# Bond Market Stimulus: Firm-Level Evidence from 2020-21*

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**Abstract**

Using micro-data on corporate balance sheets, we study firm behavior after the unprecedented policy support to corporate bond markets in 2020. As bond yields fell, firms issued bonds to accumulate large and persistent amounts of liquid assets instead of investing. Conceptually, the benefits depend on how highly bond issuers valued this liquidity at the margin. We show they generally had access to bank liquidity that they chose not to use: many issuers left their credit lines untouched, while others used bonds to repay existing loans. Moreover, equity payouts remained high: almost half of issuers still repurchased shares in Spring 2020.

*Keywords*: Corporate bonds, unconventional monetary policy, corporate liquidity
*JEL codes*: G23, E44, G32, E52

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# Introduction

The corporate bond market took center stage in the recent COVID crisis. In the midst of a "dash for cash" [Acharya and Steffen, 2020b], March witnessed significant market turmoil that included sudden spikes in credit spreads and outflows from bond funds, liquidity drying up, and a drop in new issuance. This turmoil triggered a spectacular change in the Federal Reserve credit policy and direct support for the corporate bond market for the first time ever through a series of announcements in March and April. There is considerable evidence that this intervention led to a remarkable "V-shaped recovery" in bond markets in a matter of weeks. Credit spreads fell abruptly, fund outflows were reversed, and liquidity was restored, ultimately leading to record bond issuance volume.[1] The Fed intervention aimed to "support market functioning", but importantly it also targeted "employment and spending of businesses", in the words of Chairman Powell.[2] While it is clear that the Federal Reserve revitalized *markets*, there are still some open questions regarding the net effects on *firms* and the real sector. In particular, the transmission channel of such unconventional monetary policy is not well understood.

To this end, this paper studies firm behavior in the wake of the intervention using micro-data on corporate balance sheets. We ask a central empirical question: what did bond issuers do with the funds? We link bond issuance data with firm-level outcomes, following firms up to a year after the intervention, and document the dynamics of real investment, cash, bank credit, and equity payouts. We find that firms issued bonds to accumulate large and persistent amounts of liquid assets instead of investing. Conceptually, the benefits depend on how valuable this additional liquidity was to firms. We show that these firms generally had access to bank liquidity that they chose not to use and equity payouts remained high, raising the question of how highly many issuers valued this additional liquidity at the margin.

[1] For detailed micro-evidence, including high-frequency analysis of the announcements effects of the bond purchasing program, see Haddad et al. [2021a], Gilchrist et al. [2020], Kargar et al. [2020], Boyarchenko et al. [2020], Halling et al. [2020a], O'Hara and Zhou [2020], Falato et al. [2020], Becker and Benmelech [2021].

[2] Semiannual Monetary Policy Report to the Congress, June 16th, 2020.

We first provide evidence that, unlike normal times, 2020 bond issuers used bond proceeds to accumulate liquid assets. Importantly, this accumulated cash was still largely unspent by early 2021, up to a year after issuance. On the other hand, there was virtually no increase in real assets, consistent with investment opportunities being depressed through 2020. For example, Chevron issued $650 million in bonds on March 24th, but cut its 2020 capital spending plan by $4 billion. Acharya and Steffen [2020b] first identified that the safest firms issued bonds to raise cash at the start of the COVID crisis. The Fed intervention allowed riskier firms to do the same.

Our finding that firms borrowed to accumulate cash is at odds with state-of-the-art macroeconomic models of monetary transmission that assume that firms borrow to finance investment [Kaplan et al., 2018, Ottonello and Winberry, 2020, Auclert et al., 2020]. However, dynamic corporate finance models that stress the value of corporate liquidity can explain this behavior: firms preemptively lock-in long-term financing when it is temporarily plentiful [Bolton et al., 2013, Eisfeldt and Muir, 2016, Acharya et al., 2020b]. Nevertheless, in theory, the marginal value of additional liquidity declines with the total financial slack available to the firm. For this reason, it is important not to consider bond financing in isolation. The next two parts of the paper thus investigate available bank credit and equity payouts, respectively.

