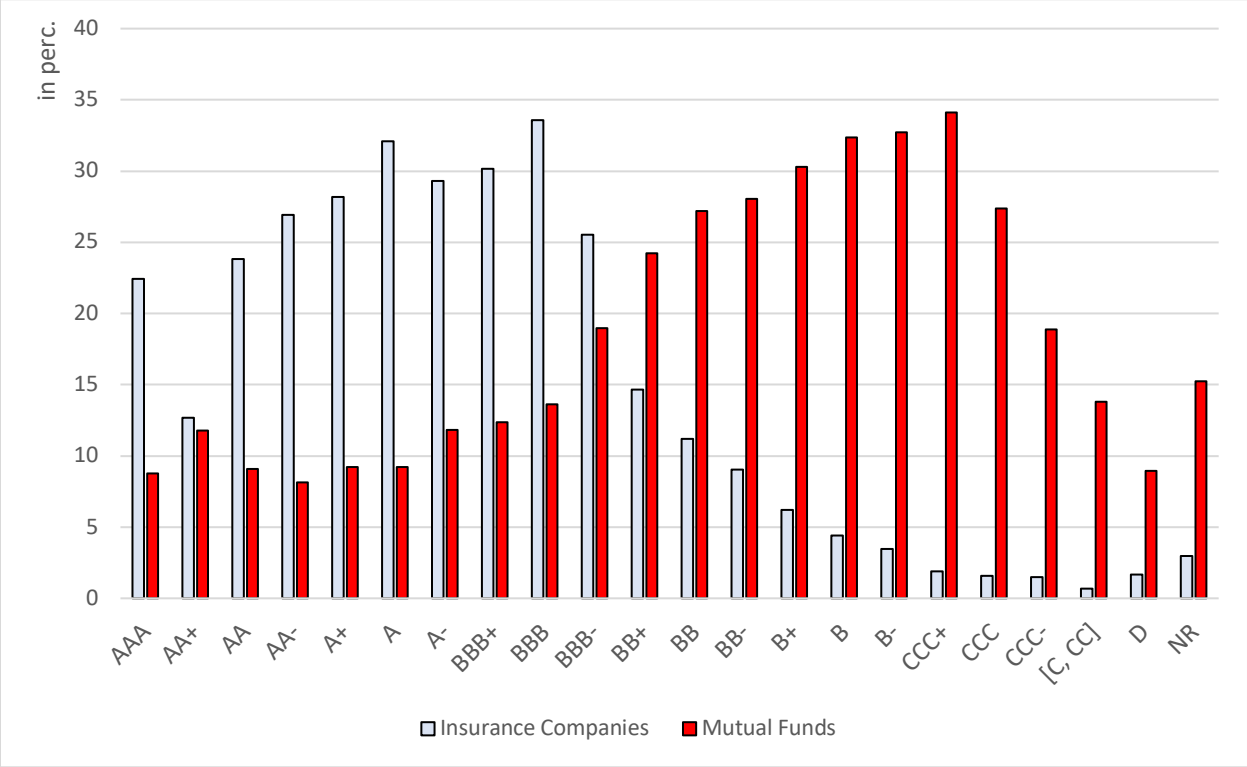
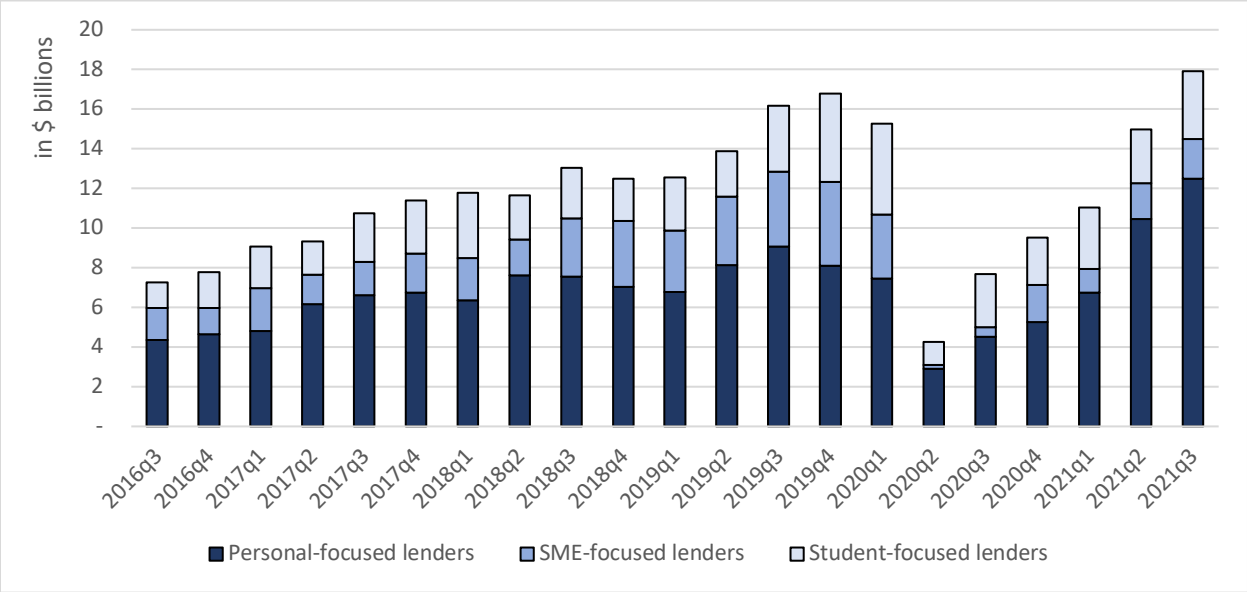
