Crowding Out Bank Loans: Liquidity-Driven Bond Issuance*

Olivier Darmouni
Columbia Business School

Kerry Y. Siani
Columbia Business School

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Abstract

According to conventional wisdom, banks play a special role in providing liquidity in bad times, while capital markets are used to fund investment in good times. Using micro-data on corporate balance sheets following the COVID-19 shock, we provide evidence that instead, the corporate bond market is central to firms' access to liquidity, crowding out bank loans even when the crisis did not originate in the banking sector. We first show that, contrary to good times, bond issuance is used to increase holdings of liquid assets rather than for real investment. Second, most issuers, including many riskier "high-yield" firms, prefer issuing bonds to borrowing from their bank. Over 40% of bond issuers leave their credit line untouched in 2020Q1. Moreover, a large share of bond issuance is used to repay existing bank loans. This *liquidity-driven* bond issuance suggests that the V-shaped recovery of bond markets, propelled by the Federal Reserve, is unlikely to lead to a V-shaped recovery in real activity.

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Introduction

Liquidity has always been a central topic in corporate finance, and the recent "dash for cash" that followed the COVID outbreak has put this issue at the forefront of the crisis [Acharya et al., 2012, Li et al., 2020]. The textbook view emphasizes the role of the banking sector in providing liquidity in bad times, while capital markets fund investment in good times. Banks have a comparative advantage for providing liquidity both because credit lines are committed in advance and because bank loans are funded by deposits [Holmström and Tirole, 1998, Kashyap et al., 2002, Gatev and Strahan, 2006]. However, corporate bond issuance reached historical heights in the spring of 2020, even though the banking sector was healthy. This surge was partly due to a spectacular change in the Federal Reserve credit policy that supported the corporate bond market directly for the first time. This episode raises the question: What is the role of the bond market in providing liquidity in bad times? How do firms choose between borrowing from banks versus the bond market? What are the implications for monetary policy?

This paper sheds light on these questions through the lens of bond issuance, i.e. the primary market for corporate bonds. While it is clear that the Federal Reserve has revitalized *markets*[1], there are still some open questions regarding the net effects on *firms* and the real sector. Our approach is to understand aggregate issuance dynamics through the lens of micro-data on bond issuers' balance sheet. Importantly, we examine data that include the latter part of the crisis through June 2020, not only the March-April period. We provide evidence that, contrary to the textbook view emphasizing the role of banks, the corporate bond market is central to firms' access to liquidity, in two ways. First, unlike in good times, bond issuance was used to increase holdings of liquid assets rather than real investment. Second, bond issuance crowded out bank loans although the the crisis did not originate in the banking sector, even for many "high-yield" riskier firms. These findings question the comparative advantage of

[1]See for example Haddad et al. [2020], Boyarchenko et al. [2020], Falato et al. [2020], Kargar et al. [2020], O'Hara and Zhou [2020], Gilchrist et al. [2020], Liang [2020].

banks in liquidity provision, and have implications for the real effects of bond issuance and the new Federal Reserve credit policy.

We first show that, propped up by the Fed, the bond market lent extensively to firms in this period. While spreads rose before falling, closely following secondary markets (see Figure 1), the dynamics of volume were extraordinary. Both investment-grade (IG) and high-yield (HY) markets reached historical heights in the post-March 2020 period. As of end of May 2020, investment grade (high yield) issuance reached over $500 billion ($120 billion), compared to just over $200 billion ($90 billion) over the same period last year.[2] This amounted to a remarkable "V-shaped recovery" in bond markets in a matter of weeks, including for riskier firms that were shut out for no more than a few weeks. Interestingly, HY bond issuance extended beyond issuers eligible for direct Federal Reserve purchases, suggesting an important role for ETF purchases and a broad commitment to "backstop" the market.

While this surge in issuance is striking, there are still open questions about how it ultimately affected firms and the real sector. We argue that a necessary first step to trace out the real effects of issuance flows is to understand how firms' balance sheets are affected. For this purpose, we link the issuance data with firm-level financial statements and capital structure information. While these data are imperfect, balance sheet adjustments are nevertheless indicative of underlying economic forces. Broadly speaking, we are interested in understanding (i) what firms do with the funds raised from the bond market, relative to normal times, and (ii) how bond issuance interacted with bank financing.

We start by documenting that during COVID, firms used the bond market differently than in normal times. First, while in normal times, firms follow an issuance pattern and raise bonds when they have lower cash balances and debt coming due, firms issuing during COVID raise bond capital earlier in their bond financing cycle and have less debt coming due. Second, we document that after issuance, COVID-era issuers are more likely to hoard cash rather than invest in real assets. In addition, firms were less likely to pay out to equity holders after

[2]Includes U.S. firms and firms that issue in USD and report financial statements in USD.

issuing during COVID. To document these facts, we examine quarterly changes in firms' assets following issuance during the COVID period: March 1 - May 31 2020. We draw comparisons to normal times using data from 2010-2019. A reasonable concern with identifying unique aspects of COVID issuance is that the firms that were able to issue bonds during this period may be different than bond issuers in normal times. To overcome this issue, we control for potential bond market selection bias towards stronger firms by estimating within-firm regressions that further account for macroeconomic fluctuations by absorbing industry-quarter fixed effects. Our findings lend credence to the hypothesis that a large share of issuance was "precautionary" and thus unlikely to be immediately reinvested in the firms. For example, Chevron issued $650 million in bonds on March 24th, but is cutting its 2020 capital spending plan by $4 billion. Moreover, by comparing bond issuer balance sheet adjustments during COVID to those during the 2008 financial crisis, we find that the use of bond capital to increase liquidity is a new phenomenon, suggesting a secular shift in the use of corporate bonds.

We then document that, even though the shock did not originate in the banking sector, bond issuance crowded out bank loans, in two ways. We first show that many firms left their existing credit lines untouched while issuing bonds instead. For example, Chevron had $5 billion in credit line available at the beginning of 2020, yet it still issued $650 million in bonds. Strikingly, this behavior includes many riskier HY firms: almost 40% of HY issuers received no new net bank funding between January and March. Only 19% had maxed out their credit line by end of March, and the average draw-down rate was below 40%. Many of these riskier firms had available "dry powder" from banks, arranged before the crisis, that they did not use. The pattern is even stronger for IG firms, which represent the bulk of aggregate issuance in this period, with over 60% not drawing on their existing credit lines. In aggregate, the amount of undrawn bank credit available at the beginning of 2020 was larger than the total funds raised from bond issuance. HY issuers in our matched sample issued $93 billion in bonds while having $156 billions of undrawn credit available. The gap is also large for IG issuers.

Second, we show that a large share of issuers that did borrow from their bank early in the crisis repaid by issuing a bond in the following weeks. While over 60% of HY firms that issued in March-July received bank funds in March, two-thirds of these repaid some amount after their bond issuance. Over 40% actually repaid their credit line in full, and only a few borrowed additional funds from banks in the second quarter. For example, Kraft Heinz, which was downgraded from IG to junk in February 2020, drew $4 billion from its credit line between February and March. In May, it issued $3.5 billion in bonds (up from a planned $1.5 billion, due to strong investor demand) and used these funds to repay its credit line. In six months, the share of Kraft's credit coming from banks went from zero to 12% and then back to zero. We find that Kraft is far from an isolated example: among HY issuers repaying bank loans, the median firm paid back 100% of its Q1 borrowing, representing 60% of their bond issuance. In aggregate, a full quarter of HY firms' bond proceeds went to pay back bank loans. The pattern is similar for IG firms, although a smaller share drew on their credit lines in the first place. We estimate that at least $75 billion was repaid by bond issuers to banks between April and July 2020. Moreover, the majority of the Federal Reserve single-name corporate bond portfolio consists of issuers that had access to bank funds which they did not draw.[3]

The last part of the paper discusses the interpretation of these findings and their implications. We argue that the importance of *liquidity-driven bond issuance* in bad times is key to explaining the events of the first half of 2020. In the face of temporary cash-flow shocks, firms borrow to build liquidity buffers or refinance debt but not to invest. Liquidity-driven debt issuance thus spikes *because* the real recovery is slow, not in spite of it, while investment-driven debt issuance is delayed. Moreover, bonds were revealed preferred to bank loans by most firms. Interestingly, unlike the previous crisis, the shock did not originate in the banking sector. Instead, it is apparent that the Federal Reserve unprecedented intervention in bond markets has at least partially eliminated one key aspect of banks' specialness: the implicit and explicit government support they receive. In order to explain the strict preference for bond

[3]Based on Federal Reserve portfolio as of July 31, 2020, as reported on August 10, 2020. https://www.federalreserve.gov/monetarypolicy/smccf.htm

financing, we argue that bonds are more *committed* than loans: bonds have longer maturities and fewer covenants that can be passively violated, implying a more nuanced perspective on the value of bank "flexibility" relative to market financing. Moreover, it is not obvious that the bond-loan spread widened significantly, reinforcing the idea that non-price terms, such as maturity and covenants, were a key driver of firms' preference for bonds over loans in these times.

Lastly, we draw some implications for central bank intervention. First, our evidence shows that it is important to account for the crowding out of bank loans when evaluating the aggregate effects of these new public programs on the real economy. For the majority of issuers, propping up bond markets does not alleviate a hard credit constraint, since they have available bank funding. Preventing large credit line draw-downs is nevertheless valuable for at least three reasons: it guarantees a longer-term funding source for firms, it helps weaker issuers to "keep their powder dry," and it reduces balance sheet constraints on banks. However, the benefits of supporting the bond market directly by extending lender of last resort policies beyond the banking sector must be balanced against potential losses on central bank bond holdings or asset prices distortion leading to excessive risk-taking. This is an important area for future research.

Related Literature Our first contribution is to provide evidence that the bond market is a key source of liquidity in bad times for large firms. Broadly speaking, the conventional view suggests that banks are the primary source of funds in bad times. Banks hold large amounts of deposits [Kashyap et al., 2002], receive deposit inflow in bad times [Gatev and Strahan, 2006], and can provide liquidity insurance by arranging funding ahead of time via credit lines [Holmström and Tirole, 1998, Acharya et al., 2018]. While it is well established that large firms tend to prefer to borrow from capital markets for investment purposes, our evidence shows they also prefer it for liquidity purposes. Like bank credit, the bond market plays a dual role that varies over the cycle: it funds investment in good time and builds liquidity

buffers in bad times.[4]

Many studies have used the recent COVID crisis as a testing ground for how firms access liquidity in bad times. However, although existing works tend to focus on the first part of the crisis (until early April), we also examine the latter part of the period, spanning May to July. This period is crucial to understand the underlying economics: it allows us to study the crowding out of bank loans as well as the behavior of HY firms that almost exclusively issued in the second quarter. Li et al. [2020] document the importance of bank lending for corporate liquidity at the height of the crisis. Looking at the whole period of March - July, we find that (1) not all firms seeking liquidity drew down on bank loans, and (2) many firms later tap bond markets to replace their outstanding bank loans. We relate closely to Acharya and Steffen [2020b] which studies how the prevalence of cash, credit line draw-downs and bond issuance vary in the cross-section of firms, highlighting the significant impact of credit risk on corporate cash holdings up until mid-April. We further map out balance sheet adjustments of these bond issuers in the months following the initial crisis, allowing us to infer how firms deployed bond capital. We also relate to recent work on secondary bond markets [Haddad et al., 2020, Kargar et al., 2020, O'Hara and Zhou, 2020, Falato et al., 2020, Gilchrist et al., 2020, Liang, 2020, Flanagan and Purnanandam, 2020], bond issuance [Boyarchenko et al., 2020, Halling et al., 2020a], credit lines draw-down [Greenwald et al., 2020, Chodorow-Reich et al., 2020, Bosshardt and Kakhbod, 2020] and the value of financial flexibility [Fahlenbrach et al., 2020]. Brunnermeier and Krishnamurthy [2020a], Brunnermeier and Krishnamurthy [2020b] and Crouzet and Tourre [2018] show that the effect of the crisis as well as the appropriate response depends on the underlying frictions in corporate financing.

The focus of this paper is the role of the bond market in bad times. It thus relates to a long line of work on the choice of bank vs. bond financing [Bolton and Scharfstein, 1996,

[4]Corporate liquidity management is a central topic in finance research, and has received considerable attention. See for instance Almeida et al. [2004], Eisfeldt and Muir [2016], Bolton et al. [2011], Graham and Leary [2018], Acharya et al. [2012], Opler et al. [1999], Bates et al. [2009], Denis and Sibilkov [2010], Riddick and Whited [2009], Foley et al. [2007] or Almeida et al. [2014] for a survey. Ivashina and Scharfstein [2010] study bank lending during the financial crisis.

Diamond, 1991, Rajan, 1992]. The conventional view, based on the Great Recession, is that firms substitute towards bonds and away from loans in bad times because banks' balance sheets weaken, driving down loan supply [Becker and Ivashina, 2014, Crouzet, 2017, De Fiore and Uhlig, 2015, Schwert, 2018, Adrian et al., 2013, Halling et al., 2020b]. The COVID crisis, which did not originate from the banking sector, shows that this is not the only force at play in driving firms' preference for bonds.

Finally, our paper contributes to the ongoing debate about the efficacy of monetary policy, and specifically measures aimed at the corporate bond market.[5] Our evidence supports intervention in the corporate bond market, given that it is a key source of liquidity in bad times, extending the traditional lender of last resort policy beyond the banking sector. However, the crowding out of bank loans we document matters when evaluating the aggregate effects of these new public programs on the real economy.

1 Background and Data

The scope of this paper is to understand the role that the corporate bond market plays for firm liquidity in both good and bad times. We use the period surrounding COVID as a testing ground for bad times. Due to mandated COVID-related lockdowns, many firms faced significant reductions in operating income in spring 2020. (De Vito and Gomez [2020], OECD [2020]) As cash-generating operations halted, firms resorted to a variety of measures to alleviate severe cash shortfalls. Many large firms, such as General Electric, Boeing, and Airbnb slashed operating expenses by cutting down their workforce, while others suspended dividends.[6] In late March, media outlets reported that more than 130 companies in the U.S.

[5]This includes work on quantitative easing [Grosse-Rueschkamp et al., 2019, Ertan et al., 2019, Giambona et al., Todorov, 2020, Arce et al., 2018, Lhuissier and Szczerbowicz, 2018, De Santis and Zaghini, 2019, Siani, 2019] as well as monetary policy more generally [Kashyap et al., 1996, Crouzet, 2019, Darmouni et al., 2019, Ippolito et al., 2018, Holm-Hadulla and Thürwächter, 2020, Bolton and Freixas, 2006, Elliott et al., 2019].

[6]Sources: "GE to Cut 10% of Aviation Workforce as Coronavirus Grounds Airliners"; *Wall Street Journal*, 03/23/2020; "Boeing Cuts Its Workforce Due To The Coronavirus Crisis", *NPR*, 04/29/2020; "Airbnb Cuts 1,900 Jobs, 25% Of Its Workforce, As Pandemic Freezes Travel" *NPR*, 05/05/2020. Many firms reduced payouts to equity: Ford Motor Co. and Freeport-McMoRan Inc. suspended dividend payments while AT&T

and Europe drew down over $125 billion in bank debt.[7] Acharya and Steffen [2020b] find that by April 9, close to 70% of originally available credit lines were drawn down. Moreover, Li et al. [2020] document that the weekly growth rate in bank lending hit over 6%, the highest rate in recorded history.

Internal funds and bank lending are natural sources of liquidity in bad times. The textbook view emphasizes the role of the banking sector to fund negative liquidity shocks [Kashyap et al., 2002, Bolton et al., 2016], either because (1) credit lines are arranged in advance (liquidity insurance) [Holmström and Tirole, 1998], or (2) deposit inflows may increase in bad times (flight to quality) [Gatev and Strahan, 2006]. What is novel about the COVID period, however, is how heavily and widely firms relied on bond capital for liquidity needs. Despite significant volatility in credit spreads, firms issued bonds at record volumes in March - May 2020. At the start of the crisis, only firms with higher credit ratings were able to issue bonds at substantially elevated spreads [Acharya and Steffen, 2020b], while riskier firms with sub-investment grade credit ratings were shut out of the market. That led to an unprecedented change in the Federal Reserve credit policy with the introduction of programs to support this market directly for the first time in spring 2020.[8] What followed was a remarkable recovery of both investment grade and high yield corporate bond issuance. In this paper, we track this wave of bond capital raising and compare how firms use bond proceeds during the liquidity crunch of COVID versus during normal times.

To this end, we construct a panel data set covering all U.S. non-financial bond issuers from January 2000 to June 2020. Bond-level issuance data comes from Mergent FISD, which includes detailed issuance-level data on corporate bond offerings, and is combined with bond

halted share repurchases. "Companies Race for Cash in Coronavirus Crisis", *Wall Street Journal*, 03/23/2020

[7] "Dash for cash: companies draw $124bn from credit lines", *Financial Times*, 03/25/2020.

[8] Through the Primary Market Corporate Credit Facility (PMCCF) and Secondary Market Corporate Credit Facility (SMCCF), the Federal Reserve pledged a combined $750 billion to the purchase of corporate bonds and bond ETFs. The facility is backed by $75 billion of equity capital from the Department of Treasury. While the primary focus of these programs was to purchase investment grade securities, on April 9, 2020, the Fed announced that high yield ETFs and certain recently downgraded firms would also be eligible. See the Fed's statement and Boyarchenko et al. [2020] and Gilchrist et al. [2020] for an analysis of the program and corresponding announcement effects.

auction data from Credit Flow Research (CFR). We restrict the sample to U.S. dollar bonds of at least $100 million face value issued by firms that report in U.S. dollars. In line with much of the empirical literature on corporate bond issuance, we exclude financial, sovereign, and utility issuers. We further exclude convertible bonds, capital impact bonds, community bonds, PIK securities, and bonds issued directly in exchange for an identical bond.[9] We merge the issuance data with quarterly balance sheet data from Compustat and hand-collected debt composition from Capital IQ. For the analysis on firm balance sheet adjustments, we include only those issuers we can match to Compustat. The filters leave us with 1,485 unique issuers issuing 9,754 bonds for which we have quarter-end balance sheet data.[10] For the firms that issued during COVID, 38% have data available for the second quarter following issuance; for the rest of the firms, second quarter data has not yet been reported.[11] Tables 1 and 2 display summary statistics of our baseline sample.[12] In a typical week in 2019, a median of five IG firms issued $6 billion in bonds while a median of five HY firms issued $4 billion. In normal times, the median bond size is $500 million with an eight year tenor and yield of 5%.

[9]Convertible issuance was particularly strong in early 2020: "Convertible bond issues surge in coronavirus-hit market", Reuters, July 3, 2020. In our main analysis, we exclude convertible bonds, however including convertible issuance has no significant effect on our results. Bonds associated with the T-Mobile / Sprint acquisition in April 2020 are also excluded

[10]To compare covenants between bonds and loans for the same issuers, we add loan data from WRDS-Thomson-Reuters' LPC Dealscan: 524 of the issuers have a loan (defined as one of the following: 'Revolver/Line', 'Standby Letter of Credit', 'Revolver/Term Loan','364-Day Facility') available as of end of 2019. We use the Chava and Roberts [2008] link to match bond issuers to loans.

[11]We are able to match 85.6% of bonds in our sample to firms in Compustat. 48% of unmatched bonds are foreign issuers. The rest do not have reported financials in Compustat in the quarters of issuance. For balance sheet analyses, we include only the 91% of matched issuing firms that either report financial statements in U.S. dollars or are domiciled in the U.S.