Using data on credit lines, we document two new facts that suggest that many bond issuers were apparently far from a binding credit limit. First, many firms left their existing credit lines untouched while instead issuing bonds. For example, CVS had over $6 billion in credit line available, yet it still issued $4 billion in BBB-rated bonds. Strikingly, both riskier high yield (HY) and safer investment grade (IG) firms often chose not to use their available "dry powder" from banks that had been arranged before the crisis. Almost 30% of HY firms that issued bonds received no new net bank funding between January and March. The pattern is even stronger for BBB-rated IG firms, which were responsible for the bulk of bond issuance in this period, with 50% not drawing on their existing credit lines. Importantly, establishing this fact requires looking at data on off-balance sheet bank credit, an important source of liquidity

for firms.

Second, issuers that did borrow from their banks early in the crisis aggressively repaid these loans by issuing bonds after the intervention. Among HY issuers that received bank funds in March, nearly three quarters repaid some amount after their bond issuance, while 40% actually repaid their credit line in full by the end of June 2020. 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 and used these funds to repay its credit line. Kraft was far from an isolated example: among HY issuers repaying bank loans, the median firm paid back 100% of its Q1 borrowing, representing 54% of its bond issuance. 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 $110 billion was repaid by bond issuers to banks between April and June alone.

These findings suggest revisiting classical theories of the choice between bonds and bank loans. The view that bond issuance in bad times is primarily driven by weak balance sheets of banks, given compelling evidence from the previous crisis [Becker and Ivashina, 2014, 2018], seems less plausible in this setting.[3] Moreover, even though bond yields fell, it is not obvious in the data that bonds became cheaper than loans for these firms in this period. Nevertheless, differences in other contract terms, such as longer maturity, fixed interest rates, or weaker covenants for bonds could explain the substitution even if relative prices did not change much: the core logic is to lock-in funds for as long as possible. While this is intuitive, classical theories of banks' advantage in liquidity provision over capital markets tend to ignore this aspect of borrower demand.[4]

[3]There was no concurrent banking crisis to depress loan supply to the same extent as in 2008-09. Banks entered the crisis with strong balance sheets, received large deposit inflows and were able to lend extensively, at least to large firms in the form of credit lines draw-downs [Acharya and Steffen, 2020b, Li et al., 2020, Greenwald et al., 2020, Chodorow-Reich et al., 2020]. This is not to say that there were no disruptions in loan markets, in particular for small firms [Greenwald et al., 2020, Chodorow-Reich et al., 2020, Kapan and Minoiu, 2021, Acharya et al., 2020b]. The market for term loans for large firms was also disrupted [Becker and Benmelech, 2021], partly because of institutional investors [Fleckenstein et al., 2020].

[4]Classical corporate finance models predict that bank loans are more attractive to borrowers needing emergency liquidity, while capital markets fund investment in good times. Different theories of the advantage of bank debt have been proposed: in Holmström and Tirole [1998] credit lines committed in advance provide

A second open question relates to the effects on equity payouts. Acharya and Plantin [2021] raise the concern that loose monetary policy can lead to leveraged payouts. In normal times, it is not uncommon for bond issuance to finance share repurchases [Farre-Mensa et al., 2018, Ma, 2019]. During COVID, though, the probability of repurchasing shares following bond issuance fell by about 20 percentage points. This is consistent with some firms aiming to preserve cash on their balance sheets, as covered widely in the news media.[5] However, it is important to note that almost 50% of issuers still repurchased shares between March and June 2020, in a period of high uncertainty. At face value, this evidence questions how highly many issuers valued additional liquidity at the margin and suggests the large reduction in yields following the intervention might have unintentionally fueled opportunistic issuance.

Our findings also suggest that the 2020 Federal Reserve program had a different transmission mechanism relative to the 2016 ECB corporate bond purchase program. While both programs had similar effects on markets by reducing yields and stimulating issuance, the effect on firms' balance sheets was strikingly different: Grosse-Rueschkamp et al. [2019] find no effect on cash holdings, credit line balances, or share repurchases. At a broad level, both programs led to bond-loan substitution, but in quite distinct ways given the different settings.