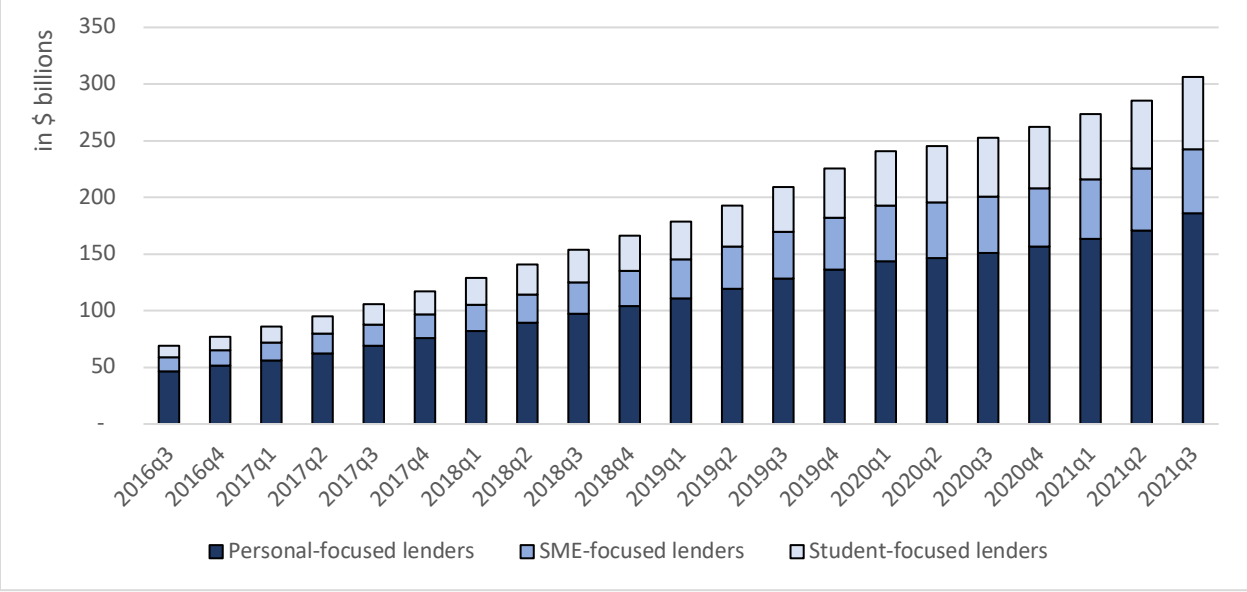