[12]Firms that issue in bond markets are on the larger end of the distribution of all firms. In 2019, the median bond issuer had $10.8 billion in total assets and $1.4 billion in quarterly revenues at year end, compared to the median Compustat firm with $1.7 billion in assets and $216 million in quarterly revenues.

2 Bond Issuance during COVID

2.1 Record aggregate issuance volumes

A striking fact about the COVID episode is that the dynamics of volume were extraordinary. Propped up by the Federal Reserve announcements, the bond market lent extensively to firms. Figures 2 and 3 show that both investment-grade (IG) and high-yield (HY) markets reached historical heights in March and April 2020. The riskiest firms issued over $120 billion in USD high yield bonds in January-May 2020, compared to over $90 billion in the same period in 2019, despite a three-week hiatus in March 2020. Similarly, IG bond issuance hit over $500 billion in volume issued by 204 unique firms by May, compared with over $200 billion over the same period in 2019.

IG firms began issuing early on during the COVID crisis despite significant spikes in credit spreads (see Figure 3). Figure 4 shows weekly spread dynamics separately for investment-grade (IG) and high-yield (HY) issuers during this period. Average weekly spreads for IG bond issuers increased by over 200 bps from February to March before falling back to levels slightly elevated above pre-COVID levels.[13]

While IG issuance was robust even prior to the Fed's announcement to support corporate bond markets, Figure 3 shows that high yield issuers were buoyed significantly by the Fed. However, note that the increased volume of HY issuance extended beyond issuers eligible for direct Federal Reserve purchases. Indeed, direct purchase of HY bonds is restricted to "fallen angels" issuers that were classified as investment grade as of March 22, 2020.[14] As of the end of May, the only firms eligible under the Fed's bond-buying criteria that had actually issued bonds were Ford Motor Co. and Macy's Inc. This gap suggests an important role for ETF purchases and a broad commitment to "backstop" the market, in line with some of the

[13] Compared to credit spread spikes around the 2008 financial crisis, these fluctuations are moderate. Between November 2008 and January 2009, average IG bond spreads on new bonds averaged well over 600 basis points in some weeks. See Figure 5 for more historical context.

[14] According to the Fed disclosure on April 9, in order to be eligible, a firm needed a plurality of agencies to rate it IG (BBB- and above) as of March 22, and a plurality of agencies to rate it BB-/Ba3 or above at the time of the Fed purchase. See the Fed announcement for more details.

evidence in Boyarchenko et al. [2020].

2.2 Bond issuance to raise liquidity in bad times

In this section, we aim to explore whether the bond market provided liquidity to firms during the COVID crisis. To do this, we link issuance data with firm-level financial statements and capital structure information. While these data are imperfect, balance sheet adjustments are nevertheless indicative of underlying economic forces. Broadly speaking, we are interested in understanding which firms issued during COVID in 2020, why, and whether there are differences from normal times.

2.2.1 Which firms issued bonds in Spring 2020?

Firms that issued bonds in Spring 2020 were different from the typical bond issuer in normal times. A priori, the selection into issuance is unclear: weaker firms might need more funds, but might be excluded from the market. Figure 6 compares characteristics of firms issuing bonds during the height of the COVID crisis to those issuing bonds in normal times. It is apparent that 2020 issuers are larger and started the year with more cash on their balance sheets. Moreover, Figure 7 shows that firms that issued during COVID were better rated issuers that were more likely to have issued recently. These results are in line with Halling et al. [2020a], who highlight the prominence of experienced bond issuers during this period, and are consistent with a narrative that bond markets were only willing to lend to firms on the safer end of the spectrum during the period of market turmoil.

Because we want to study why firms choose to issue bonds in normal times vs. in COVID times, we need to separate out potential selection effects. To do this, we run regressions that include firm fixed effects to account for bond market selection bias towards stronger firms. We further include industry-quarter fixed effects to absorb any industry-specific shocks to demand

for capital.

$$
\begin{aligned}
Y_{f,q-1} = \alpha_f + \alpha_{ind \times q-1} + \beta_0 \mathbf{1}\{issue_{fq}\} \\
+ \beta_1 \mathbf{1}\{issue_{fq}\} \times \mathbf{1}\{\text{COVID issue}_{fq}\} + \gamma' X_{f,q-1} + \epsilon_{f,q-1}
\end{aligned}
\tag{1}
$$

Table 3 present estimates of how different balance sheet characteristics are for firms issuing in normal times vs. during COVID. Estimates of β_0 represent how characteristic $Y_{f,q-1}$ differs between a firm's balance sheet prior to a bond issuance in normal times and the same firm's balance sheet in any other quarter not immediately surrounding a bond issuance. Estimates of β_1 represent the incremental effect of issuing a bond during COVID on the respective balance sheet metric $Y_{f,q-1}$.

First, we find that firms that issued during COVID are even more cash-rich in the previous quarter than they are prior to bond issuance in normal times. The estimated $\hat{\beta}_1$ for the cash-assets regression is positive with a magnitude that is both statistically and economically significant. Moreover, Table 3 shows that firms usually issue bonds when they have not issued bonds in many quarters and when the proportion of current debt is high. This is evidence of a regular cadence in bond issuance. During COVID, however, issuing firms enter the quarter with less current debt coming due. This suggests that rollover risk was less likely to be the primary decision factor for issuance during COVID than initially thought.[15] COVID issuers also have issued more recently than they had prior to bond issuance in normal times (see also Figure 7). These results are consistent with the notion of bond issuance for the purpose of unanticipated liquidity provision.

2.2.2 What did firms do with bond capital in COVID vs. normal times?

Next, we explore how firms deploy bond capital in times of crisis. We document that, during COVID, firms used the bond market differently than in normal times. To do this, we

[15] "Will the coronavirus trigger a corporate debt crisis?", *Financial Times*, 03/12/2020.

examine quarterly changes in firms' assets before and following issuance in 2020.[16] We draw comparisons to normal times using data from 2010-2019. In normal times, bonds are often used for long-term investment and acquisitions, or even to finance payouts to share holders (Farre-Mensa et al. [2018], Acharya and Plantin [2020]). However, we find that spring 2020 issuers were more likely to hoard cash rather than invest in real assets.

More precisely, we run three empirical tests. First, we run a simple *frequency analysis*, where we count the number of bond-issuing firms with significant decreases and increases in various balance sheet characteristics following issuance in normal times vs. in COVID times. See Table 4 for a summary. Second, we run an *event study analysis* by regressing firm balance sheet characteristics on dummy variables for each of the four quarters leading up to issuance and the two quarters following issuance.

$$Y_{fq} = \sum_{m=-4}^{1} \beta_m Issue_{f,q+m} + \alpha_f + \alpha_{ind \times year} + \gamma' X_{fq} + \epsilon_{fq} \tag{2}$$

We run the regression separately for IG and HY firms, and for issuance during normal times vs. issuance during COVID. Then we plot the time dummy coefficients, β_m, to visualize the pre- and post-trends of balance sheet characteristics in COVID times vs. normal times. Results are in Figures 8 and 9.

Next, we explore within-firm *post-issuance balance sheet adjustments* in normal times versus COVID times. This allows us to compare the magnitudes of balance sheet adjustments of issuance in good vs. bad times within firm. To do this, we run the following regression:

$$\begin{aligned} Y_{f,q+m} = \alpha_f + \alpha_{ind \times q+m} + \beta_0 \mathbf{1}\{issue_{fq}\} \\ + \beta_1 \mathbf{1}\{issue_{fq}\} \times \mathbf{1}\{\text{COVID issue}_{fq}\} \\ + \gamma' X_{f,q+m} + \epsilon_{f,q+m} \qquad \forall m = 1, 2 \end{aligned} \tag{3}$$

That is, we look at how a firm's balance sheet changes up to two quarters following a

[16] Note we are restricted to bond issuers for which we have end-of-quarter balance sheet data in 2020Q1 and 2020Q2

bond issuance, absorbing the firm fixed effect and accounting for industry specific shocks (we further control for return on assets and quarterly stock market returns to account for unobservable firm-specific shocks that could affect Y). We can thus interpret the $\hat{\beta}_1$ estimate as the incremental effect on Y of an issuance during COVID, m quarters after bond issuance. Table 5 and 6 show the results, and below we discuss the main findings.

Greater increase in cash holdings. First, in the frequency analysis, we find that firms issuing during COVID were much more likely to end the quarter with a significant ($> 10\%$) increase in their cash balance (See Figure 10). With the event study analysis in Figure 8, we show that this result persists into the second quarter following bond issuance, and that this persistence of cash hoarding is more pronounced for COVID issuance. In normal times, cash holdings are elevated at the end of the quarter of issuance, but decrease by the second quarter following issuance. In COVID times, however, cash holdings continue to be elevated in the second quarter following issuance. For high yield firms, this result is even more dramatic. Further, we find that HY firms have elevated cash in the quarter prior to bond issuance. At the start of the COVID crisis, there was virtually no HY issuance (see Figure 3), thus the increased cash prior to bond issuance likely reflects that these riskier firms found alternative sources of cash (such as drawing down on a bank loan) before they were able to access bond markets.

From the post-issuance balance sheet adjustments regressions in Tables 5 and 6, we find that the effect of bond issuance during COVID on a firm's cash to assets ratio within firm is nearly doubled in the first quarter relative to normal times. Moreover, in the second quarter after issuance, there is a statistically and economically significant increase in cash hoarding activity following bond issuance during COVID relative to normal times.

Next, we check for heterogeneous responses by firms with greater negative cash flow shocks. The idea is that firms have "operating leverage" arising from fixed costs of operations that cannot be scaled down quickly as sales fall. Firms with greater negative liquidity shocks should thus rely more heavily on borrowing to continue operating. To test if this is the

case, we compare balance sheet adjustments across corporate issuers based on their exposure to COVID. Table 7 displays the results, classifying firms into most and least affected sectors based on sector-level (3-digit industry code) employment changes between 2019Q2 and 2020Q2 from the BLS, following Chodorow-Reich et al. [2020].[17] In the most affected sectors, 79% of March 2020 issuance resulted in a significant increase in cash, relative to only 58% in normal times, a large increase of 21pp. Least affected sectors exhibit a more limited difference, from 61% to 75%. Evidently, firms with greater cash flow shocks responded by relying more heavily on bond issuance to increase cash reserves. These findings lend credence to the hypothesis that a large share of issuance was "precautionary", particularly for firms that experienced worse operational performance due to COVID [Acharya et al., 2012, Bosshardt and Kakhbod, 2020].[18]

Less increase in real investment. Are bond proceeds used towards reinvestment in real activity? To explore this question, we use increases in non-cash assets as a proxy for investment in operating activity. In the frequency analysis reported in Table 4, we find that in normal times, 58% of IG issuers increase non-cash assets by the second quarter following issuance; however, in COVID times, only 23% of issuers did. The results from the post-issuance balance sheet adjustments regressions in Tables 5 and 6 allow us to compare the differences within firm. We find that firms show an increase in non-cash assets of 7% and 9% in the first and second quarter end, respectively, following a bond issuance in normal times. COVID-era issuance, however, is not followed by an increase in reinvestment. Instead, there is a negative effect on non-cash assets in the two quarters following bond issuance during COVID. Evidently, bond capital raised during COVID is unlikely to be immediately reinvested in the firms. An illuminating example is Chevron, which raised $650 million in bond capital on

[17] We use the abnormal decline in employment by subtracting out the average Q2-to-Q2 employment change from 2015-2019, as per Chodorow-Reich et al. [2020]. Employment changes are an imperfect proxy for liquidity shock. As an alternative exposure metric, we try the same analysis using gross output by industry as a proxy for COVID exposure, to very similar results.

[18] In addition, in the most affected sectors, there was more increase in leverage than in normal times, which can potentially worsen debt overhang going forward. [Brunnermeier and Krishnamurthy, 2020a, Crouzet and Tourre, 2018]

March 24th, and explicitly said that it would not use these funds for investment. Instead, it plans to reduce its 2020 capital spending plan by $4 billion (or 20%) in response to the crisis. Chevron CEO said: "We are taking actions expected to preserve cash, support our balance sheet strength, lower short-term production, and preserve long-term value." This suggests that the fast rebound in bond issuance will not lead to a correspondingly quick rebound in investment, output or employment.

Equity payouts and issuance: Next, we explore whether firms use bond proceeds to pay out shareholders. The last column in the post-issuance balance sheet adjustments regressions of Table 6 show that in normal times, firms follow up bond issuance with an increase in total equity payouts.[19] However, during COVID, bond issuers were more likely to reduce equity payouts in the quarters following a bond issuance. We further employ the event study analysis from specification (2) and map out the evolution of a firm's dividend payouts and share repurchases relative to the bond issuance timeline. Figure 9 show that the reduction in equity payouts includes both decreases in dividends and equity repurchases following bond issuance, consistent with news of firms slashing dividends to manage cash flow during the crisis.[20] These reductions in equity payouts that coincide with bond issuance are consistent with the hypothesis that these issuers were liquidity constrained during COVID.

As further evidence that issuers during COVID were facing liquidity shortfalls in greater magnitude than issuers in normal times, we find that some bond issuers during COVID also tapped equity markets. Indeed, in our sample of bond issuers from March to May 2020, 52% of bond issuers also issued equity. From our event study analysis in Figure 9, we find that while in normal times, equity issuance does not necessarily coincide with bond issuance, the riskiest bond issuers during COVID were more likely to issue equity right before or concurrently with a bond issuance. This suggests that these firms went to great lengths to raise cash during

[19]Total equity payouts is defined as equity purchases plus dividend payments minus equity issuance proceeds, scaled by total assets. See Table 16 for more details on variable definitions

[20]Many firms reduced payouts to equity: Ford Motor Co. and Freeport-McMoRan Inc. suspended dividend payments while AT&T halted share repurchases. "Companies Race for Cash in Coronavirus Crisis", *Wall Street Journal*, 03/23/2020

COVID.

2.2.3 How did use of bond capital during COVID compare to the 2008 crisis?

Has the way firms use bond capital changed since the financial crisis? To explore this question, we extend the dataset back to 2000, and look at post-issuance balance sheet adjustments during the 2008 financial crisis. We find some evidence that the use of bond capital for liquidity purposes is unique to the COVID crisis, suggesting a secular shift in the way firms use bond markets. Table 8 and 9 show the changes in balance sheet characteristics for firms issuing between September 1, 2008 and June 30, 2009, using the baseline specification. While firms did increase cash in the two quarters following bond issuance in normal times from 2000-2019, firms issuing during the 2008 financial crisis actually shed more cash in the quarters following the crisis. If anything, there was a small (though statistically insignificant) increase in non-cash assets following bond issuance, suggesting that crisis-era firms did use bond capital to reinvest in real activity. This suggests that cash hoarding exhibited by COVID-era issuers did not occur to the same extent during the 2008 crisis.

Overall, we find that, unlike in normal times, issuers used bond capital for liquidity purposes during COVID. In COVID times, firms issued bonds earlier than usual, and paid out less to shareholders. Importantly, COVID-era bonds were used to build up cash reserves rather than to reinvest in the firm. These results show that, at a broad level, credit can play a dual role: it can fund investment or it can build liquidity buffers, a pattern that has been well documented for bank credit. We argue that the bond market also plays both roles, and that the relative importance of these roles changes with the state of the economy.

3 The Crowding Out of Bank Loans

Another important aspect to consider is that the bond market should not be analyzed in a vacuum. Indeed, bond issuers have access to both bond and loan markets. The conventional

view tends to argue that banks are the main source of funds in bad times, over capital markets [Gatev and Strahan, 2006, Kashyap et al., 2002, Bolton et al., 2016].

How did bond issuers use loan markets during this episode? To investigate this question, we match our issuance data with information on each issuer's debt composition from Capital IQ. These data contain information on amount outstanding of different debt instruments, including revolving credit, term loans, leases and commercial paper. It also includes information on undrawn credit lines, important sources of liquidity for firms [Sufi, 2009, Li et al., 2020, Acharya and Steffen, 2020b, Greenwald et al., 2020, Chodorow-Reich et al., 2020], that were available as the COVID crisis unfolded. Note that the debt composition data is reported only at quarter end, so we approximate flows by computing differences between quarters. We break down the analysis into two steps: (i) the first quarter of 2020 (early part of the crisis) and (ii) the second quarter of 2020 (later part of the crisis). We collect data for all firms that issued bonds in March-June 2020 that report their financial statements in U.S. dollars in our analysis. Our merged sample includes 320 firms for which Capital IQ reports data for the first quarter following issuance. We have data for the second quarter for 90% of these firms; for the rest of the firms, this data has not yet been released.

3.1 Bank Borrowing in 2020 Q1

We first show that many issuers left their existing credit lines untouched in the first quarter of 2020, even though the shock did not originate in the banking sector. We find that in aggregate, most (if not all) funds raised in the bond market could have potentially been raised by drawing on outstanding credit lines with banks. For more information on credit line usage during the first part of the crisis, see Acharya and Steffen [2020b] for a study of all public firms and Li et al. [2020] for a study of banks. Greenwald et al. [2020] and Chodorow-Reich et al. [2020] study a large panel of firms including SMEs.

As an example, Chevron had $5 billion of its credit line available at the beginning of 2020, yet it still issued $650 million in bonds. We show that Chevron was far from an isolated case,

and strikingly, this behavior includes many riskier HY firms. Table 10 tracks the change in debt composition during the first quarter of 2020. The first three rows show the share of firms that, respectively, (i) maxed out of their credit lines (i.e., have revolving credit outstanding larger than 90% of their available credit as of end of 2019), (ii) drew on their credit lines without maxing out, and (iii) did not draw on their credit line. Note that because the data consists of stocks of debt outstanding reported quarterly, these numbers are not completely free of measurement error.[21] The fourth row reports the share of firms that did not receive bank funding, in net, in the first quarter, aggregating revolving credit, term loans and leases. The fifth row reports average draw-down rates, defined as the ratio of additional revolving credit over available credit at the end of 2019.

Looking at the sample of all HY firms that issued between March and June, only 19% had maxed out their credit line by end of March, and the average draw-down rate was 39%. Looking beyond credit lines and including new term loans and leases does not change the picture: 35% did not receive new net bank funding in the first quarter that covers the height of the crisis. This implies that many of these riskier firms had available "dry powder" from banks, arranged before the crisis, that they decided not to use early in the first part of the crisis, even though they did not issue any bonds until later in the crisis. The pattern is even more striking when looking at IG firms that issued in March or April, although there is still a risk gradient within this group. Among firms rated BBB (the riskiest IG issuers), 54% left their credit line untouched and 44% did not get additional bank funds, in net, in the first quarter of 2020. Their average draw-down rate is only 22%. For the safest firms, rated A or above, 82% left their credit line untouched and the draw-down rate was only 8% on average. This difference is consistent with Acharya and Steffen [2020b].

In aggregate, the amount of undrawn bank credit available at the beginning of 2020 was

[21] First, our definition of "maxing out" can occasionally incorrectly include firms that signed new credit lines during the COVID crisis. In our exploration, this measurement problem seems to be more pronounced for IG firms. For instance, MacDonald's signed a new credit line of $10B, of which it drew $1B. Second, we can only observe quarter-end balance. If a firm drew on its credit line on March 1st and repaid it by March 31st, our data would not capture this behavior.

larger than the total funds raised from bond issuance. Table 11 shows the aggregate flows by different types of debt instruments. Our matched sample of IG firms raised a total of $476 billion in bonds and $142 billion in loans in this period, despite having $681 billion of credit line available at the start of the year. IG firms also borrowed in the form of commercial paper during this time, although to a much smaller extent than bond issuance. While the gap is smaller for HY firms, it appears that a large majority of funds raised in the bond market could nevertheless have come instead from drawing on existing credit lines. Indeed, HY issuers in our matched sample issued $93 billion while having $156 billion of undrawn credit. Their aggregate draw-downs reach only $47 billion. Figure 11 illustrates this unused aggregate dry powder visually.