Evidence from 2020-21 can thus help to draw a more complete picture of how corporate bond purchases by central banks transmit to the real economy. It highlights the value of not just looking at market data, such as yields and issuance volumes, but also at firms' balance sheets and operations throughout the months following the intervention. Our evidence also points to considerable heterogeneity among issuers and to the practical challenge for central banks of how to best target these unconventional policy actions, in order to help firms that need liquidity the most. The events of 2020 show that a closer integration of corporate finance and macroeconomics is an important agenda for further research.

liquidity insurance; in Kashyap et al. [1996] and Gatev and Strahan [2006], having a deposits franchise decreases the cost of providing liquidity; in Diamond [1991] or Rajan [1992] bank have superior monitoring ability.

[5]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. Interestingly, Hotchkiss et al. [2020] shows that equity issuance was important for smaller and riskier firms that typically do not issue bonds.

**Related literature:** This paper contributes to our understanding of unconventional monetary policy, and specifically measures aimed at the corporate bond market. While there is extensive evidence that the Federal Reserve actions lowered bond yields and stimulated issuance in 2020,[6] we provide a first step towards understanding real effects by documenting the dynamics of firms' real investment, cash, bank credit, and equity payouts, up to a year after the intervention. Our evidence relates to the debate on whether asset purchase programs stimulate firm investment or only lead to capital structure changes [Stein, 2012, Giambona et al., 2020]. We also show that the effect of the 2020 intervention on firm's balance sheets was different from the CSPP implemented in Europe.[7]

The goal of this paper is to provide evidence on the transmission channel in order to inform the micro-foundations of state-of-the-art macroeconomic models of monetary transmission [Ottonello and Winberry, 2020, Kaplan et al., 2018, Auclert et al., 2020]. Just as the Global Financial Crisis showed that financial intermediation was more complex than previously thought and needed a proper place in macro-finance models, evidence from 2020-21 highlights the complexity and importance of bond markets and corporate finance for the macro-economy. Nevertheless, estimating the full macroeconomic effects is beyond the scope of this paper, and our reduced-form evidence is not the proper counterfactual to assess what would have happened absent the intervention.

This paper is also part of a growing literature on corporate financing during the COVID crisis. We build on Acharya and Steffen [2020b] who link bond ratings with credit line drawdowns and bond issuance in the early part of the COVID crisis by studying the later period after the intervention and following firms into early 2021. Moreover, Halling et al. [2020a] show that aggregate equity issuance was an order of magnitude smaller than bond issuance,

[6]See for instance Boyarchenko et al. [2020], Haddad et al. [2021a], Kargar et al. [2020], O'Hara and Zhou [2020], Gilchrist et al. [2020], Liang [2020], Flanagan and Purnanandam [2020], Vissing-Jorgensen [2020].

[7]See Grosse-Rueschkamp et al. [2019], Ertan et al. [2019], Arce et al. [2021]. Other work examining the effect of conventional and unconventional monetary policy on the bond market include Kashyap et al. [1996], Crouzet [2019], Lhuissier and Szczerbowicz [2018], Todorov [2020], Pegoraro and Montagna [2021], De Santis and Zaghini [2019], Ippolito et al. [2018], Holm-Hadulla and Thürwächter [2020], Bolton and Freixas [2006], Elliott et al. [2019], Giambona et al. [2020], Siani [2019], Darmouni et al. [2019].

but Hotchkiss et al. [2020] argues that equity was the predominant form of financing for small, young, and unrated firms, while the larger firms we focus on relied entirely on debt. While Li et al. [2020], Greenwald et al. [2020], Chodorow-Reich et al. [2020] show that only large firms benefited from the large increase in bank lending, we show that many bond issuers did not in fact use bank funding even before the intervention. Becker and Benmelech [2021] document the resilience of the corporate bond market relative to loans markets. We view these results as highly complementary, reinforcing the view that bond markets should not be considered in isolation and that sources of financing vary in the cross-section of firms.