Figure 7: Collapse of FinTech Lending in March 2020 and Consecutive Resurrection
This figure shows the volume of lending by FinTech platforms that focus on personal loans, loans to small and medium-sized enterprises (SMEs) and student loans, respectively. Panel A presents the volume per quarter between the third quarters of 2016 and 2021, while Panel B shows the cumulative volume over this time period. Note that SME-focused loans do not include Paycheck Protection Program loans. Source: S&P Global Market Intelligence's US Digital Lending Report, February 2022.

Panel A: Loan Originations by US Digital Lenders



Panel B: Cumulative Loan Originations by US Digital Lenders



ONLINE APPENDIX

Evolution of Debt Financing toward Less-Regulated Financial Intermediaries in the United States*

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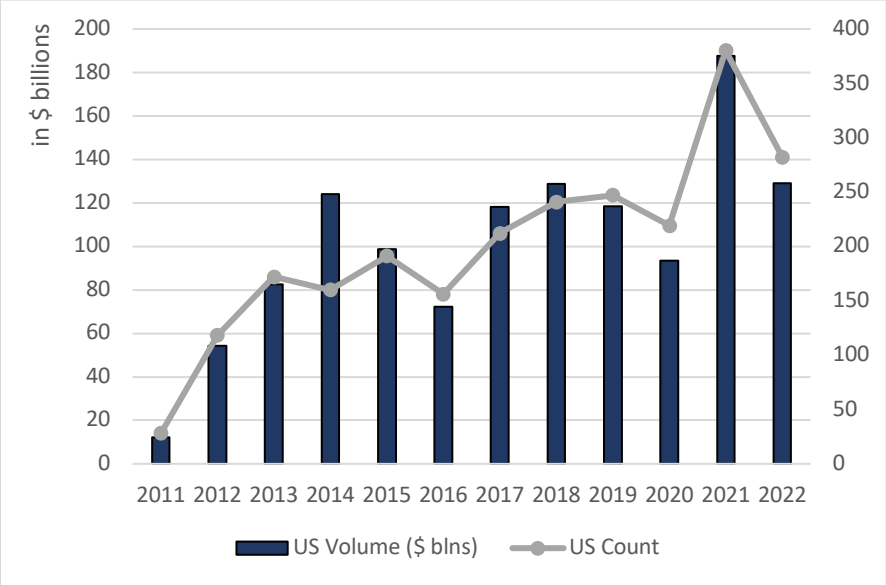
Figure OA.1: CLO Issuance and Cov-Lite Leveraged Loans

Panel A shows the growth of the CLOs in the United States. Panel B shows the time series of covenant-lite loans as a percentage of the leveraged syndicated loans in the US PitchBook classifies loans as leveraged if they are non-investment-grade rated or carry spreads of SOFR +125 or higher and secured by a first or second lien.

Source, Panel A: LCD

Source, Panel B: https://pitchbook.com/leveraged-commentary-data/leveraged-loan-primer#second-lien

Panel A: CLO Issuance



Panel B: Covenant-Lite Loans

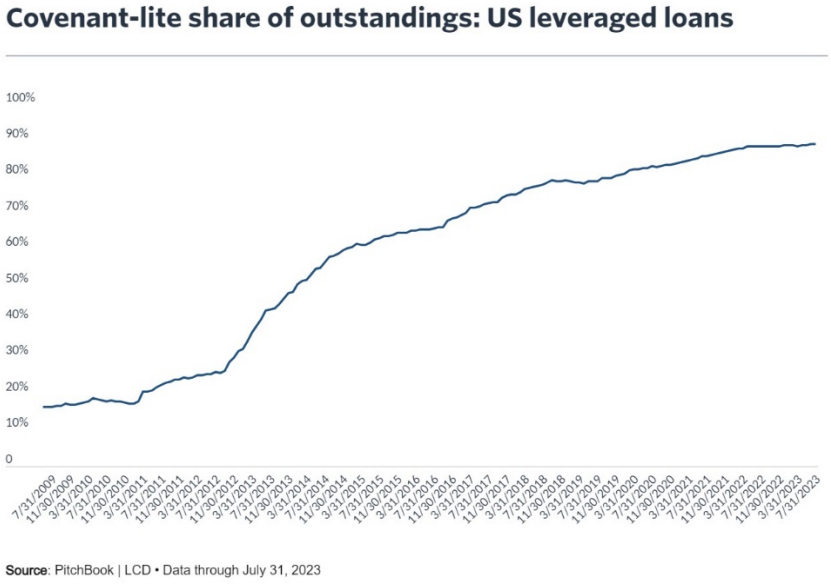
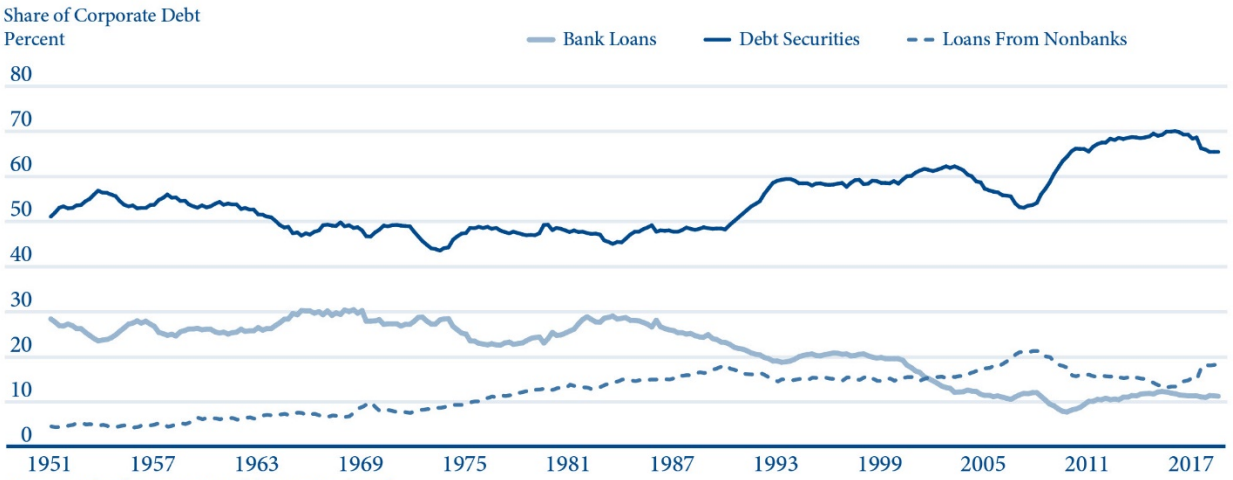