3.2 Repaying Bank Loans in 2020 Q2

Next, we examine whether firms use proceeds from bond issuance to repay bank loans. To this end, we investigate changes in firms' debt composition during the second quarter of 2020. The latter part of the COVID period, from April to June, has received less attention, but is particularly revealing.

We find that a large share of issuers that did borrow from their banks early in the crisis repaid by issuing a bond in the following quarter. Panel A for 12 shows the share of bond issuers that repaid in Q2 at least some amount of their Q1 credit line draw-down. Among all HY issuers, two-thirds of these repaid some amount after their bond issuance. In fact, over 40% actually repaid their credit line *in full*, and only a few borrowed additional funds from banks in the second quarter. For example, Kraft Heinz, which was downgraded from IG to junk in February 2020, drew $4 billion from its credit line between February and March. In May, it issued $3.5 billion of bonds (up from a planned $1.5B, due to strong investor demand) and used these funds to repay its credit line in its entirety. In six months, the share of Kraft Heinz's credit coming from banks went from zero to 12% and then back to zero. Kraft Heinz is far from an isolated example: Panel B of Table 12 shows the distribution of credit line

repayment as a fraction of either Q1 draw-down or bond issuance, conditional on repaying. Among HY issuers repaying bank loans, the median firm paid back 100% of its Q1 borrowing, representing 60% of their bond issuance. These patterns are similar for IG firms, although a smaller share drew on their credit lines in the first place. Over 85% of firms that drew-down repaid their bank, with the median also repaying 100%. There is little difference between issuers rated BBB and A or above.

Figure 12 illustrates the cross-section of repayment behavior by plotting credit line draw-down in Q1 against draw-down in Q2 for each firm in our sample. A negative value indicates that the firm paid down a portion of the outstanding credit line. Strikingly, many firms are exactly on the negative forty-five degree line, denoting full repayment within three months. A noticeable number of firms repaid even more, using bonds to pay down bank debt that preceded the COVID crisis. Many firms repaid partially, with only a few borrowing more in the second quarter.

Table 13 displays the aggregate amount of bond proceeds used to repay bank loans between the first and second quarter of 2020. We find that in aggregate, a full fifth of HY firms' bond proceeds went to pay back bank loans, repaying a third of what was borrowed in the first quarter. The pattern is similar for IG firms, although weaker since a smaller share drew on their credit lines in the first place. BBB firms repaid over half of their bank borrowing from Q1, while firms rated A or above repaid all of their credit lines (but no term loans). We estimate that at least $75 billion was repaid by bond issuers to banks between April and June 2020. This flow of repayment is consistent with aggregate bank lending shown in Figure 13: total bank commercial and industrial lending has fallen by $180 billion between mid-May and end of June.

This represents a remarkable pattern of debt substitution, whereby firms borrow from bond investors and pay back their banks. Results from our regression analysis (3) with firm leverage ratios as the outcome variable suggest that this debt substitution phenomenon is likely unique to bad times. Firms issuing bonds in normal times experience an uptick in leverage in the

quarters following raising bond capital (see Table 5 and Table 6). However, firms issuing during COVID times notably have an economically significant incremental decline in leverage in the quarter of bond issuance, nearly wiping out any increase in leverage from the bond issuance itself.[22] The event study in Figure 8 shows a similar story, where COVID issuance, unlike issuance in normal times, is followed by statistically insignificant changes in total debt. Altogether, these results suggest that during COVID, firms issue bonds partially to pay down bank loans, rather than to lever up for investment purposes. These firms thus display a revealed preference for outstanding bond capital as a source of liquidity over bank credit.

4 Discussion and Implications

4.1 Mechanisms

How do our findings square with existing views of liquidity provision and corporate borrowing? Our evidence raises two questions: what explains the spike in debt markets activity while real activity is far from recovery? And why did bond issuance crowd out bank loans? We argue that the importance of liquidity-driven bond issuance in bad times is key to explaining the events of the first half of 2020.

Borrowing Without Investment: First, firms will borrow if their need for funds is large relative to the cost of external finance. Note first that credit plays multiple roles: firms do not borrow solely for *investment* reasons to fund long-term projects; they also borrow for *liquidity* reasons. There are at least two potential (non-exclusive) drivers behind liquidity-driven issuance. The first one is the desire to build liquidity buffers to withstand temporary cash-flow shocks. It is established that firms value financial slack because it preserves the optionality for investment, particularly when facing large unhedgeable shocks [Bolton et al.,

[22]Recall that HY issuers are not included in Table 6 since they only issued in 20201Q2 after after, and the Q3 data is not widely available yet.

2020, 2019, DeMarzo and Sannikov, 2006].[23] In addition, firms tend to have fixed costs of operations that cannot be quickly scaled down as sales fall, leading to "operating leverage." Borrowing allows firms to continue operating in spite of a negative shock to cash flow.[24] In the context of the COVID crisis, the cash-flow shortfall is expected to last for possibly a few years and is large in absolute value. This motive is consistent with a sudden spike in long-term debt issuance, so that firms can defer repayment to after the shock while saving on issuance costs. This type of debt issuance thus spikes *because* the real recovery is slow, not in spite of it. In fact, the larger the shock, the larger the issuance volume. On the other hand, investment-driven debt issuance will be delayed.

Another potential driver of debt issuance unrelated to investment is a period of particularly low external financing costs. This is related to the idea of market timing, broadly understood, in which firms take advantage of temporarily cheap financing by borrowing and hoarding liquid assets even though they have no immediate need for them [Bolton et al., 2013, Eisfeldt and Muir, 2016, Baker and Wurgler, 2002]. As Federal Reserve actions likely led to low costs of bond capital in the Spring of 2020 relative to what is expected in the future, this channel is also consistent with a sudden spike in long-term debt issuance with no immediate impact on investment.

Preference of Bonds over Bank Loans: If a firm wants to raise debt, why would it prefer bonds over bank loans? It is well established that for investment purposes, large firms tend to prefer to borrow from capital markets rather than from banks, because they are safer and more transparent [Petersen and Rajan, 1994, Holmstrom and Tirole, 1997]. However, banks are viewed to have a comparative advantage over capital markets for providing liquidity in bad times. A first argument is that there are synergies with their deposit franchise, either because a flight to safety leads to deposit inflows in bad times [Gatev and Strahan, 2006] or because banks are required to hold large balances of liquid assets [Kashyap et al., 2002]. A

[23] In Xiao [2018], firms respond to higher default probabilities during the 2008 crisis by borrowing to save for self-insurance.

[24] See for example Kahl et al. [2019] for the implications of operating leverage on financial policies.

second argument is that funding can be committed in advance in the form of credit lines: liquidity insurance allows for more funding relative to a "wait-and-see" policy [Holmström and Tirole, 1998]. In fact, while large U.S. public firms borrow heavily from the bond market for investment, it is well known that virtually all of these firms have standing credit line agreements with banks [Sufi, 2009]. However, our evidence of borrowing patterns in 2020 shows that bond markets often dominate bank loans for liquidity purposes as well, despite the fact that bond issuance is not funded by deposits and is not arranged in advance. We thus contribute to the debate on what makes banks "special."[25] We consider four (non-mutually exclusive) channels in turn.

First, one possibility, consistent with what happened during the Great Recession, is that the banking sector became impaired during the COVID episode. The conventional view is that firms substitute towards bonds and away from loans in bad times because banks' balance sheets weaken, driving down loan supply [Becker and Ivashina, 2014, Schwert, 2018, Adrian et al., 2013].[26] However, in 2020, the crisis did not originate in the banking sector. While we cannot completely rule out that some large firms wanted to draw down on credit lines but were denied funds by their banks (for example because of strict capital regulations), existing evidence points to this supply restriction being limited in 2020. Li et al. [2020] show that banks experienced massive increases in deposits and cash that reached twice as much as the already extraordinary increase in aggregate lending, and that liquidity and capital posed no constraint on banks, in stark contrast to what happened during the 2008 crisis. Moreover, Greenwald et al. [2020] and Chodorow-Reich et al. [2020] show that large firms were able to draw on their credit lines extensively, unlike smaller firms. Thus, liquidity provision in the current crisis differs from the Great Recession. This is consistent with the findings in Acharya and Steffen [2020b] that well-rated firms drew-down less in 2020 relative to 2008-09.

[25]Note that this should not be interpreted as saying that bond investors should provide revolving credit lines instead of banks. Simply that the comparative advantage of banks for liquidity provision is smaller than previously thought.

[26]Note that bank loans were still a key source of funds for many firms during the Great Recession [Halling et al., 2020b].

Nevertheless, there is some survey evidence that banks are tightening lending standards for large firms in Q2 and Q3 of 2020.[27]

Second, the spectacular reversal of the Federal Reserve credit policy has at least partially eliminated one key aspect of banks' specialness: the implicit and explicit government support they receive. This support implies that banks are viewed as a safe haven by investors, enhancing their willingness to hold deposits in bad times [Gatev and Strahan, 2006]. Historically, the corporate bond market has been outside the scope of government support, but this has changed in dramatic fashion in Spring 2020. Indeed, we observe that even if bond issuance is not funded by counter-cyclical deposits, investor demand for bonds was strong during the COVID episode. Using granular data on order books, we find that the demand for IG bonds was high even before the first Fed announcement on March 23rd. Figure 14 shows that the (weekly average) ratio of total order book to amount issued for each bond remained elevated throughout March. Moreover, while Falato et al. [2020] document unprecedented outflows from corporate bond funds in March and early April, the phenomenon was short-lived. Following the Federal Reserve's announced intent to support corporate bond markets on April 9, there were significant net inflows to both HY and IG bond funds that remained very large through August (see Figure 15). A potential rationale is that corporate bonds represent an ideally positioned asset class: they balance (1) investor demand for safe assets and (2) reach for yield. First, corporate bonds, particularly issued by highly rated firms, have limited downside.[28] The Fed's stated support helped buoy the safety of corporate bonds further. At the same time, these bonds pay a high spread over Treasuries, providing an attractive alternative for safe investments in a time when interest rates are at historical lows. For instance, Table 1 shows that median IG bonds pay 137 basis points above U.S. Treasury yields, while HY bonds exceed respective risk-free benchmarks by 410 basis points. However, even if one was

[27]See the Senior Loan Officer Opinion Survey on Bank Lending Practices conducted by the Federal Reserve: `https://www.federalreserve.gov/data/sloos.htm`.

[28]The annual default rate for all rating categories BB and above has been well below 1% since 2003. Source: S&P Global "Default, Transition, and Recovery: 2019 Annual Global Corporate Default And Rating Transition Study", April 29, 2020

willing to assume that corporate bonds were as safe as bank deposits, the question of why so many firms seem to have a strict preference for the bond market still remains.

One reason is that bond financing is more *committed* than bank loans. Indeed, recessions typically imply cash-flow shocks that last for as long as a few years, and firms that need to cover operational fixed costs thus prefer sources of funds that are committed for a long period of time. Loans are less attractive in that respect: they have (1) shorter maturities and (2) more restrictive covenants. While the typical loan maturity is four years (see Schwert [2018]), the median IG (HY) bond issued in 2019 is 13 (8) years (see Table 1). Bonds are often repaid early, but at the borrower's choice because it is advantageous to do so [Xu, 2018, Becker et al., 2018].

Moreover, it is well known that loans have covenants that give lenders discretion to reduce credit before maturity [Sufi, 2009, Chodorow-Reich and Falato, 2017, Lian and Ma, 2018, Greenwald et al., 2019, Acharya et al., 2014]. In practice, this difference is often measured through the relative prevalence of "maintenance" vs. "incurrence" covenants.[29] Maintenance covenants can be passively violated, creating additional risk of financial distress even for firms that could be far from bankruptcy, while incurrence covenants are less intrusive and much more rarely triggered passively [Green, 2018, Becker and Ivashina, 2016]. In Table 14, we compare the prevalence of common maintenance and incurrence covenants for loans and bonds in our sample.[30] Note that the same set of firms face zero maintenance covenants on their bonds, but many on their loans. For example, 66% (48%) of the bank loans that IG (HY) issuers have available include maintenance covenants restricting leverage, and 44% (42%) of both IG (HY) bond issuers must maintain certain earnings targets. Moreover, bank loans are far more

[29]Roberts and Schwert [2020] provide the following example for the two kinds of covenants: "Consider a leverage covenant restricting the debt-to-EBITDA ratio to remain below four. With a maintenance covenant, should the borrower's debt-to-EBITDA ratio rise above four for any reason, the borrower would be considered in violation of the covenant and in technical default, absent a waiver from the lender. With an incurrence covenant, the borrower must take an action (e.g., issue debt) that generates a debt-to-EBITDA ratio greater than four in order to be in violation. For instance, if the borrower's debt-to-EBITDA ratio rises above four because of an earnings shock, the borrower would not be in violation of the incurrence covenant." Cov-light loans tend to have less maintenance covenants, but they also tend to be term loans.

[30]Table 2 in Bradley and Roberts [2015] makes a similar comparison for private vs. public debt 1993-2001

likely to be secured than bonds: roughly 10% (68%) of bank loans that IG (HY) bond issuers have available are secured, compared to a 1% (12%) share of bonds issued in normal times.[31]

This implies a more nuanced perspective on the value of bank "flexibility" relative to market financing. A well understood benefit of bank debt is that it is easier to renegotiate because it tends to be held by more concentrated creditors relative to bonds [Bolton and Scharfstein, 1996]. However, the flip side is that renegotiation can be detrimental to the borrower: loan contracts include non-price loan terms that grant lenders discretion after bad news.[32] When the borrower faces a large but temporary reduction in cash-flows like during COVID, avoiding premature renegotiation is attractive. This is well understood in practice: "Companies don't want to be subject to the testing of maintenance covenants," said Evan Friedman, head of covenant research at Moody's. Going to the bond market can give companies more freedom, as they don't have to demonstrate their financial fitness again until the debt matures."[33] For smaller cash-flow shocks in normal times, credit lines could be more attractive as they have smaller set up costs.[34]

Finally, the cost of bond financing might have fallen relative to the cost of loans, leading firms to "time the market" by issuing bonds instead of loans. Clearly, the Federal Reserve's unprecedented stated intent to "backstop" the corporate bond market helped firms issue bonds at very low costs, in line with the surge of investor demand described above. While spreads on credit lines are set ahead of time and thus do not adjust until the agreement expires (unless there is a renegotiation), bond issuance is priced in real time and many issuers have benefited from historically low rates after the Fed intervention (see Figure 16).[35] However, firms may

[31] On the other hand, the prevalence of incurrence covenants that place restrictions on dividends, asset sales, or stock issuance is in general lower in loans than bonds for firms across the ratings distribution.

[32] Covenants are the prototypical example, but short-maturity or collateral requirements also enhance the ability of the lender to renegotiate terms or restrict credit [Chodorow-Reich et al., 2020].

[33] "Companies Issue New Bonds to Pay Down Short-Term Debt Amid Pandemic", *Wall Street Journal*, September 2nd 2020.

[34] Note however that commercial paper often tends to dominate credit lines for the safest firms that have access to that market.

[35] Note that we are not claiming that bonds are necessarily cheaper than loans, simply that the bond-loan spread could have shifted during this time. In fact, bonds tend to have a higher rate than loans, in large part because they are junior to bank loans. Schwert [2020] uses firm-level variation to estimate the level of the spread in a sample of U.S. firms. Estimating the change in this spread at a high-frequency is however

anticipate that government support might not persist forever, and indeed bond yields have bottomed out at the end of July. The market timing logic implies that firms rationally respond to favorable financing conditions (that might not prevail for long) by raising external capital, particularly when anticipating bad cash flow shocks. Moreover, consistent with our findings, these firms hold the proceeds in cash or pay down credit lines to preserve financial slack going forward.

To gauge the potential for market timing to explain this crowding out, we provide a back of the envelope estimate of the relative cost of bonds vs. loans during this time period. Looking at changes between Dec 31 2019 (before the crisis) to June 30th 2020 (after the market panic and Fed intervention), bond yields are not much lower today relative to 2019. For AA rated bonds, yields on ICE BofA US Corporate Index went from 2.40% to 1.57%, a 83bps decrease. For BBB bonds, the fall was even smaller, at 51bps (3.19% to 2.68%), while for BB HY bonds yields actually increased by 134bps (3.77% to 5.11%). Estimating changes in loans rates is more difficult, but one thing to note is that the vast majority of credit lines have a floating rate that move one to one with a benchmark rate (often LIBOR or the prime rate). In Spring 2020, these benchmark rates fell by 150bps as the Federal Reserve returned to the zero lower bound. This is two to three times larger than the drop in bond yields for highly rated firms. However, the cost of bank borrowing also depends on whether loan spread increased during this time. Note that for the majority of credit lines, the spread is fixed at issuance and does not adjust unless it is renegotiated. Moreover, this simple calculation suggests that for firms that did not see their credit line price renegotiated, loans became relatively cheaper during this time. This is however not definitive evidence, and a more thorough analysis of loan vs bond spreads is warranted.[36] Nevertheless, it reinforces the idea that non-price terms, such as maturity and covenants, are a key driver of firms' preference for bonds over loans in these

challenging since loans are not traded in the way corporate bonds are. Median bank loan spreads for firms that issued bonds in 2019 rated AA, BBB, and BB were around 37, 112, and 146 basis points above the benchmark rate, respectively.

[36]Firms that violate a covenant or have a performance pricing provision in their loan contract can experience a rise in their loan spread as their creditworthiness deteriorates. Whether this rise is larger or smaller than the increase in bond spreads observed during this time is an open question.

times.

4.2 Implications for Monetary Policy

Finally, our findings have important implications for central bank intervention. First, it is important to account for the crowding out of bank loans when evaluating the aggregate effects of these new public programs on the real economy. For the majority of issuers, propping up bond markets does not alleviate a hard credit constraint, since they have available bank funding. One dollar of bond issued does not equal one dollar of new net borrowing by the firm. Bond markets should not be considered in isolation: bond issuers are active in both bond and loan markets, and they strategically substitute between the two. The Federal Reserve bond market intervention played a dual role: preventing a market panic, but also allowing firms to borrow more and inject funds into their operations. Our evidence suggests that public programs were successful at achieving the first goal, but less so at achieving the second.

Preventing large credit line draw-downs is nevertheless valuable for at least three reasons. First, bond capital guarantees longer-term funding sources for firms, while bank loans have a higher risk of being withdrawn by banks after, for instance, a violation of a maintenance covenant even if the borrower has not "misbehaved." Second, they help weaker issuers "keep their powder dry". Many HY issuers drew down on their credit lines during the weeks in which the bond market was in distress. Having the option to access liquidity quickly is valuable for these firms. Third, it reduces balance sheet constraints on banks [Grosse-Rueschkamp et al., 2019, Acharya and Steffen, 2020a]. If banks are close to their constraint, that could help credit flow towards smaller firms which are dependent on bank credit.[37]

The question of whether our evidence supports direct intervention in the corporate bond market is more subtle. On the one hand, if firms prefer bonds over bank loans for liquidity in bad times, it would be beneficial to extend traditional lender of last resort policies geared

[37] As of now, there is however little evidence that corporate bond purchases have "trickled down" to smaller borrowers. In fact, it seemed that small firms were largely unable to borrow from banks during the spring of 2020 [Chodorow-Reich et al., 2020, Greenwald et al., 2020].

toward the banking sector. This is in line with recent actions by central banks around the world, leading to drastic innovations in credit policy by the Federal Reserve in particular, while the European Central Bank (ECB) has also extended the set of eligible corporate bonds that can be pledged as collateral for central bank funding. However, how to weigh these benefits against potential losses on central bank bond holdings or risk of asset price distortions is difficult and an important area for future research. First, central banks would have to credibly commit to backstop the bond markets in the future, which would be a massive expansion of the government safety net. Second, it is well understood that safety nets can potentially lead to excessive risk-taking, sowing the seeds of the next crisis. Is providing safety nets to markets more dangerous than to banks?