Finally, we also contribute to the literature trying to understand the role of the bond market in corporate finance. Given compelling evidence from the Global Financial Crisis, prior work has argued that the key driver of bond issuance in bad times is weak balance sheets of banks [Becker and Ivashina, 2014, Crouzet, 2017, De Fiore and Uhlig, 2015, Schwert, 2018, Adrian et al., 2013, Erel et al., 2012]. Our evidence shows that during the COVID crisis, which did not originate in the banking sector, bonds were largely revealed-preferred to loans, suggesting that this is unlikely to be the only force at play. Furthermore, the conventional view stresses that bond financing is used to fund investment, while bank credit lines are used for liquidity management [Acharya et al., 2020a].[8] The fact that bond issuance was broadly used to expand liquidity buffers and competed with credit lines suggests that the bond market is more central to corporate liquidity management than previously thought. Interestingly, the economics behind bond issuance seem quite different from commercial paper, which is typically seen as the main source of market-based liquidity for firms. Lastly, we relate to prior work on bond-financed payouts [Acharya and Plantin, 2021, Ma, 2019, Farre-Mensa et al., 2018].

[8]This squares with evidence that many large firms keep sizeable credit lines with banks, even if they have access to the bond market for investment [Sufi, 2009, Acharya et al., 2020a, Greenwald et al., 2020].

# 1 Background and Data

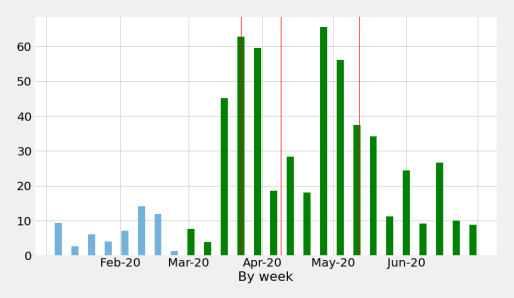
There was a significant increase in the need for corporate liquidity following the COVID shock in early 2020. Many firms faced large reductions in operating income and rising uncertainty in spring 2020 [De Vito and Gomez, 2020, OECD, 2020]. A "dash for cash" ensued [Acharya and Steffen, 2020b], as cash-generating operations halted and firms resorted to a variety of measures to alleviate severe cash shortfalls.

Moreover, bond markets took center stage in early 2020. First, the onset of the crisis saw significant disruptions in secondary markets. In March, we observed sudden spikes in spreads and outflows from bond funds as secondary market liquidity dried up [Haddad et al., 2021a, Kargar et al., 2020, O'Hara and Zhou, 2020, Falato et al., 2020, Ma et al., 2020]. Issuance in primary markets plummeted to a near stop, especially for riskier firms. This bond market turmoil triggered a spectacular response by the Federal Reserve. In addition to lowering the policy rate back to zero, providing liquidity to dealers and purchasing large quantities of Treasuries bonds, it also directly supported the market for the first time by announcing the purchases of corporate bonds.

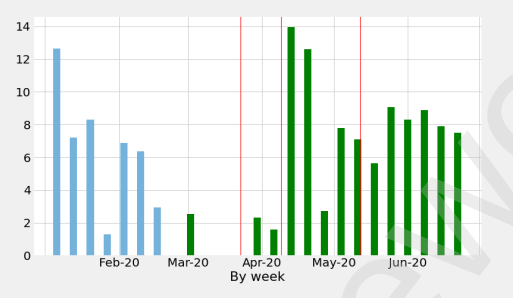
These announcements on March 23 and April 9 had a significant effect on bond markets. High-frequency analysis using secondary market data shows that these two dates had the strongest effects and stand out even compared to the battery of other emergency measures taken during this period [Haddad et al., 2021a]. In turn, this market rebound spilled over to primary markets: issuance quickly reached historical heights leading to a remarkable "V-shaped recovery" in bond markets in a matter of weeks, including for riskier firms.[9]

Figure 1 illustrates these dynamics for both the investment-grade (IG) and high-yield (HY) markets. 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