Figure OA.2: Corporate Borrowings in the United States

This figure presents a time series of the shares of different forms of corporate borrowings --debt securities, bank, and nonbank loans-- in the 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



Source: Federal Reserve Board (Haver Analytics).

Notes: Bank loans do not include mortgages. Data are through second quarter 2019.

Figure OA.3: Bond Holdings of US Mutual Funds and ETFs
This figure shows the time series of bond holdings of mutual funds and ETFs. The data is from the US federal flow of funds account.

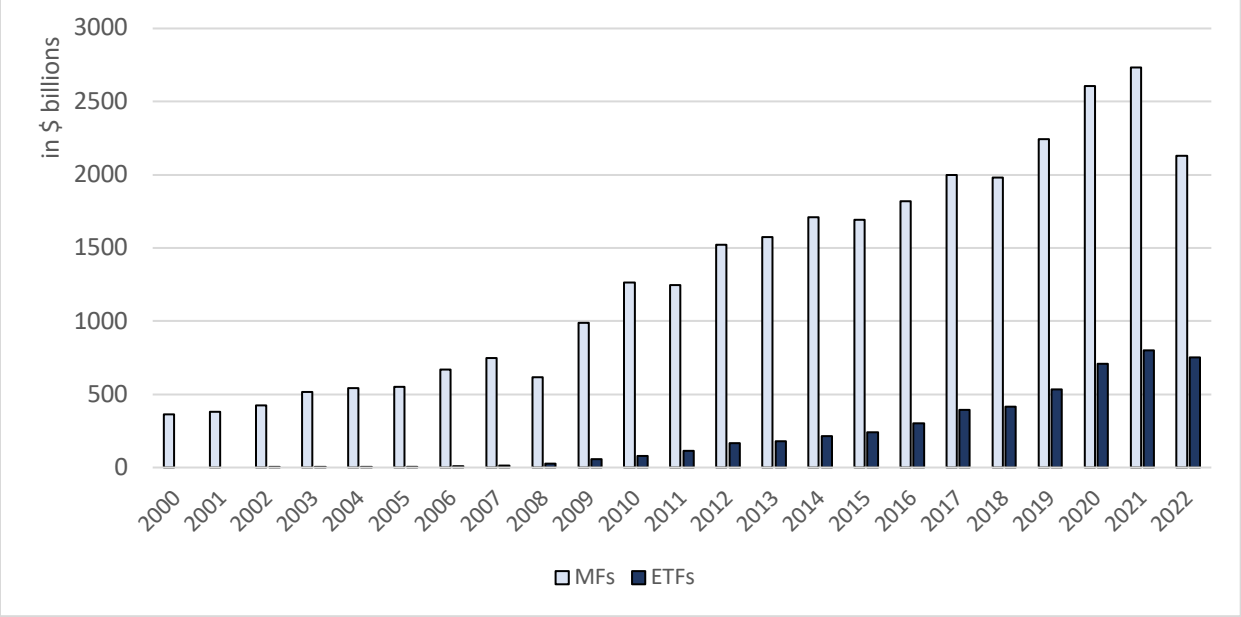


Figure OA.4: Volume of Bond Issuance Across Time
This figure shows the time series of the investment-grade (IG) and high-yield (HY) bond issuance in the United States. Data is from Sifma.