One concern is that markets are more difficult to monitor than banks. In the traditional model, central banks use banks as their conduit to support the financial system while conducting bank supervision in parallel. The regulatory reforms that followed the Great Recession seemed to have been successful in limiting moral hazard and ensuring that banks' balance sheets were strong at the onset of the next crisis. However, while there is only a short list of systemic financial institutions, the numbers of actors that are part of the corporate bond market is vastly larger and more dispersed and they tend to delegate risk-assessment to rating agencies. Nevertheless, a counter-argument is that bond investors are significantly less leveraged than banks and thus do not expose the economy to the same systemic and amplification spiral in the event of large losses. However, bonds funds funded by equity might still be forced to sell highly-rated corporate bonds in order to meet redemptions, leading to market dislocations [Ma et al., 2020]. The changing nature of financial intermediation and liquidity transformation implies a need to potentially re-think the appropriate scope of central bank intervention.

A final challenge is how to target unconventional policy actions aimed at the bond market. Intuitively, supporting the riskiest segments of the bond markets seem to have the largest benefit, but also the largest potential costs. One observation is that the Federal Reserve's

purchase of single-name corporate bonds has skewed towards the largest and safest firms. There are some concerns about whether these firms are the most "constrained." For instance, Table 15 shows that the majority of the Federal Reserve single-name corporate bond portfolio consists of issuers that had access to bank funds that they did not draw on during the crisis. Brunnermeier and Krishnamurthy [2020a] argues that, in the absence of clear frictions, an "IG-corporate QE" program would have limited real effects on these firms.

5 Conclusion

While the textbook view emphasizes the role of the banking sector in providing funds in bad times, the corporate bond market was at the center of the recent COVID crisis. This paper sheds light on the role of the bond market in providing liquidity in bad times through the lens of bond issuance. Using micro-data on firm balance sheets, we track the usage of bond capital during COVID times and compare to normal times. We show that, propped up by the Fed, the bond market lent extensively to firms in this period, with both investment-grade and high-yield markets reaching historical heights. However, we argue that this V-shaped recovery of bond markets is unlikely to lead to a V-shaped recovery in real activity by documenting two facts on balance sheet adjustments.

First, firms used the bond market differently than in normal times: COVID issuers are more likely to hoard cash rather than invest in real assets. This behavior is even stronger in firms that suffered greater negative cash flow shocks due to COVID. Firms raise bond capital to build liquidity buffers and maintain financial flexibility. As expected real recovery slows, precautionary bond issuance actually increases. This behavior was further buoyed by Fed actions to lower external financing costs. Second, the majority of issuers prefer to issue bonds rather than receive bank loans during these times, exhibiting a revealed preference for bond capital. We find two ways in which bank loans are crowded out by bond issuance. One, firms chose to issue bonds even while their existing credit lines were untouched. Banks

had significant capital committed to firms that chose to issue bonds rather than tap the committed capital. Two, firms that did draw down on bank loans then issued bonds in order to pay down the bank loans. In bad times, bond issuance can be liquidity-driven rather than investment-driven, and crowd out bank loans.

We argue that unlike in the Great Recession, when the banking sector was severely impaired, the substitution away from bank loans is unlikely to be driven solely by bank balance sheet constraints. We provide two alternative potential rationales. One, by providing explicit government support to bond markets, the Federal Reserve made bonds more attractive to investors. Two, bond financing is more committed than bank loans, due to its (i) longer average maturity and, importantly, (ii) less restrictive covenants. These features may make bond financing more preferable to firms anticipating large but temporary reductions in operating cash flows. While market timing motives may have played a role for individual firms, it is not obvious that the bond-loan spread widened significantly. Instead, non-price terms, such as maturity and covenants, are likely key drivers of firms' preference for bonds over loans during this time.

These results have important implications for unconventional monetary policy. Our findings that bond capital provides a key source of liquidity to firms in bad times support central bank intervention in corporate bond markets in times of corporate liquidity crises. However, for the majority of issuers, supporting bond markets does not alleviate a hard credit constraint, since they have access to committed bank capital. Instead, the bond market support may help prevent a large aggregate draw-down on bank capital, thus reducing balance sheet constraints for banks. Relaxing liquidity constraints for banks can thus benefit firms that do not have access to bond markets. We leave the question of how to weigh the benefits of leaving more dry powder for the banks against potential losses from asset price distortion for further research. The rich interactions between corporate debt and the macro-economy is a promising agenda going forward [Brunnermeier and Krishnamurthy, 2020b].

Figures and Tables

Table 1 – Summary statistics: bond issuance, 2019-2020

	Num Offerings	Amount (Bn)	Tenor	Rating	Credit Spread	Yield
IG Issuance: 2019						
10%	2	1.4	9.5	13.7	92	2.89%
50%	5	6.0	13.3	14.8	137	3.78%
90%	10	21.2	19.1	16.7	193	4.46%
IG Issuance: Weeks since March 2020						
2020-03-02	11	7.8	12.7	14.5	141	2.46%
2020-03-09	3	3.9	12.2	14.2	211	2.91%
2020-03-16	11	45.2	15.6	17.2	270	3.93%
2020-03-23	28	64.2	13.2	16.0	273	3.68%
2020-03-30	19	60.1	14.0	15.4	346	4.24%
2020-04-06	12	22.7	10.8	15.5	314	3.82%
2020-04-13	11	28.4	12.1	15.3	237	3.22%
2020-04-20	15	19.5	10.6	14.6	260	3.37%
2020-04-27	23	68.0	13.9	15.6	214	3.11%
2020-05-04	28	56.7	12.9	15.2	255	3.31%
2020-05-11	20	37.5	15.2	14.8	251	3.54%
2020-05-18	10	35.0	17.0	16.3	170	2.73%
2020-05-25	9	11.2	14.5	15.6	169	2.51%
HY Issuance: 2019						
10%	2	1.5	6.8	8.0	314	5.16%
50%	5	4.2	7.9	8.9	410	6.25%
90%	10	8.5	9.3	10.3	534	7.47%
HY Issuance: Weeks since March 2020						
2020-03-02	3	2.5	8.7	10.0	447	5.46%
2020-03-30	4	2.3	5.0	9.5	662	6.56%
2020-04-06	3	1.6	5.0	7.0	814	8.62%
2020-04-13	11	14.2	5.5	10.4	709	7.73%
2020-04-20	17	12.6	5.2	9.5	689	7.24%
2020-04-27	6	3.0	5.0	8.7	551	6.91%
2020-05-04	10	7.8	6.1	10.6	562	6.83%
2020-05-11	11	8.1	6.2	8.2	662	7.23%
2020-05-18	11	5.9	6.3	9.3	607	7.72%
2020-05-25	8	9.6	6.2	8.8	631	7.59%

Source: Mergent FISD, retrieved via WRDS October 21, 2020. **Note:** Includes all USD corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in U.S. dollars. Excludes sovereign, supra-sovereign, financial, and utility offerings, convertible notes, impact bonds, bonds issued directly in exchange of existing bonds, PIK notes, and reopening issuance of existing bonds. Variables are averaged across week, except number of offerings and amount issued, which are summed across weeks.

Table 2 – Summary statistics: bond issuers, 2017-2020

	Normal times			Covid times		
	10%	50%	90%	10%	50%	90%
Balance sheet metrics						
Cash/Assets (prior Q4)	0.5%	5.1%	20.6%	0.8%	4.8%	19.3%
Cash/Assets (Q1)	0.5%	4.9%	20.2%	1.6%	7.9%	22.1%
Debt/Assets (prior Q4)	16.3%	37.9%	64.1%	22.6%	39.4%	67.4%
Debt/Assets (Q1)	18.0%	38.9%	63.3%	25.4%	41.9%	70.2%
Current debt/Debt (prior Q4)	0.0%	2.9%	15.4%	1.2%	5.6%	15.6%
Log assets (prior Q4)	7.2	9.1	10.9	8.2	9.8	11.5
Cash flow metrics						
Sales growth	-18%	-1%	17%	-26%	-5%	10%
Profit growth	-186%	-29%	116%	-291%	-31%	66%
Cash flow growh	-139%	-43%	69%	-150%	-61%	32%
Cash growth	-47%	-1%	94%	-19%	27%	373%
Bond metrics						
Amount per bond (MM)	300.0	500.0	1140.0	400.0	650.0	1400.0
Credit spread (bps)	95.0	238.0	511.5	155.0	297.5	713.9
Yield	3.386%	5.099%	7.737%	2.479%	3.881%	8.413%
Tenor (years)	5.0	8.0	11.0	5.0	8.0	30.0
Coupon	3.140%	5.000%	7.675%	2.400%	3.875%	8.500%
Rating	7.0	12.0	16.0	9.0	14.0	17.0
Days since last issuance	178.5	567.5	2226.5	131.6	391.5	1625.3
Days to next maturity	96.8	1121.0	2952.2	54.0	427.0	1859.0

Source: Mergent FISD, http://bv.mergent.com/view/scripts/MyMOL/index.php, retrieved July 30, 2020 and Compustat. **Note:** Includes all USD corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in U.S. dollars. “COVID" refers to bond issuers from March 1 - May 29, 2020. “Normal" refers to bond issuers from March 1 - May 29, 2017-2019. Growth variables are measured from Q4 of prior year to Q1 in year of issuance. Excludes sovereign, supra-sovereign, financial, and utility offerings, convertible notes, impact bonds, bonds issued directly in exchange of existing bonds, PIK notes, and reopening issuance of existing bonds. See Table 17 for mapping of credit ratings to the numerical aggregation shown here.

Table 3 – Firm balance sheets prior to issuance

	(1) Cash/Assets$_{t-1}$	(2) Current debt/Debt$_{t-1}$	(3) Leverage$_{t-1}$	(4) Qtrs since last bond$_{t-1}$
Issue$_t$	-0.00546***	0.0146***	0.0000825	0.0954***
	(0.00139)	(0.00371)	(0.00223)	(0.0149)
COVID×Issue$_t$	0.0160***	-0.0170**	-0.00814	-0.197***
	(0.00332)	(0.00676)	(0.00982)	(0.0382)
ROA$_{t-1}$	0.0631	-0.183***	-0.455***	0.772**
	(0.0731)	(0.0629)	(0.131)	(0.328)
Firm FE	✓	✓	✓	✓
Ind x Yr-Qtr FE	✓	✓	✓	✓
Observations	34021	22509	32755	7377
R-squared	0.777	0.321	0.797	0.815

Notes: Observations are at the firm-quarter level, from 2010Q1-2020Q2, for firms that issue bonds. Regression (4) includes only firm-quarters 2015Q1-2020Q2 due to data limitations. We exclude firm-quarters where the firm has just issued a bond in the prior 3 quarters. "Cash/assets" is che/at. "Current debt/debt" is debt due within one year ($dd1$) divided by total debt. "Leverage" is total debt / total assets. Total debt is $dltt + dlc$, total LT debt plus debt in current liabilities. Ratios are all winsorized to the 1%. "Qtrs since last bond" indicate log of the the number of quarters since the last issuance by the same firm. $Issue_t$ is an indicator variable that equals one if that firm issues a bond in the following quarter. Firm controls include return on assets (operating income before depreciation divided by total assets, or $oibdp/at$). We include firm (gvkey) fixed effects and industry (naic2) x year-quarter fixed effects. Standard errors, in parentheses, are clustered at the industry level.

Table 4 – Comparing IG vs. HY exposed issuers, normal vs. COVID and 2008 Crisis times

.	.	IG: Increase	IG: Same	IG: Decrease	HY: Increase	HY: Same	HY: Decrease
Normal times							
	Cash change Q1	62%	11%	39%	61%	5%	38%
	Cash change Q2	63%	8%	39%	60%	7%	37%
	Non cash ta change Q1	44%	53%	9%	48%	44%	10%
	Non cash ta change Q2	58%	39%	11%	54%	32%	17%
	Lev change Q1	62%	27%	18%	56%	32%	14%
	Lev change Q2	59%	22%	30%	58%	27%	19%
	Payout change Q1	44%	10%	56%	40%	6%	57%
	Payout change Q2	40%	5%	63%	37%	10%	55%
Covid times							
	Cash change Q1	79%	4%	21%	69%	4%	27%
	Cash change Q2	88%	1%	13%			
	Non cash ta change Q1	16%	60%	27%	10%	49%	42%
	Non cash ta change Q2	23%	46%	30%			
	Lev change Q1	64%	23%	17%	52%	24%	24%
	Lev change Q2	57%	20%	28%			
	Payout change Q1	26%	11%	65%	13%	5%	84%
	Payout change Q2	13%	6%	83%			
Crisis times							
	Cash change Q1	68%	5%	30%	86%	0%	14%
	Cash change Q2	77%	0%	23%	86%	0%	14%
	Non cash ta change Q1	40%	44%	19%	10%	48%	43%
	Non cash ta change Q2	61%	25%	16%	29%	38%	33%
	Lev change Q1	55%	16%	32%	32%	32%	37%
	Lev change Q2	52%	9%	41%	16%	26%	58%
	Payout change Q1	19%	19%	65%	27%	7%	67%
	Payout change Q2	36%	14%	52%	27%	20%	53%

Notes: IG firms are rated BBB- and above. COVID issuers are firms issuing in March 1 -May 31 2020. Normal issuers are firms issuing in March 1 -May 31, 2017-2019. Crisis issuers are firms issuing in March 1 -May 31, 2009. An "increase" ("decrease") is when the balance sheet characteristic has a quarter-on-quarter change of greater (less) than 2%; "Same" refers to a smaller than 2% change in either direction.

Table 5 – Firm balance sheets right after issuance

	(1) Cash/Assets$_{t+1}$	(2) Leverage$_{t+1}$	(3) Non-cash assets$_{t+1}$	(4) Current debt/Debt$_{t+1}$	(5) Equity payout$_{t+1}$
Issue$_t$	0.0115***	0.0244***	0.0679***	-0.00385***	0.169***
	(0.00127)	(0.00243)	(0.0112)	(0.00122)	(0.0307)
COVID×Issue$_t$	0.0189***	-0.0222**	-0.0249	-0.0199***	-0.369**
	(0.00503)	(0.00882)	(0.0543)	(0.00510)	(0.166)
ROA$_{t+1}$	0.0652	-0.437***	-1.482*	-0.209***	6.595***
	(0.0723)	(0.114)	(0.773)	(0.0718)	(1.187)
Qtrly stock return$_{t+1}$	0.0000159	-0.0000779	-0.000291	-0.0000570***	-0.000175
	(0.0000105)	(0.0000763)	(0.000274)	(0.00000607)	(0.000122)
Firm FE	✓	✓	✓	✓	✓
Ind x Yr-Qtr FE	✓	✓	✓	✓	✓
Observations	34470	33142	34470	23518	31585
R-squared	0.778	0.799	0.948	0.322	0.767

Notes: Observations are at the firm-quarter level, from 2010Q1-2020Q2. We exclude observations where the firm issued in the previous 2 quarters. $Issue_t$ is an indicator variable that equals one if that firm issues a bond in that quarter; $COVID \times Issue_t$ is an indicator variable for the reference bond being issued after March 1, 2020 and before June 1, 2020. "Cash/Assets" is che/at, winsorized at the 1% level. "Leverage" is total debt / total assets. "Non-cash assets" is the log of $(at - che)$. "Current debt / debt" is debt due within one year ($dd1$) divided by total debt. Total debt is $dltt + dlc$, total LT debt plus debt in current liabilities. "Equity payout" is the log of (equity purchases + dividend payments), or $log(prstkc + dv)$. Firm controls include return on assets (operating income before depreciation divided by total assets, or $oibdp/at$) and one quarter stock market return ($(prrc_t/prrc_{t-1}) - 1$). We include firm (gvkey) fixed effects and industry (naic2) x quarter fixed effects. Standard errors, in parentheses, are clustered at the industry level.

Table 6 – Firm balance sheets two quarters after issuance

	(1) Cash/Assets$_{t+2}$	(2) Leverage$_{t+2}$	(3) Non-cash assets$_{t+2}$	(4) Current debt/Debt$_{t+2}$	(5) Equity payout$_{t+2}$
Issue$_t$	0.00112	0.0249***	0.0852***	-0.0144***	0.122***
	(0.000963)	(0.00232)	(0.0127)	(0.00115)	(0.0222)
COVID×Issue$_t$	0.0337***	-0.0182	-0.118*	-0.0133*	-0.339***
	(0.00750)	(0.0130)	(0.0619)	(0.00736)	(0.113)
ROA$_{t+2}$	0.0921	-0.428***	-1.480*	-0.201***	6.375***
	(0.0765)	(0.116)	(0.762)	(0.0640)	(1.108)
Qtrly stock return$_{t+2}$	0.0000137	-0.0000775	-0.000293	-0.0000595***	-0.000161
	(0.0000116)	(0.0000746)	(0.000279)	(0.00000597)	(0.000122)
Firm FE	✓	✓	✓	✓	✓
Ind x Yr-Qtr FE	✓	✓	✓	✓	✓
Observations	33576	32284	33576	22909	30784
R-squared	0.785	0.800	0.947	0.324	0.765

Notes: Observations are at the firm-quarter level, from 2010Q1-2020Q2. We exclude observations where the firm issued that quarter or two quarters prior. $Issue_t$ is an indicator variable that equals one if that firm issues a bond in that quarter; $COVID \times Issue_t$ is an indicator variable for the reference bond being issued after March 1, 2020 and before June 1, 2020. "Cash/Assets" is che/at, winsorized at the 1% level. "Leverage" is total debt / total assets. "Non-cash assets" is the log of $(at - che)$. "Current debt / debt" is debt due within one year ($dd1$) divided by total debt. Total debt is $dltt + dlc$, total LT debt plus debt in current liabilities. "Equity payout" is the log of (equity purchases + dividend payments), or $log(prstkc + dv)$. Firm controls include return on assets (operating income before depreciation divided by total assets, or $oibdp/at$) and one quarter stock market return $((prrc_t/prrc_{t-1}) - 1)$. We include firm (gvkey) fixed effects and industry (naic2) x quarter fixed effects. Standard errors, in parentheses, are clustered at the industry level.

Table 7 – Comparing exposed vs. less exposed issuers, normal vs. COVID times

_	Increase	Same	Decrease	_	Increase	Same	Decrease
Least affected issuers: Normal times				Least affected issuers: Covid times			
Cash change	61%	6%	40%	Cash change	75%	5%	23%
Non cash ta change	45%	48%	11%	Non cash ta change	14%	60%	27%
Lev change	61%	27%	17%	Lev change	58%	29%	16%
Payout change	45%	6%	53%	Payout change	29%	10%	63%
Most affected issuers: Normal times				Most affected issuers: Covid times			
Cash change	58%	10%	40%	Cash change	79%	3%	20%
Non cash ta change	47%	48%	6%	Non cash ta change	15%	53%	37%
Lev change	53%	38%	14%	Lev change	64%	15%	22%
Payout change	33%	12%	63%	Payout change	12%	8%	81%

Notes: Exposure to COVID is measured by the firm's industry. Most affected firms belong to a NAIC3 industry that had a higher than median loss in employment from January - April 2020. Least affected firms belong to a NAIC3 industry that had a lower than median loss in employment from January - April 2020. COVID issuers are firms issuing in March 2020. Normal issuers are firms issuing in March 1 - June 30, 2017-2019. Normal firms are also categorized into "least affected" and "most affected" based on how impacted their NAIC3 category was during COVID. An "increase" ("decrease") is when the balance sheet characteristic has a quarter-on-quarter change of greater (less) than 2%; "Same" refers to a smaller than 2% change in either direction.