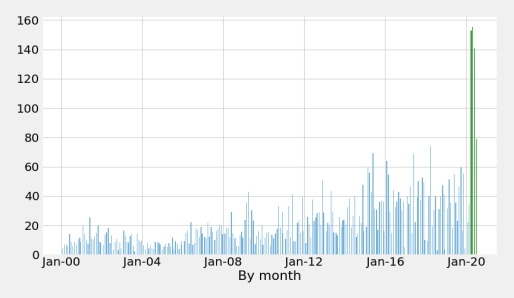
[9]Note also that it is well understood that the intervention worked mainly through an announcement effect: actual purchases did not occur until weeks later and ended up being small given the strong market recovery. For more micro-evidence on secondary and primary markets during the Spring 2020 crisis, see Halling et al. [2020a], Boyarchenko et al. [2020], Gilchrist et al. [2020], Liang [2020].



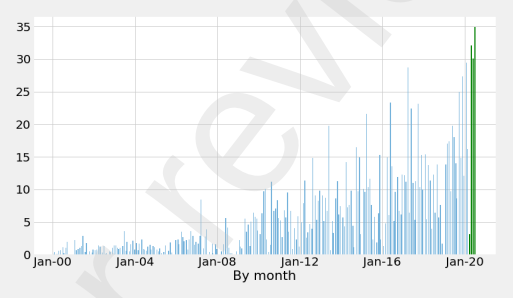

(a) IG: 2020




(b) HY: 2020




(c) IG: 2000-2020




(d) HY: 2000-2020

Figure 1 – Comparing IG vs. HY bond issuance volumes

**Source:** Mergent FISD, retrieved via WRDS October 21, 2020. Denotes weekly issuance volumes for USD corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in U.S. dollars. 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).

in March 2020.[10] Similarly, IG bond issuance hit over $500 billion in volume issued by May, compared with over $200 billion over the same period in 2019.

While it quickly became clear that the Federal Reserve's announcements of its intent to purchase bonds revitalized markets, there are still some open questions regarding the net effects on firms and the real sector. The goal of this paper is to study firm behavior in the wake of the intervention and draw implications for monetary policy. We take the market rebound as given and ask a central empirical question: What did bond issuers do with the funds? This firm-level evidence is a key first step to better understanding the transmission mechanism. Nevertheless, we note from the outset that estimating the full macroeconomic effects is beyond

[10]Becker and Benmelech [2021] and Hotchkiss et al. [2020] find that the number of HY issuers was nevertheless below trend initially. Section 4 shows however that HY issuance strengthened in the second half of 2020, in line with HY yields falling more slowly relative to IG.

the scope of this paper: our reduced-form evidence is not the proper counterfactual to assess what would have happened absent the intervention.[11]

We construct a panel data set covering all U.S. non-financial bond issuers in the past two decades. Our main empirical analysis compares the behavior of bond issuers in the post-intervention "COVID" period of March 23 to June 30, 2020 with those of the "normal" period of 2010-2019. Additional tests use issuance data all the way back to 2000, as well as through December 2020. Importantly, we follow 2020 issuers' balance sheets into early 2021, up to one year after their first 2020 issuance. This is key to understanding the impact on firms beyond the immediate market rebound.

Bond issuance data comes from Mergent FISD, which includes detailed security-level data on corporate bond offerings. 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 registered bonds issued directly in exchange for an identical Rule 144A bond.[12] We merge the issuance data with quarterly balance sheet data from Compustat and quarterly debt composition from Capital IQ. The filters and merges yield a sample of 313 firms issuing 594 bonds during the COVID period, and 1,256 firms issuing 6,443 bonds in the "normal period".[13]

[11]Note that the difference-in-difference design of high-frequency studies looking at relative changes in secondary market spreads around eligibility threshold [Kargar et al., 2020, Boyarchenko et al., 2020, O'Hara and Zhou, 2020, Gilchrist et al., 2020] are difficult to replicate when studying primary markets and low-frequency firm-level outcomes. This is in part because the Fed announcements seemed to have had very broad effects on issuance, beyond specific eligibility criteria. For instance, the programs targeted especially bonds with maturities below five years, which is much shorter than the average maturity of the bonds issued in the COVID-19 period [Halling et al., 2020a].