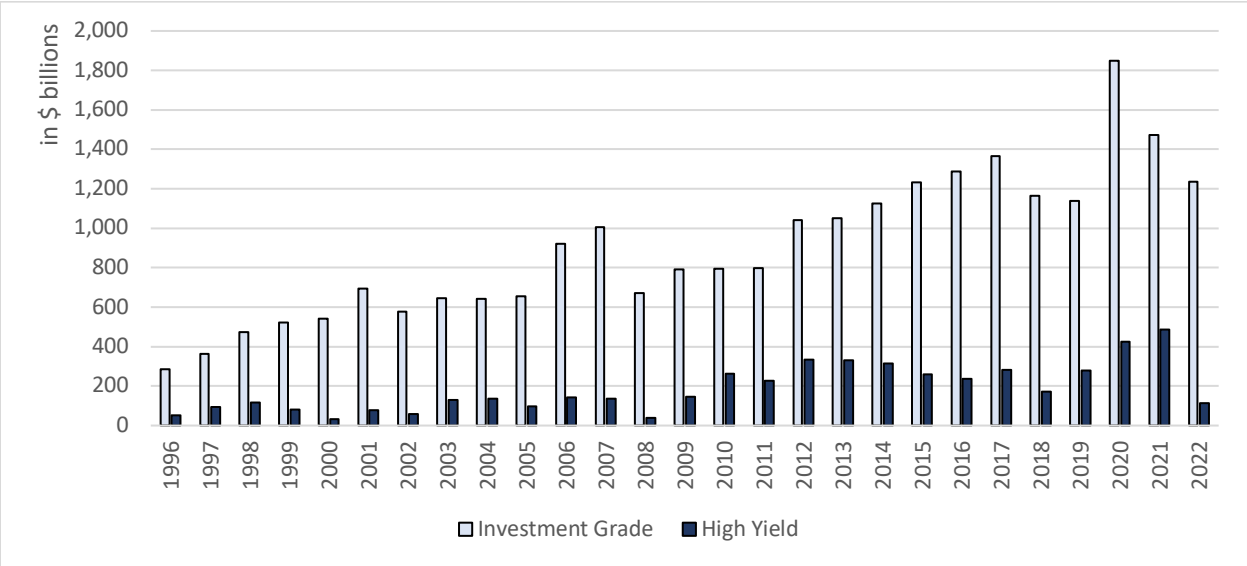
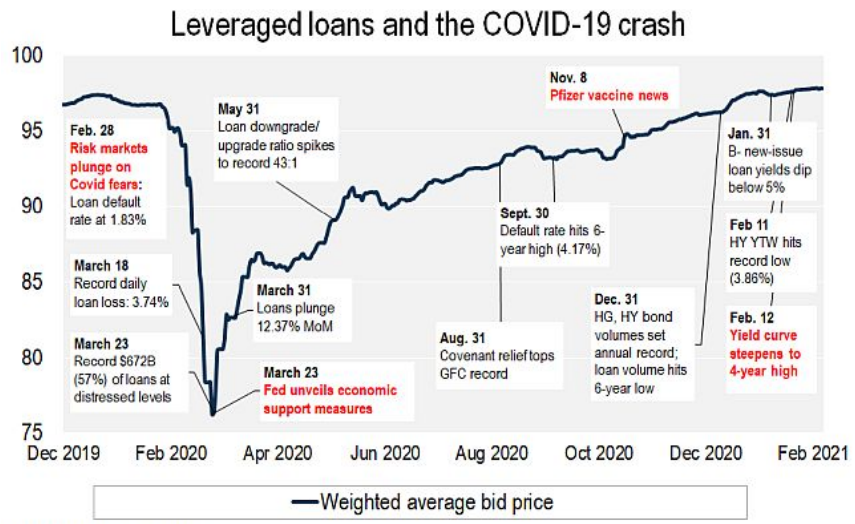


Figure OA.5: Leveraged Lending in the COVID-19 Era

These figures plot the dynamics of loan issuance around and during the COVID-19 crash. See 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

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 March 14, 2021. March 2021 data is 30 days through March 14.
Source: LCD, an offering of S&P Global Market Intelligence

Figure OA.6: Net Inflows to US Fixed-Income Mutual Funds Over Time.
This figure shows the time series of monthly net inflow to domestic and foreign US fixed-income mutual funds. Graphs are constructed using the CRSP Mutual Fund Database. The sample is restricted to the following investment styles defined via the crsp_obj_cd variable: I, ICQ, and IF.