Table 8 – Firm balance sheets right after issuance: 2008 Crisis

	(1) Cash/Assets$_{t+1}$	(2) Leverage$_{t+1}$	(3) Non-cash assets$_{t+1}$	(4) Equity payout$_{t+1}$
Issue$_t$	0.00865***	0.0221***	0.0596***	0.163***
	(0.000655)	(0.00290)	(0.00449)	(0.0264)
Crisis×Issue$_t$	-0.00953***	-0.00810	0.0664**	0.0525
	(0.00250)	(0.0150)	(0.0263)	(0.186)
ROA$_{t+1}$	0.0290	-0.475**	-2.341**	9.114***
	(0.0730)	(0.173)	(1.106)	(1.958)
Qtrly stock return$_{t+1}$	0.00000761	-0.0000497	-0.000130	-0.000219***
	(0.00000614)	(0.0000390)	(0.000125)	(0.0000639)
Firm FE	✓	✓	✓	✓
Ind x Yr-Qtr FE	✓	✓	✓	✓
Observations	28219	27130	28219	25633
R-squared	0.773	0.798	0.949	0.768

Notes: Observations are at the firm-quarter level, from 2000Q1-2019Q4. We exclude observations where the firm issued in the previous 2 quarters. $Issue_t$ is an indicator variable that equals one if that firm issues a bond in that quarter; $Crisis \times Issue_t$ is an indicator variable for the reference bond being issued after September 1, 2008 and before June 30, 2009. "Cash/Assets" is che/at, winsorized at the 1% level. "Leverage" is total debt / total assets. "Non-cash assets" is the log of $(at - che)$. "Current debt / debt" is debt due within one year ($dd1$) divided by total debt. Total debt is $dltt + dlc$, total LT debt plus debt in current liabilities. "Equity payout" is the log of (equity purchases + dividend payments), or $log(prstkc + dv)$. Firm controls include return on assets (operating income before depreciation divided by total assets, or $oibdp/at$) and one quarter stock market return $((prrc_t/prrc_{t-1}) - 1)$. We include firm (gvkey) fixed effects and industry (naic2) x quarter fixed effects. Standard errors, in parentheses, are clustered at the industry level.

Table 9 – Firm balance sheets two quarters after issuance: 2008 Crisis

	(1) Cash/Assets$_{t+2}$	(2) Leverage$_{t+2}$	(3) Non-cash assets$_{t+2}$	(4) Equity payout$_{t+2}$
Issue$_t$	0.00865***	0.0221***	0.0596***	0.163***
	(0.000655)	(0.00290)	(0.00449)	(0.0264)
Crisis×Issue$_t$	-0.00953***	-0.00810	0.0664**	0.0525
	(0.00250)	(0.0150)	(0.0263)	(0.186)
ROA$_{t+2}$	0.0290	-0.475**	-2.341**	9.114***
	(0.0730)	(0.173)	(1.106)	(1.958)
Qtrly stock return$_{t+2}$	0.00000761	-0.0000497	-0.000130	-0.000219***
	(0.00000614)	(0.0000390)	(0.000125)	(0.0000639)
Firm FE	✓	✓	✓	✓
Ind x Yr-Qtr FE	✓	✓	✓	✓
Observations	28219	27130	28219	25633
R-squared	0.773	0.798	0.949	0.768

Notes: Observations are at the firm-quarter level, from 2000Q1-2019Q4. We exclude observations where the firm issued that quarter or two quarters prior. $Issue_t$ is an indicator variable that equals one if that firm issues a bond in that quarter; $Crisis \times Issue_t$ is an indicator variable for the reference bond being issued after September 1, 2008 and before June 30, 2009. "Cash/Assets" is che/at, winsorized at the 1% level. "Leverage" is total debt / total assets. "Non-cash assets" is the log of $(at - che)$. "Current debt / debt" is debt due within one year ($dd1$) divided by total debt. Total debt is $dltt + dlc$, total LT debt plus debt in current liabilities. "Equity payout" is the log of (equity purchases + dividend payments), or $log(prstkc + dv)$. Firm controls include return on assets (operating income before depreciation divided by total assets, or $oibdp/at$) and one quarter stock market return $((prrc_t/prrc_{t-1}) - 1)$. We include firm (gvkey) fixed effects and industry (naic2) x quarter fixed effects. Standard errors, in parentheses, are clustered at the industry level.

Table 10 – Bank borrowing in 2020Q1 for bond issuers

	HY Share	IG, BBB Share	IG, A or above Share
Maxed out CL	0.19	0.095	0.033
Drew some CL	0.42	0.36	0.15
Did not draw CL	0.39	0.54	0.82
No net bank funds	0.35	0.44	0.65
Av. drawdown rate	0.39	0.22	0.081

Notes: This table classifies bond issuers based on changes in outstanding debt for different credit instruments during 2020Q1, based on Capital IQ Capital Structure Summary table. Row 1 defines issuers that maxed out credit lines if the increase in Revolving Credit is at least 90% of Undrawn Revolving Credit at the end of 2019. Row 2 defines issuers that drew some of their credit lines if this ratio is between 90% and 0%. Row 3 defines issuers that did not draw if this ratio is 0% or less. Row 4 defines issuers with no net bank funding if there was no increase in the sum of Revolving Credit, Term Loans and Capital Leases. Row 5 defines the draw-down rate as the ratio as the increase in Revolving Credit over Undrawn Revolving Credit at the end of 2019. HY issuers include all U.S. HY firms that issued a bond between March and June that we could merge with Capital IQ information. IG issuers include all U.S. IG firms that issued a bond between March and April that we could merge with Capital IQ information.

Table 11 – Debt Composition: Aggregate Flows over 2020Q1

	HY Billions of USD	IG, BBB Billions of USD	IG, A or above Billions of USD
Bond issuance	93.0	236.6	239.3
Credit line	47.5	86.2	7.27
Term loan	1.97	27.6	21.0
Commercial paper	-0.10	-3.49	19.6
Undrawn credit EOY 2019	156.6	430.8	250.6

Notes: This table classifies aggregate debt flows based on FISD bond issuance data (Row 1) as well as changes in outstanding debt for other credit instruments during 2020Q1 based and Capital IQ Capital Structure Summary table (Rows 2,3 and 4). Undrawn credit EOY 2019 is the outstanding available Undrawn Revolving Credit at the end of 2019. HY issuers include all U.S. HY firms that issued a bond between March and June that we could merge with Capital IQ information. IG issuers include all U.S. IG firms that issued a bond between March and April that we could merge with Capital IQ information.

Table 12 – Crowding out bank loans

Panel A: Share of bond issuers repaying credit lines in Q2

	Mean
HY	
Share Repaid some credit line in Q2, condtional on Q1 draw-down	0.62
Share Repaid all credit line in Q2, condtional on Q1 draw-down	0.44
IG, BBB	
Share Repaid some credit line in Q2, condtional on Q1 draw-down	0.85
Share Repaid all credit line in Q2, condtional on Q1 draw-down	0.60
IG, A or above	
Share Repaid some credit line in Q2, condtional on Q1 draw-down	0.91
Share Repaid all credit line in Q2, condtional on Q1 draw-down	0.82

Panel B: Fraction of credit line repayment conditional on repaying

	Mean	25%	50%	75%
HY				
Q2 CL repayment/Q1 CL drawdown (%)	153.2	80.6	100	122.5
Q2 CL repayment/Bond issuance (%)	77.6	28.6	60	100
IG, BBB				
Q2 CL repayment/Q1 CL drawdown (%)	157.9	82.1	100	100
Q2 CL repayment/Bond issuance (%)	76.2	30	63.7	100
IG, A or above				
Q2 CL repayment/Q1 CL drawdown (%)	100	100	100	100
Q2 CL repayment/Bond issuance (%)	79.3	16	38	100

Notes: Panel A displays the share of bond issuers that repaid some of their credit line balance 2020Q2, based on Capital IQ Capital Structure Summary table, separately by high-yield and investment grade issuers. Panel B displays the fraction of credit line repayment in 2020Q2 relative to 2020Q1 credit line draw-downs (Row 1) or bond issuance in 2020 since March (Row 2), conditional on repaying some positive amount in 2020Q2. The sample includes all U.S. firms that issued a bond between March and June that we could merge with Capital IQ information for Q1 and Q2.

Table 13 – Crowding out of bank loans: Aggregate Flows over 2020Q1 vs. 202Q2

	HY Billions of USD	IG, BBB Billions of USD	IG, A or above Billions of USD
Bond issuance since March 2020	85.6	232.6	247.4
Credit line Q1	46	82.4	6.95
Credit line Q2	-11.9	-41.8	-6.94
Term loan Q1	1.87	26.8	21.5
Term loan Q2	-4.90	-11.3	1.50

Notes: This table classifies aggregate debt flows based on based on FISD bond issuance data (Row 1) as well as changes in outstanding debt for credit lines and term loans based and Capital IQ Capital Structure Summary table. Rows 2 and 4 displays the change between 2019Q4 and 202Q1. Rows 2 and 4 displays the change between 202Q1 and 202Q2. The sample includes all U.S. firms that issued a bond between March and June that we could merge with Capital IQ information for Q1 and Q2.

Table 14 – Non-Price Terms and Covenants

	Bonds:				Loans:	
	IG-normal	HY-normal	IG-covid	HY-covid	IG	HY
Secured	0.5%	11.5%	1.1%	33.3%	10.1%	67.8%
Term at issue (months)	148.2	102.9	164.4	64.0	59.0	59.9
Maintenance covenants:						
LeverageTest	0.0%	0.0%	0.0%	0.0%	65.9%	48.3%
NetEarningsTest	0.0%	0.0%	0.0%	0.0%	43.8%	41.7%
MaintenanceNetWorth	0.0%	0.0%	0.0%	0.0%	7.7%	4.4%
Incurrence covenants:						
DividendsRelatedPayments	0.2%	38.0%	0.6%	45.8%	13.0%	30.6%
AssetSaleClause	0.0%	26.8%	0.6%	58.3%	1.9%	19.4%
SeniorDebtIssuance	0.0%	0.0%	0.0%	0.0%	1.9%	15.6%
StockIssuance,Issuer	0.0%	12.5%	0.0%	0.0%	0.5%	5.0%

Notes: Computes (1) percentage of bonds that report covenants that have each covenant and (2) percentage of loans with each covenant. Term at issue is computed as the mean, in months, across all bonds/loans in the given cell. For firms with multiple bank loans, we use the max loan term. Bond statistics include all bonds issued from 2017-2019 and March-May 2020 that also have loans available or outstanding as of end of 2019. Loan statistics computed over all bond issuers 2017-2019 and March-May 2020 that have bank loans available or outstanding as of end of 2019. The following loan types are included: Revolver/Line, Standby Letter of Credit, Revolver/Term Loan, 364-Day Facility. "Normal" times includes bonds issued 2017-2019, while "Covid" times includes bonds issued between March 1 - May 31, 2020. Source: Mergent FISD, retrieved via WRDS October 21, 2020 and Dealscan, retrieved October 18, 2020

Table 15 – Bank borrowing for bond issuers: by share of Fed's single name bond portfolio

	Top 30 (Share)	Others (Share)	Not Purchased by Fed (Share)
Maxed out CL	0.091	0.066	0.16
Did not draw CL	0.73	0.58	0.47
No net bank funds	0.55	0.48	0.42
Av. drawdown rate	0.090	0.17	0.33

Notes: This table classifies bond issuers based on changes in outstanding debt for different credit instruments during 2020Q1, based on Capital IQ Capital Structure Summary table. Column 1 includes the thirty largest bond issuers in our sample in terms of share of the Federal Reserve's single-name bond portfolio holdings as of July 31, 2020. Column 2 includes other bond issuers that are part of the Federal Reserve's single-name bond portfolio holdings as of July 2020. Column 2 includes the remaining bond issuers in our sample.Row 1 defines issuers that maxed out credit lines if the increase in Revolving Credit is at least 90% of Undrawn Revolving Credit at the end of 2019. Row 2 defines issuers that drew some of their credit lines if this ratio is between 90% and 0%. Row 3 defines issuers that did not draw if this ratio is 0% or less. Row 4 defines issuers with no net bank funding is there was no increase in the sum of Revolving Credit, Term Loans and Capital Leases. Row 5 defines the draw-down rate as the ratio as the increase in Revolving Credit over Undrawn Revolving Credit at the end of 2019. The sample includes all U.S. firms that issued a bond between March and July that we could merge with Capital IQ information for Q1 and Q2. Fed purchases are collected from https://www.federalreserve.gov/monetarypolicy/smccf.htm as of August 10, 2020

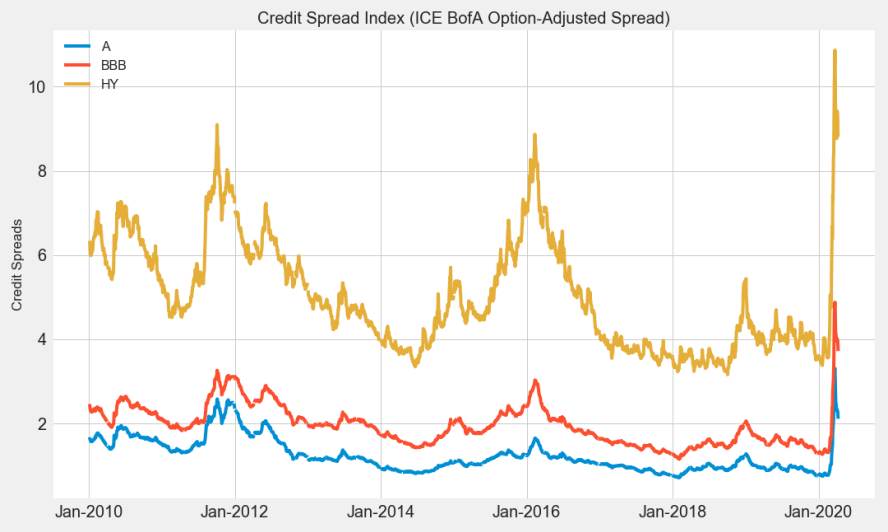
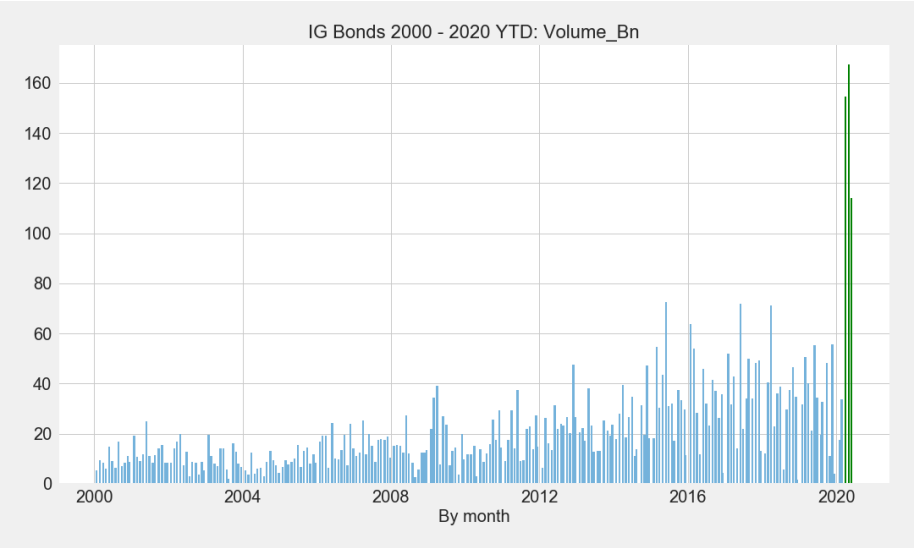
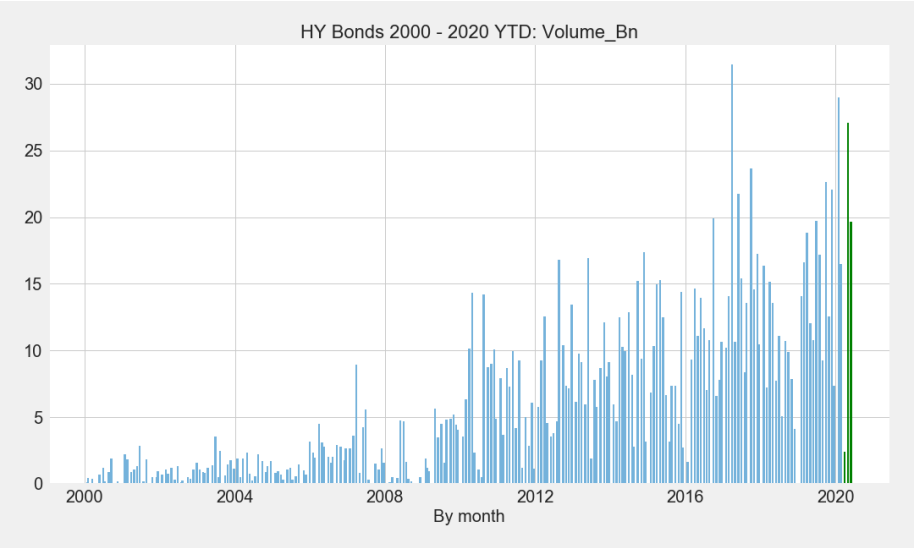


Figure 1 – IG vs. HY corporate bond spreads

Source: ICE BofA US High Yield Index Option-Adjusted Spread: spreads between an OAS index of all bonds in the respective rating category and the corresponding spot Treasury curve. "HY", or high yield, indicates bonds rated BB or below based on an average of Moody's, S&P, and Fitch. Credit spreads are in percentage points. Retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/BAMLH0A0HYM2, https://fred.stlouisfed.org/series/BAMLC0A3CA, https://fred.stlouisfed.org/series/BAMLC0A4CBBB, July 8, 2020



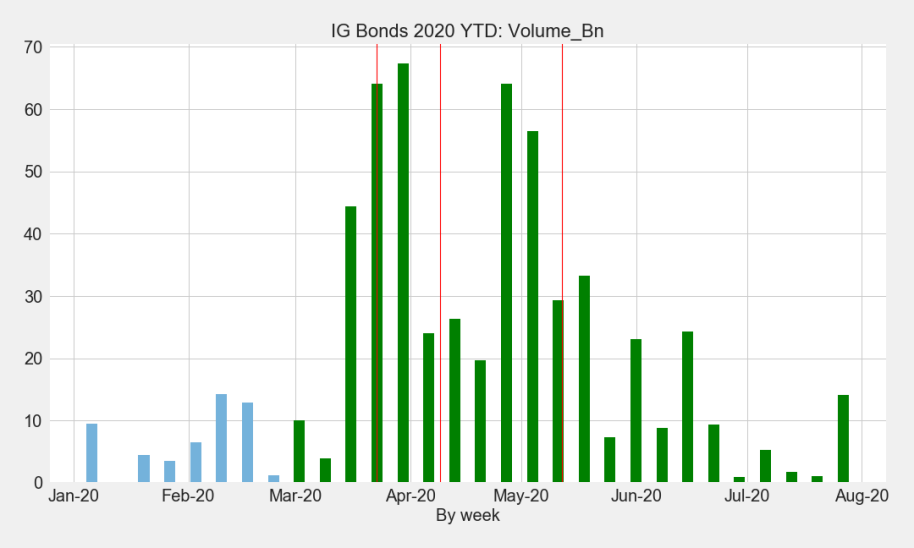
(a) IG Bond Issuance Volume since 2000



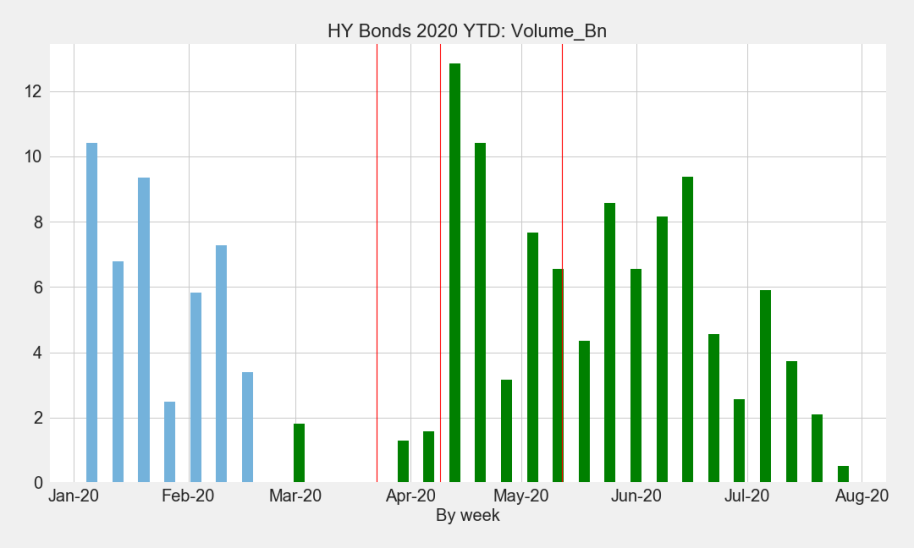
(b) HY Bond Issuance Volume since 2000

Figure 2 – Comparing IG vs. HY spreads and yields at issuance, since 2020

Source: Mergent FISD, retrieved via WRDS October 21, 2020.



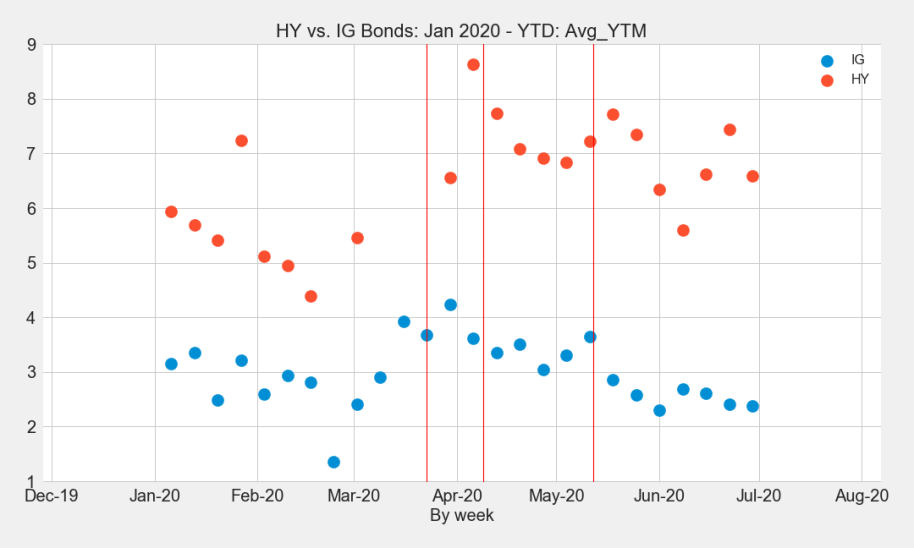
(a) IG Bond Issuance Volume since 2020



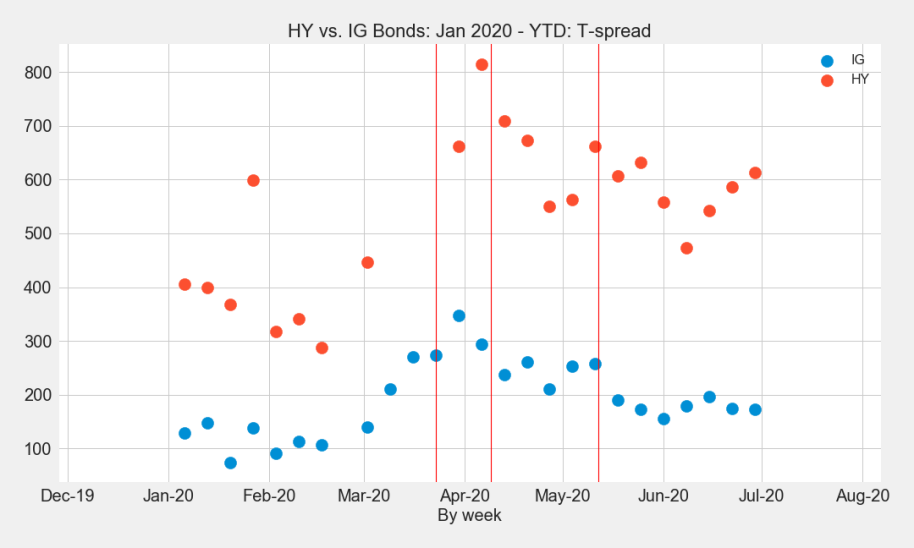
(b) HY Bond Issuance Volume since 2020

Figure 3 – Comparing IG vs. HY spreads and yields at issuance, since 2020

Source: Mergent FISD, retrieved via WRDS October 21, 2020.Note red lines correspond to March 23, 2020 (first Fed announcement to buy corporate bonds); April 9, 2020 (first Fed announcement to buy high yield corporate bonds); and May 12, 2020 (start of Fed bond buying program).



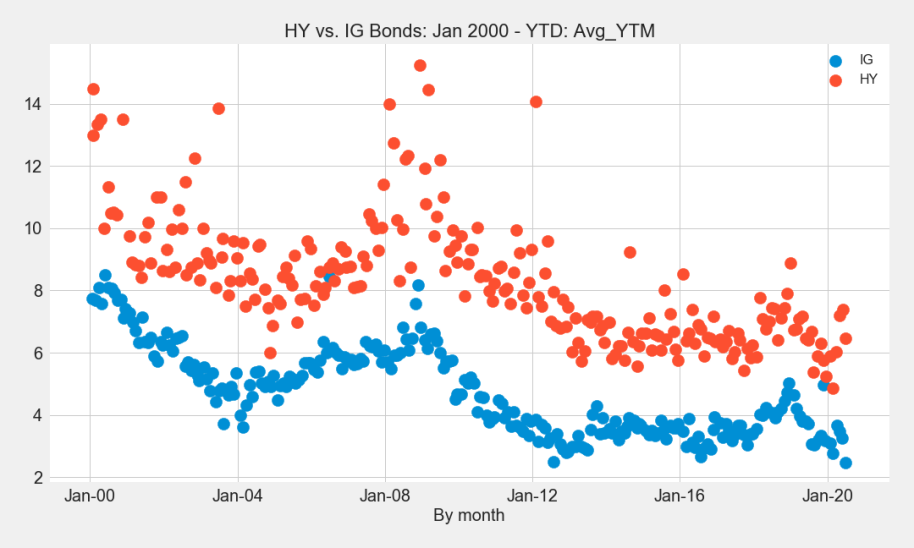
(a) Bond Issuance Yields since 2020



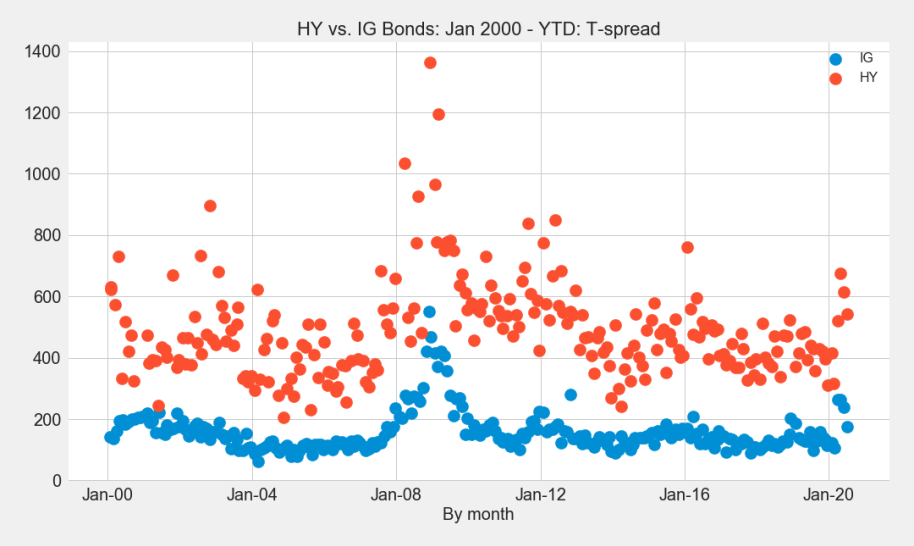
(b) Bond Issuance Credit Spreads since 2020 (bps)

Figure 4 – Comparing IG vs. HY spreads and yields at issuance, since 2020

Source: Mergent FISD, retrieved via WRDS October 21, 2020. Note red lines correspond to March 23, 2020 (first Fed announcement to buy corporate bonds); April 9, 2020 (first Fed announcement to buy high yield corporate bonds); and May 12, 2020 (start of Fed bond buying program).



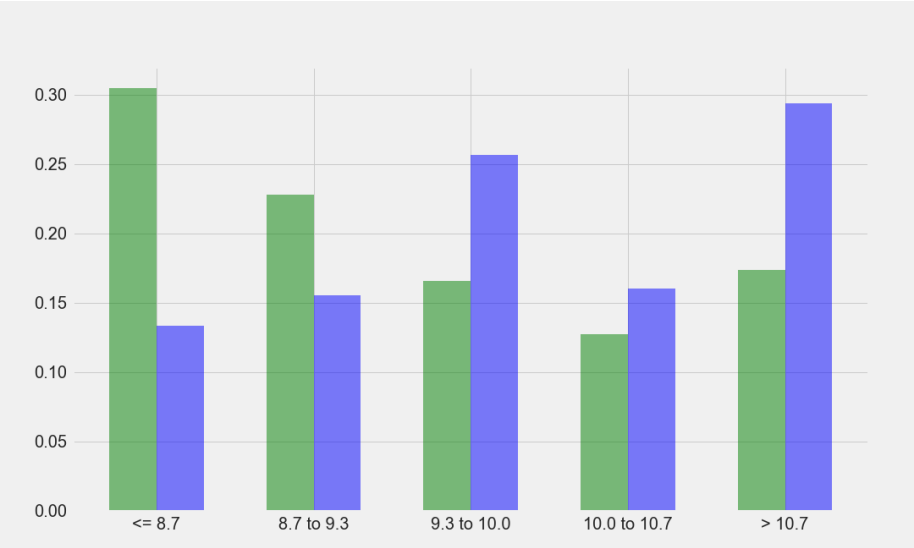
(a) Bond Issuance Yields since 2000



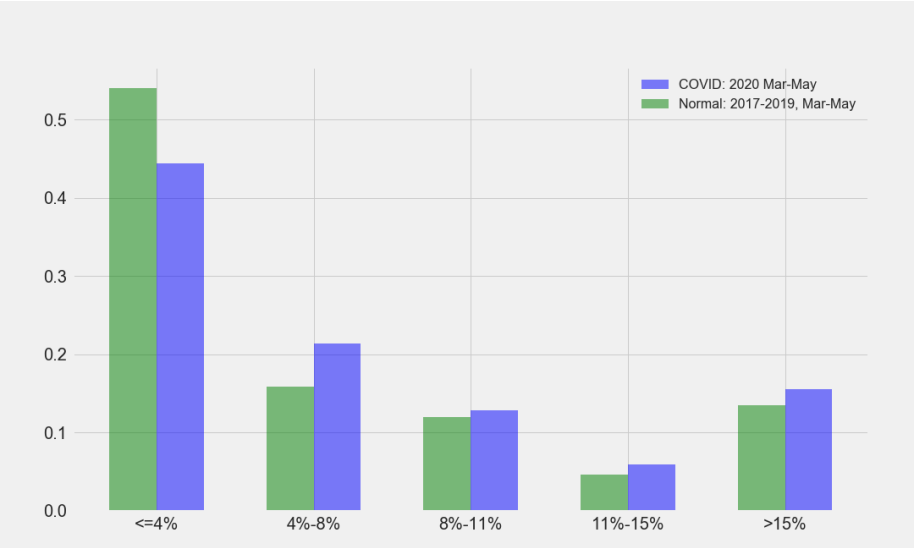
(b) Bond Issuance Credit Spreads since 2000 (bps)

Figure 5 – Comparing IG vs. HY spreads and yields at issuance, since 2000

Source: Mergent FISD, http://bv.mergent.com/view/scripts/MyMOL/index.php, retrieved July 30, 2020



(a) Log Assets, Q4

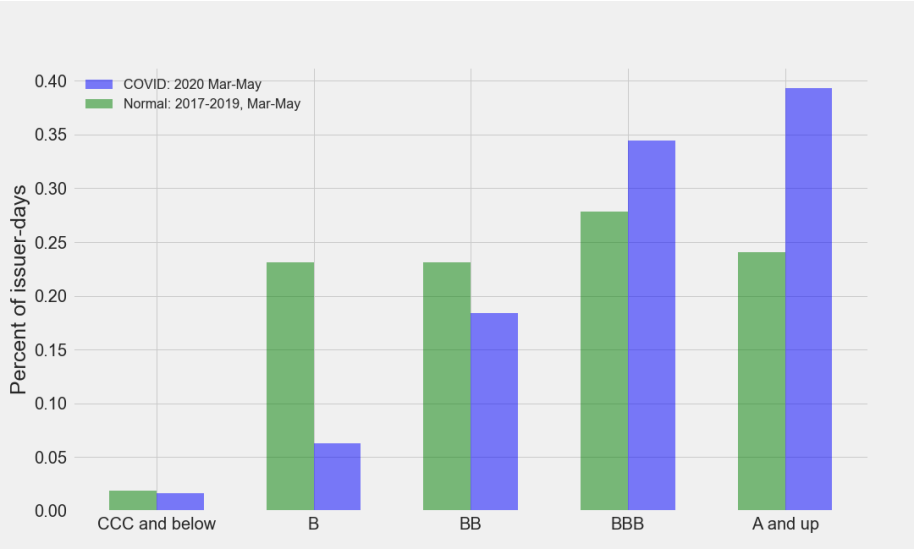


Cash as % of Total Assets, Q4

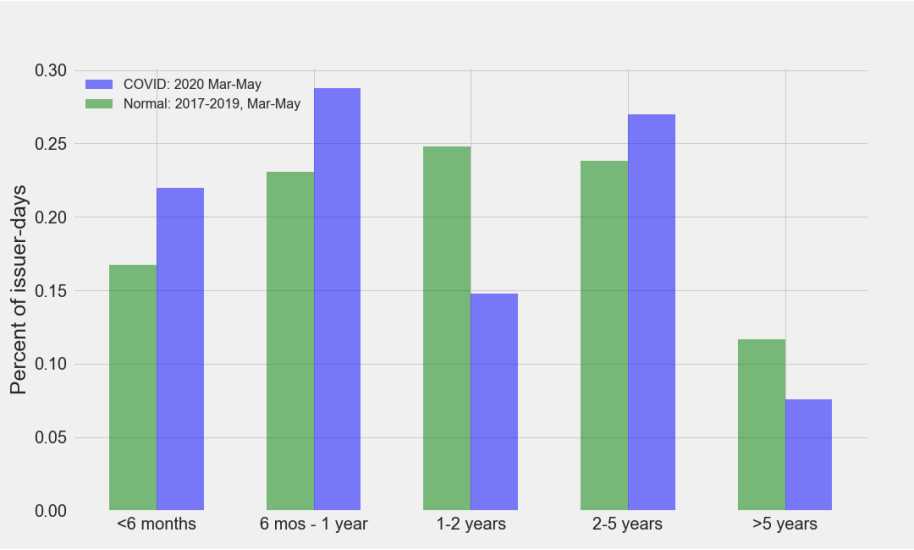
Figure 6 – Balance sheet characteristics for bond issuers: COVID vs. Normal times

Source: Compustat and Mergent FISD, http://bv.mergent.com/view/scripts/MyMOL/index.php, retrieved July 30, 2020.

Notes: Blue bars are 2019 Q4 characteristics of firms issuing in March-May 2020. Green bars are 2019 Q4 characteristics of firms issuing in March - May 2017-2019



(a) Ratings of bonds issued



(b) Days since last issuance

Figure 7 – Bond issuer characteristics: COVID vs. Normal times

Source: Mergent FISD, retrieved via WRDS October 21, 2020. **Notes:** Blue bars are characteristics of firms issuing in March-May 2020. Green bars are characteristics of firms issuing in March - May 2017-2019

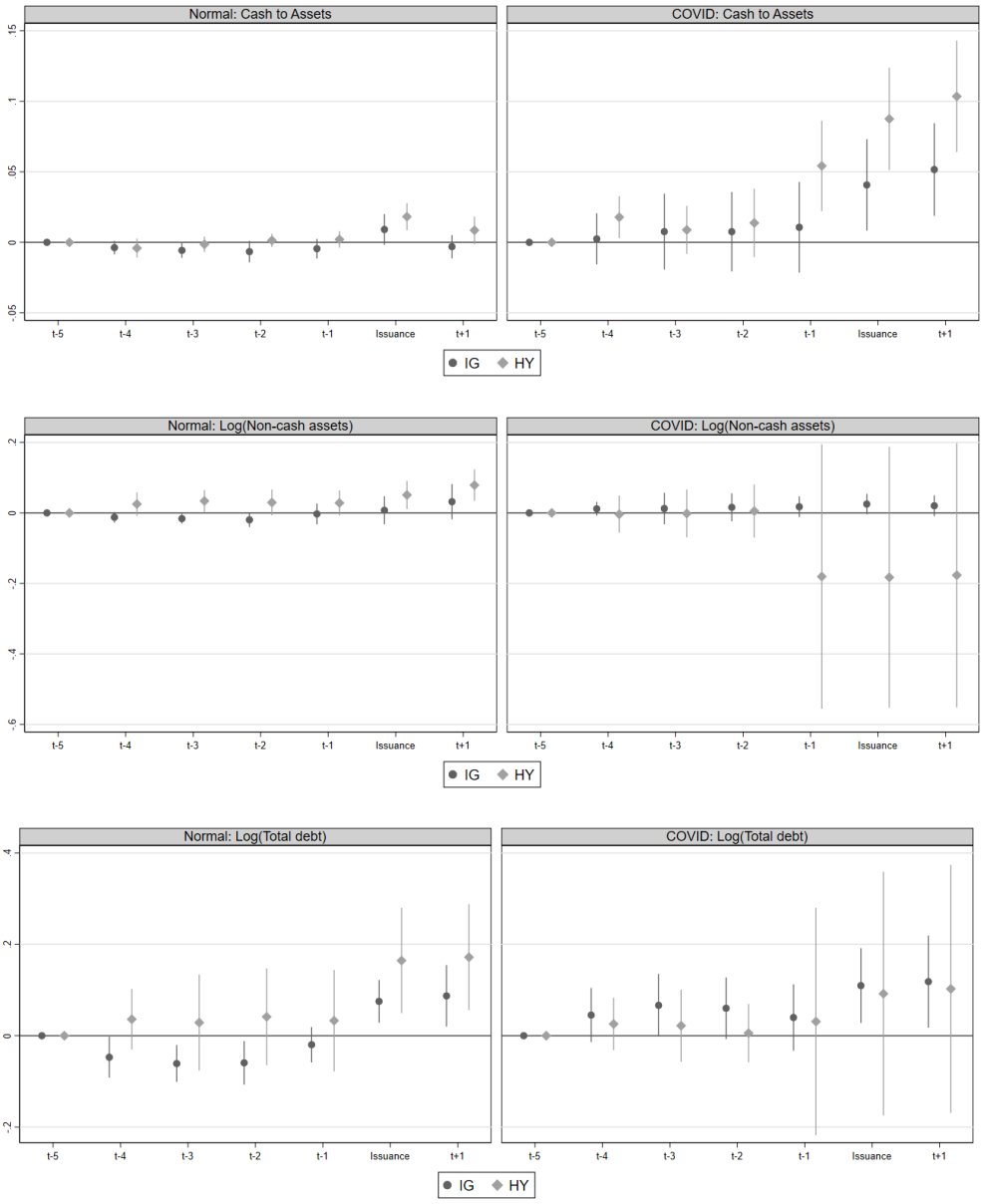


Figure 8 – Coefficient plots: Balance sheet items

Notes: Each point is an estimate of β_{t+m} from the regression $Y_{fq} = \sum_{m=-4}^{1} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \gamma' X_{fq} + \epsilon_{fq}$, with 95% confidence intervals. The blue points are investment grade firms (rated BBB- and above), while the red points are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and two quarters following a bond issuance. $cash\_assets\_w$ is $cheq/atq$, winsorized at the 1% level. $log\_non\_cash\_ta$ is the log of $(atq - cheq)$. Total debt is $dlttq + dlcq$, total LT debt plus debt in current liabilities. "Normal" times includes bonds issued between 2017-2019, while "Covid" times includes bonds issued between March 1 - May 31, 2020.

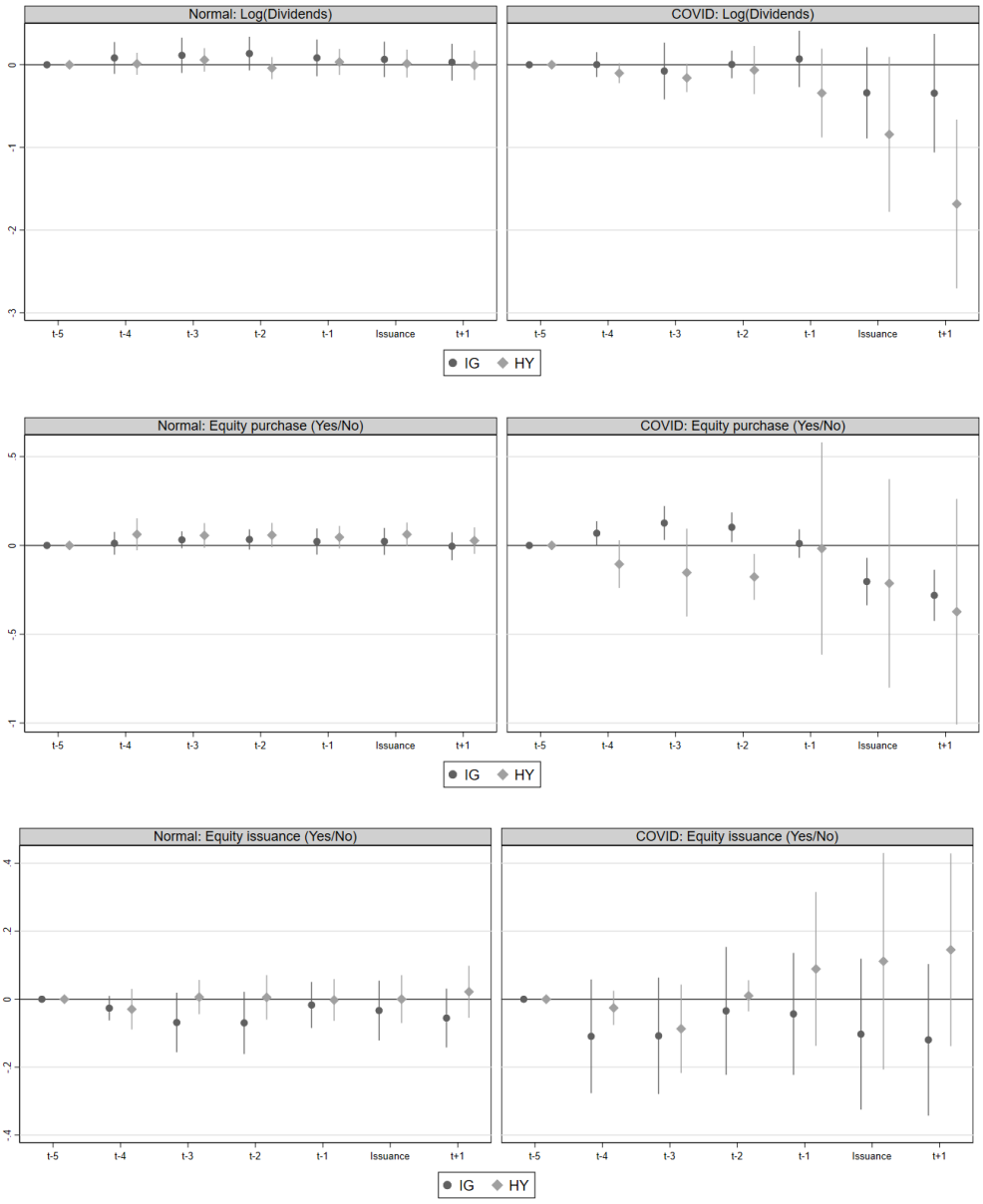
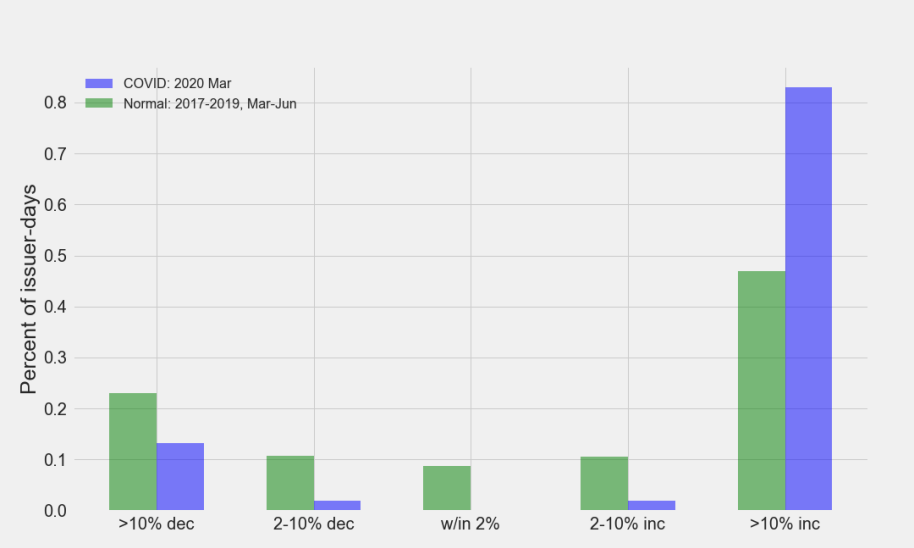


Figure 9 – Coefficient plots: Equity payout items

Notes: Each point is an estimate of β_{t+m} from the regression $Y_{fq} = \sum_{m=-4}^{1} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \gamma' X_{fq} + \epsilon_{fq}$, with 95% confidence intervals. The blue points are investment grade firms (rated BBB- and above), while the red points are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and two quarters following a bond issuance. *ep_dummy* is an indicator variable that equals 1 if there were positive share repurchases ($prstkc > 0$) in that quarter, and 0 otherwise. *eq_iss* is an indicator variable that equals 1 if there was positive equity issuance ($sstk > 0$) in that quarter, and 0 otherwise. "Normal" times includes bonds issued between 2017-2019, while "Covid" times includes bonds issued between March 1 - May 31, 2020.



(a) Δ Cash

(b) Δ Non-Cash Assets

Figure 10 – Balance sheet adjustments for bond issuers, COVID vs. normal times

Source: Compustat and Mergent FISD, http://bv.mergent.com/view/scripts/MyMOL/index.php, retrieved July 30, 2020.

Notes: Blue bars are characteristics of firms that issued in March 2020. Green bars are characteristics of firms issuing in March - June, 2017-2019. Balance sheet adjustment compares quarter end prior to bond issuance to quarter end immediately following bond issuance.

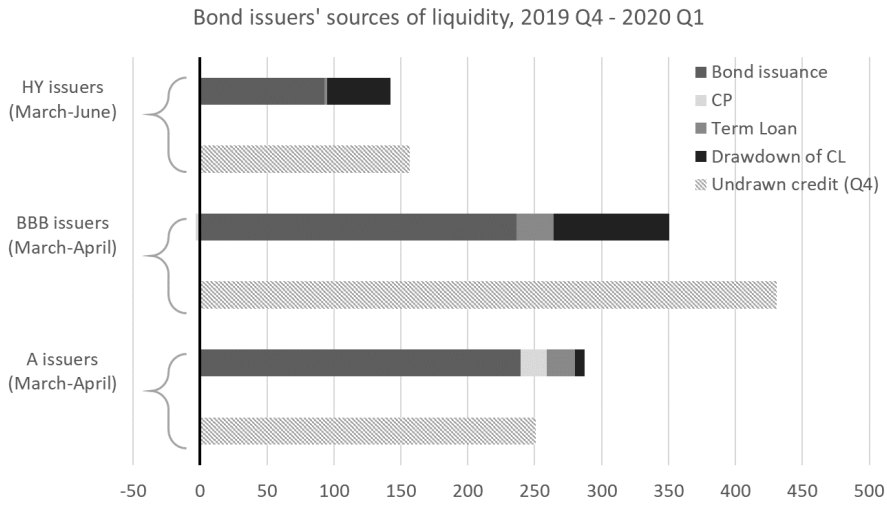


Figure 11 – Visualizing dry powder: Debt Composition Aggregate Flow

Notes: This figure classifies aggregate debt flows based on FISD bond issuance data as well as changes in outstanding debt for other credit instruments during 2020Q1 based on Capital IQ Capital Structure Summary table. Undrawn credit EOY 2019 is the outstanding available Undrawn Revolving Credit at the end of 2019. See Table 11 for underlying numbers.

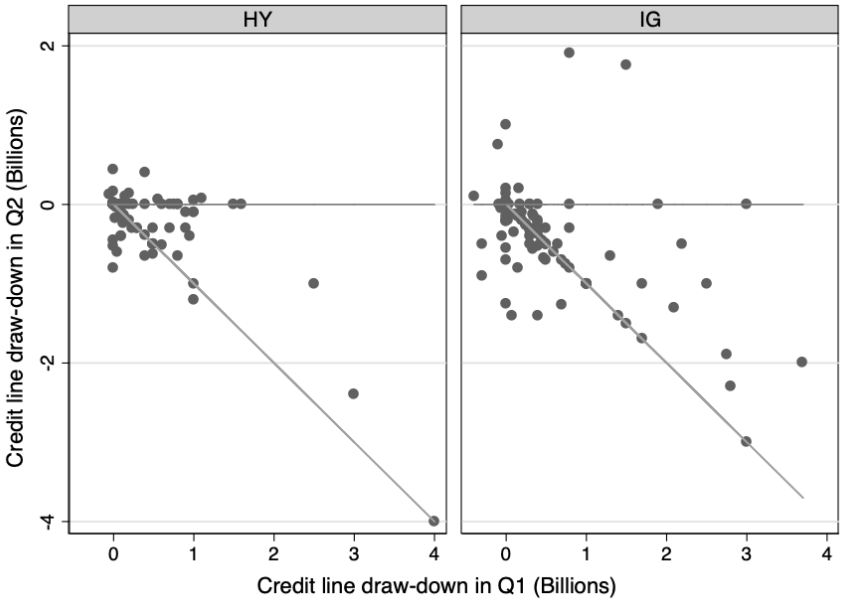


Figure 12 – Visualizing crowding out: Credit line draw-downs in 2020Q2 vs. 2020Q1

Note: This figures plots credit line repayment in 2020Q2 against 2020Q1 credit line draw-downs, based on Capital IQ Capital Structure Summary table, separately by high-yield and investment grade issuers. For ease of interpretation, the figure also displays the negative 45 degree line (exact repayment in Q2) and horizontal line (no change in credit line in Q2). Excludes large outliers Volkswagen, Ford, and GM.

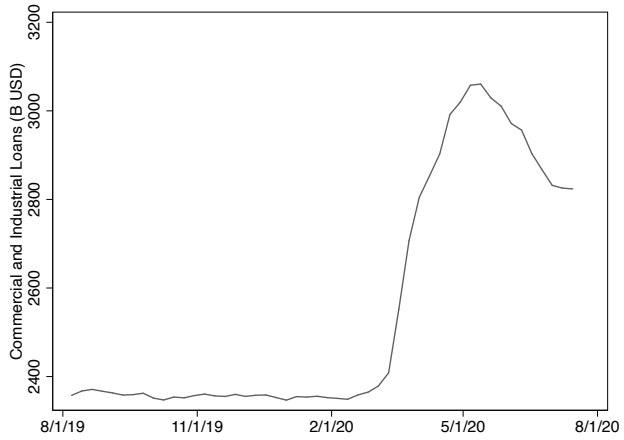


Figure 13 – Aggregate Commercial Lending

Source: Board of Governors of the Federal Reserve System (US), Commercial and Industrial Loans, All Commercial Banks [TOTCI], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/TOTCI, July 29, 2020.

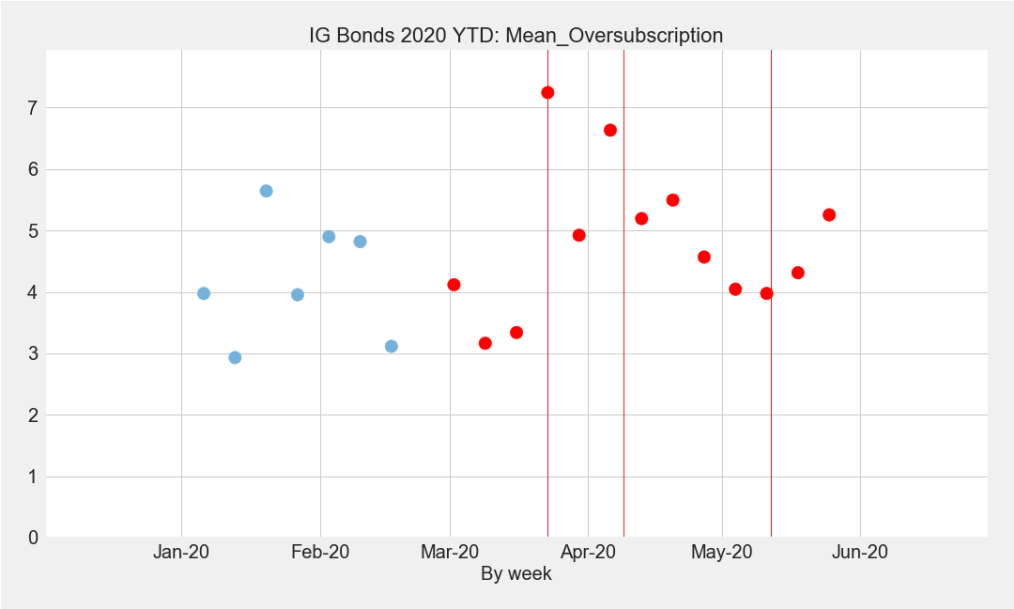


Figure 14 – Oversubscription of orderbooks

Source: Credit Flow Research.

Note: Oversubscription is computed as the ratio of the size of the order book divided by the amount issued, as reported by underwriters of the bond. Reported are weekly averages for each bond's oversubscription ratio

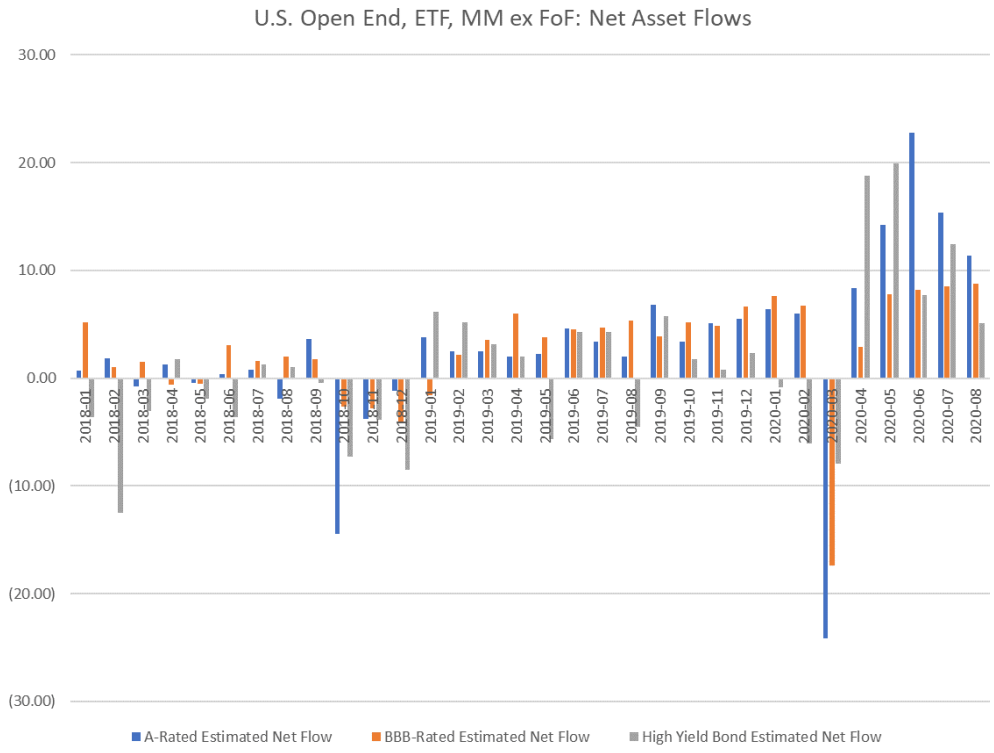
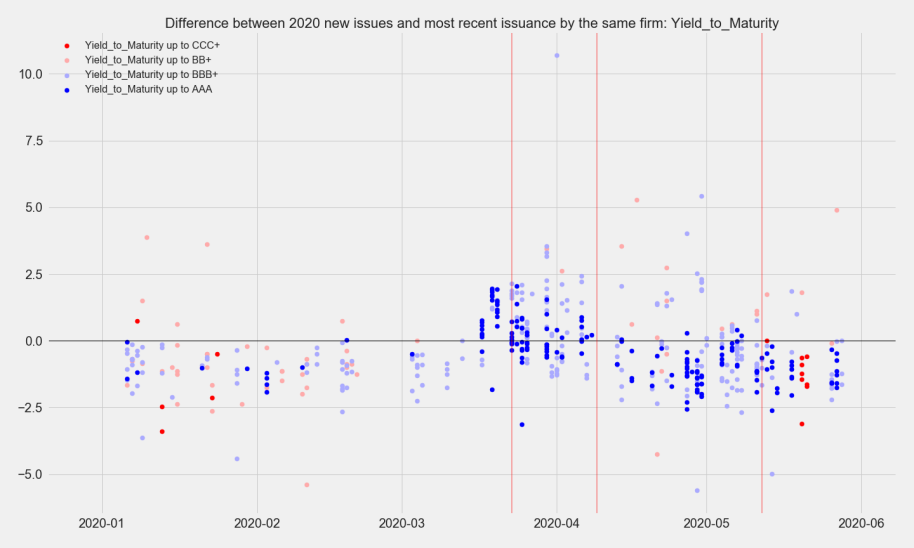


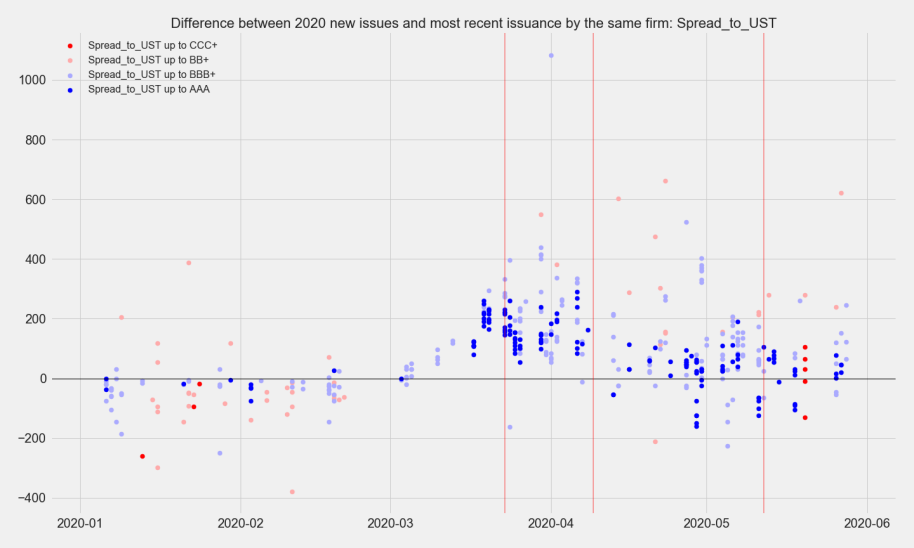
Figure 15 – Monthly net fund flows

Source: Morningstar Direct.

Note: Monthly net fund flows for U.S. open end funds, ETFs, money markets. Excludes funds of funds. Recorded in billions of U.S. dollars. Accessed September 18, 2020.



(a) Yield to maturity vs. most recent issuance by same issuer



(b) Credit spread vs. most recent issuance by same issuer

Figure 16 – Comparing IG vs. HY spreads and yields at issuance, since 2020

Source: Mergent FISD, http://bv.mergent.com/view/scripts/MyMOL/index.php, retrieved July 30, 2020. **Note**: Each point is the yield to maturity (credit spread) on a new issuance, net of the yield to maturity (credit spread) on the most recent issuance by the same issuer of the same tenor (within 1 year). A value greater than zero means the new bond has a higher cost of capital (credit spread) than the most recent bond issued by the same firm. Note red lines correspond to March 23, 2020 (first Fed announcement to buy corporate bonds); April 9, 2020 (first Fed announcement to buy high yield corporate bonds); and May 12, 2020 (start of Fed bond buying program).

References

Viral Acharya and Sascha Steffen. Stress tests" for banks as liquidity insurers in a time of covid. *VoxEU. org, March*, 22, 2020a.

Viral Acharya, Sergei A Davydenko, and Ilya A Strebulaev. Cash holdings and credit risk. *The Review of Financial Studies*, 25(12):3572–3609, 2012.

Viral V Acharya and Guillaume Plantin. Monetary easing, leveraged payouts and lack of investment. 2020.

Viral V Acharya and Sascha Steffen. The risk of being a fallen angel and the corporate dash for cash in the midst of covid. *CEPR COVID Economics*, 10, 2020b.

Viral V Acharya, Heitor Almeida, Filippo Ippolito, and Ander Perez-Orive. Bank lines of credit as contingent liquidity: A study of covenant violations and their implications. 2014.

Viral V. Acharya, Heitor Almeida, Filippo Ippolito, and Ander Perez-Orive. Credit lines and the liquidity insurance channel. Working Paper, 2018.

Tobias Adrian, Paolo Colla, and Hyun Song Shin. Which financial frictions? parsing the evidence from the financial crisis of 2007 to 2009. *NBER Macroeconomics Annual*, 27(1):159–214, 2013.

Heitor Almeida, Murillo Campello, and Michael S Weisbach. The cash flow sensitivity of cash. *The Journal of Finance*, 59(4):1777–1804, 2004.

Heitor Almeida, Murillo Campello, Igor Cunha, and Michael S Weisbach. Corporate liquidity management: A conceptual framework and survey. *Annu. Rev. Financ. Econ.*, 6(1):135–162, 2014.

Óscar Arce, Ricardo Gimeno, and Sergio Mayordomo. The effects of the eurosystem's corporate sector purchase programme on spanish companies. Working Paper, 2018.

Malcolm Baker and Jeffrey Wurgler. Market timing and capital structure. *The journal of finance*, 57 (1):1–32, 2002.

Thomas W Bates, Kathleen M Kahle, and René M Stulz. Why do us firms hold so much more cash than they used to? *The journal of finance*, 64(5):1985–2021, 2009.

Bo Becker and Victoria Ivashina. Cyclicality of credit supply: Firm level evidence. *Journal of Monetary Economics*, 62:76–93, 2014.

Bo Becker and Victoria Ivashina. Covenant-light contracts and creditor coordination. *Riksbank Research Paper Series*, (149):17–1, 2016.

Bo Becker, Murillo Campello, Viktor Thell, and Dong Yan. Debt overhang and the life cycle of callable bonds. *Swedish House of Finance Research Paper*, (18-16), 2018.

Patrick Bolton and Xavier Freixas. Corporate finance and the monetary transmission mechanism. *Review of Financial Studies*, 19(3):829–870, 2006.

Patrick Bolton and David S. Scharfstein. Optimal debt structure and the number of creditors. *Journal of Political Economy*, 104(1):1–25, 1996.

Patrick Bolton, Hui Chen, and Neng Wang. A unified theory of tobin's q, corporate investment, financing, and risk management. *The journal of Finance*, 66(5):1545–1578, 2011.

Patrick Bolton, Hui Chen, and Neng Wang. Market timing, investment, and risk management. *Journal of Financial Economics*, 109(1):40–62, 2013.

Patrick Bolton, Xavier Freixas, Leonardo Gambacorta, and Paolo Emilio Mistrulli. Relationship and transaction lending in a crisis. *Review of Financial Studies*, 29(10):2643–2676, 2016.

Patrick Bolton, Neng Wang, and Jinqiang Yang. Investment under uncertainty with financial constraints. *Journal of Economic Theory*, 184:104912, 2019.

Patrick Bolton, Neng Wang, and Jinqiang Yang. Leverage dynamics and financial flexibility. Technical report, National Bureau of Economic Research, 2020.

Joshua Bosshardt and Ali Kakhbod. Why did firms draw down their credit lines during the covid-19 shutdown? *Available at SSRN 3696981*, 2020.

Nina Boyarchenko, Anna T Kovner, and Or Shachar. It's what you say and what you buy: A holistic evaluation of the corporate credit facilities. 2020.

Michael Bradley and Michael R Roberts. The structure and pricing of corporate debt covenants. *The Quarterly Journal of Finance*, 5(02):1550001, 2015.

Markus Brunnermeier and Arvind Krishnamurthy. Corporate debt overhang and credit policy. In *Conference draft, Brookings Papers on Economic Activity*, 2020a.

Markus Brunnermeier and Arvind Krishnamurthy. The macroeconomics of corporate debt. *The Review of Corporate Finance Studies*, 2020b.

Sudheer Chava and Michael R Roberts. How does financing impact investment? the role of debt covenants. *The journal of finance*, 63(5):2085–2121, 2008.

Gabriel Chodorow-Reich and Antonio Falato. The loan covenant channel: How bank health transmits to the real economy. Technical report, National Bureau of Economic Research, 2017.

Gabriel Chodorow-Reich, Olivier Darmouni, Stephan Luck, and Matthew Plosser. Bank liquidity provision across the firm size distribution. 2020. Working Paper.

Nicolas Crouzet. Aggregate implications of corporate debt choices. *Review of Economic Studies*, 85 (3):1635–1682, 2017.

Nicolas Crouzet. Credit disintermediation and monetary policy. *Working Paper*, 2019.

Nicolas Crouzet and Fabrice Tourre. Can the cure kill the patient? corporate credit interventions and debt overhang. Working Paper, 2018.

Olivier Darmouni, Oliver Giesecke, and Alexander Rodnyansky. The bond lending channel of monetary policy. *Available at SSRN 3419235*, 2019.

Fiorella De Fiore and Harald Uhlig. Corporate debt structure and the financial crisis. *Journal of Money, Credit and Banking*, 47(8):1571–1598, 2015.

Roberto A. De Santis and Andrea Zaghini. Unconventional monetary policy and corporate bond issuance. 2019.

Antonio De Vito and Juan-Pedro Gomez. Estimating the covid-19 cash crunch: Global evidence and policy. *Journal of Accounting and Public Policy*, page 106741, 2020.

Peter M DeMarzo and Yuliy Sannikov. Optimal security design and dynamic capital structure in a continuous-time agency model. *The Journal of Finance*, 61(6):2681–2724, 2006.

David J Denis and Valeriy Sibilkov. Financial constraints, investment, and the value of cash holdings. *The Review of Financial Studies*, 23(1):247–269, 2010.

Douglas W. Diamond. Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy*, 99(4):689–721, 1991.

Andrea L Eisfeldt and Tyler Muir. Aggregate external financing and savings waves. *Journal of Monetary Economics*, 84:116–133, 2016.

David Elliott, Ralf R. Meisenzahl, José-Luis Peydró, and Bryce C. Turner. Nonbanks, banks, and monetary policy: Us loan-level evidence since the 1990s. *Working Paper*, 2019.

Aytekin Ertan, Anya Kleymenova, and Marcel Tuijn. Financial intermediation through financial disintermediation: Evidence from the ecb corporate sector purchase programme. *Fama-Miller Working Paper*, pages 18–06, 2019.

Rüdiger Fahlenbrach, Kevin Rageth, and René M Stulz. How valuable is financial flexibility when revenue stops? evidence from the covid-19 crisis. Technical report, National Bureau of Economic Research, 2020.

Antonio Falato, Itay Goldstein, and Ali Hortaçsu. Financial fragility in the covid-19 crisis: The case of investment funds in corporate bond markets. Technical report, National Bureau of Economic Research, 2020.

Joan Farre-Mensa, Roni Michaely, and Martin C Schmalz. Financing payouts. *Ross School of Business Paper*, (1263), 2018.

Thomas Flanagan and Amiyatosh Purnanandam. Corporate bond purchases after covid-19: Who did the fed buy and how did the markets respond? *Available at SSRN 3668342*, 2020.

C Fritz Foley, Jay C Hartzell, Sheridan Titman, and Garry Twite. Why do firms hold so much cash? a tax-based explanation. *Journal of financial economics*, 86(3):579–607, 2007.

Evan Gatev and Philip E Strahan. Banks' advantage in hedging liquidity risk: Theory and evidence from the commercial paper market. *The Journal of Finance*, 61(2):867–892, 2006.

Erasmo Giambona, Rafael Matta, Jose-Luis Peydro, and Ye Wang. Quantitative easing, investment, and safe assets: The corporate-bond lending channel.

Simon Gilchrist, Bin Wei, Vivian Z Yue, and Egon Zakrajšek. The fed takes on corporate credit risk: An analysis of the efficacy of the smccf. Technical report, National Bureau of Economic Research, 2020.

John R Graham and Mark T Leary. The evolution of corporate cash. *The Review of Financial Studies*, 31(11):4288–4344, 2018.

Daniel Green. Corporate refinancing, covenants, and the agency cost of debt. *Covenants, and the Agency Cost of Debt (December 18, 2018)*, 2018.

Daniel Greenwald et al. Firm debt covenants and the macroeconomy: The interest coverage channel. *Manuscript, July*, 2019.

Daniel L Greenwald, John Krainer, and Pascal Paul. The credit line channel. Federal Reserve Bank of San Francisco, 2020.

Benjamin Grosse-Rueschkamp, Sascha Steffen, and Daniel Streitz. A capital structure channel of monetary policy. *Journal of Financial Economics*, 133(2):357–378, 2019.

Valentin Haddad, Alan Moreira, and Tyler Muir. When selling becomes viral: Disruptions in debt markets in the covid-19 crisis and the fed's response. Technical report, National Bureau of Economic Research, 2020.

Michael Halling, Jin Yu, and Josef Zechner. How did covid-19 affect firms' access to public capital markets? *The Review of Corporate Finance Studies*, 2020a.

Michael Halling, Jin Yu, and Josef Zechner. The dynamics of corporate debt structure. 2020b.

Federic Holm-Hadulla and Claire Thürwächter. Heterogeneity in corporate debt structures and the transmission of monetary policy. Working Paper, 2020.

Bengt Holmstrom and Jean Tirole. Financial intermediation, loanable funds, and the real sector. *the Quarterly Journal of economics*, 112(3):663–691, 1997.

Bengt Holmström and Jean Tirole. Private and public supply of liquidity. *Journal of Political Economy*, 106(1):1–40, 1998.

Filippo Ippolito, Ali K. Ozdagli, and Ander Perez-Orive. The transmission of monetary policy through bank lending: The floating rate channel. *Journal of Monetary Economics*, 95:49–71, 2018.

Victoria Ivashina and David Scharfstein. Bank lending during the financial crisis of 2008. *Journal of Financial economics*, 97(3):319–338, 2010.

Matthias Kahl, Jason Lunn, and Mattias Nilsson. Operating leverage and corporate financial policies. In *AFA 2012 Chicago Meetings Paper*, 2019.

Mahyar Kargar, Benjamin T Lester, David Lindsay, Shuo Liu, and Pierre-Oliver Weill. Corporate bond liquidity during the covid-19 crisis. *Covid Economics*, 27:31–47, 2020.

Anil K. Kashyap, Jeremy C. Stein, and David W. Wilcox. Monetary policy and credit conditions: Evidence from the composition of external finance: Reply. *American Economic Review*, 86(1): 310–314, 1996.

Anil K Kashyap, Raghuram Rajan, and Jeremy C Stein. Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. *The Journal of finance*, 57(1):33–73, 2002.

Stéphane Lhuissier and Urszula Szczerbowicz. Monetary policy and corporate debt structure. Working Paper, 2018.

Lei Li, Philip E Strahan, and Song Zhang. Banks as lenders of first resort: Evidence from the covid-19 crisis. Technical report, National Bureau of Economic Research, 2020.

Chen Lian and Yueran Ma. Anatomy of corporate borrowing constraints. *Unpublished working paper*, 2018.

J Nellie Liang. Corporate bond market dysfunction during covid-19 and lessons from the fed's response. 2020.

Yiming Ma, Kairong Xiao, and Yao Zeng. Mutual fund liquidity transformation and reverse flight to liquidity. *Available at SSRN 3640861*, 2020.

OECD. The world economy at risk. *OECD Economic Outlook, Interim Report March*, 2020.

Maureen O'Hara and Xing Alex Zhou. Anatomy of a liquidity crisis: Corporate bonds in the covid-19 crisis. *Available at SSRN 3615155*, 2020.

Tim Opler, Lee Pinkowitz, René Stulz, and Rohan Williamson. The determinants and implications of corporate cash holdings. *Journal of financial economics*, 52(1):3–46, 1999.

Mitchell A Petersen and Raghuram G Rajan. The benefits of lending relationships: Evidence from small business data. *The journal of finance*, 49(1):3–37, 1994.

Raghuram G. Rajan. Insiders and outsiders: The choice between informed and arm's-length debt. *Journal of Finance*, 47(4):1367–1400, 1992.

Leigh A Riddick and Toni M Whited. The corporate propensity to save. *The Journal of Finance*, 64 (4):1729–1766, 2009.

Michael R Roberts and Michael Schwert. Interest rates and the design of financial contracts. Technical report, National Bureau of Economic Research, 2020.

Michael Schwert. Bank capital and lending relationships. *The Journal of Finance*, 73(2):787–830, 2018.

Michael Schwert. Does borrowing from banks cost more than borrowing from the market? *The Journal of Finance*, 75(2):905–947, 2020.

Kerry Siani. Global demand spillovers in corporate bond issuance: The effect of underwriter networks. *Available at SSRN 3508937*, 2019.

Amir Sufi. Bank lines of credit in corporate finance: An empirical analysis. *The Review of Financial Studies*, 22(3):1057–1088, 2009.

Karamfil Todorov. Quantify the quantitative easing: Impact on bonds and corporate debt issuance. *Journal of Financial Economics*, 135(2):340–358, 2020.

Jasmine Xiao. Borrowing to save and investment dynamics. *Available at SSRN 3478294*, 2018.

Qiping Xu. Kicking maturity down the road: early refinancing and maturity management in the corporate bond market. *The Review of Financial Studies*, 31(8):3061–3097, 2018.

Internet Appendix

Table 16 – Variable Definitions

Variable	Data source	Compustat code	Definition
Cash	Compustat	che	Cash and short term investments
Cash_assets	Compustat	$\frac{che}{at}$	Cash and short term investments, scaled by total assets. (winsorized at 1%)
Non-cash assets	Compustat	$at - che$	Total assets - cash and short term investments
Leverage	Compustat	$(dltt + dlc)/at$	Total debt / Total assets (winsorized at 1%)
Cpltd_debt	Compustat	$dd1/(dltt + dlc)$	Current portion of LT debt / Total debt (winsorized at 1%)
Net equity payout	Compustat	$(prstkcq - sstkq)/atq$	Net equity purchases, scaled by total assets (winsorized at 1%)
Total payout	Compustat	$\frac{prstkcq - sstkq + dvq}{atq}$	(Net equity purchases + dividends)/total assets (winsorized at 1%)
Log_dvy_q	Compustat	$log(dvq)$	Log of (Quarterly dividend payments (winsorized at 1%))
Log_gross_payout	Compustat	$log(prstkcq + dvq)$	Log of (Equity purchases + dividend payments)
ROA	Compustat	$\frac{oibdpq}{at}$	Operating income / total assets (winsorized at 1%)
Cash flow	Compustat	oancf	Quarterly operating cash flow
Profit	Compustat	ni	Quarterly net income
Credit spread	Mergent FISD	treasury_spread	Credit spread relative to benchmark US Treasury (basis points)
Yield to maturity	Mergent FISD	offering_yield	Yield to maturity on bond at issuance
Rating	Mergent FISD		Credit rating at issuance by Moody's, S&P, and Fitch: median if 3 ratings, minimum if 2 ratings; see Table 17

Notes: Quarterly ratios are winsorized at 1%.

Table 17 – Credit Rating Legend

Moody's	**S&P**	**Fitch**	**Numerical**
Aaa	AAA	AAA	22
Aa1	AA+	AA+	21
Aa2	AA	AA	20
Aa3	AA-	AA-	19
A1	A+	A+	18
A2	A	A	17
A3	A-	A-	16
Baa1	BBB+	BBB+	15
Baa2	BBB	BBB	14
Baa3	BBB-	BBB-	13
Ba1	BB+	BB+	12
Ba2	BB	BB	11
Ba3	BB-	BB-	10
B1	B+	B+	9
B2	B	B	8
B3	B-	B-	7
Caa1	CCC+	CCC+	6
Caa2	CCC	CCC	5
Caa3	CCC-	CCC-	4
Ca	CC	CC	3
C	C	C	2
C	D	D	1