[12]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. We also do not focus on equity issuance, given that bond issuance was significantly larger during this period (USD 300 billion versus USD 16 billion) [Halling et al., 2020a]. However, interestingly Hotchkiss et al. [2020] show that equity, not debt, was the predominant form of financing for small, young, and unrated firms.

[13]We are able to match 87% of bonds in our sample to firms in Compustat. 46% 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 90% of matched issuing firms that either report financial statements in U.S. dollars or are domiciled in the U.S.

Tables IA.1 and IA.2 in Internet Appendix display summary statistics of our baseline sample.[14] During the peak COVID episode of March-May 2020, the median bond was $600 million with an eight-year tenor and a yield of 4.07%. In the same months of the years 2017-2019, the median bond size was $500 million with an eight year tenor and yield of 5.125%.[15]

The 2020 crisis was an unusual episode, but it is in fact particularly interesting to study in this context for two reasons. First, there was a significant increase in the need for corporate liquidity due to high uncertainty and reductions in operating income, while investment opportunities were depressed [OECD, 2020]. This is useful because classical theories suggest bond demand is driven by investment rather than liquidity needs. Indeed, it is well understood that many large firms prefer bonds to loans when it comes to financing long-term investment: high-quality firms fund long-term projects with bonds, while lower-quality firms rely on banks [Diamond, 1991, Holmstrom and Tirole, 1997]. On the other hand, even large firms are thought to rely on bank loans to weather cash-flows shocks, specifically in the form of credit lines draw-downs [Holmström and Tirole, 1998, Kashyap et al., 2002, Gatev and Strahan, 2006, Sufi, 2009, Acharya et al., 2020a, Greenwald et al., 2020]. These theories would thus predict low bond issuance and greater reliance on bank loans during the 2020 crisis.

Second, there was no concurrent banking crisis to depress loan supply to the same extent as in 2008-09. This is useful because a common concern is that liquidity shocks for firms are often correlated with bank liquidity shocks. For instance, during the 2008-09 financial crisis, weak bank balance sheets led to a drastic fall in loan supply, which led many firms to turn to the bond markets [Becker and Ivashina, 2014, Crouzet, 2017, De Fiore and Uhlig, 2015, Adrian et al., 2013]. On the other hand, banks entered 2020 with strong balance sheets and received large deposit inflows. There is considerable evidence that they were able to lend extensively to large firms in the form of credit lines draw-downs [Acharya and Steffen, 2020b,

[14] Firms that issue in bond markets are on the larger end of the distribution of all firms. In 2019, the median bond issuer had $10.7 billion in total assets and $1.2 billion in quarterly revenues at year end, compared to the median Compustat firm with $1.5 billion in assets and $195 million in quarterly revenues.

[15] Table IA.11 also shows that secured bonds were more common during COVID, consistent with the long-term evidence of Benmelech et al. [2020], although they still constituted a small share of issuance.

Li et al., 2020, Greenwald et al., 2020, Chodorow-Reich et al., 2020]. [16] However, this is not to say that there were no disruptions in loans markets, in particular for small firms [Greenwald et al., 2020, Chodorow-Reich et al., 2020, Kapan and Minoiu, 2021, Acharya et al., 2020b]. The market for term loans for large firms was also disrupted [Becker and Benmelech, 2021, Fleckenstein et al., 2020]. For these reasons, when analyzing firms' choices between loans and bonds, we will focus on the credit line draw-down activity of bond issuers, as this segment faced little turmoil compared to the 2008-09 crisis.

# 2 Liquid Assets vs. Real Investment

This section revisits a classical macroeconomic paradigm in the light of 2020 data. State-of-the-art macroeconomic models of monetary transmission typically assume that firms borrow to finance investment [Kaplan et al., 2018, Ottonello and Winberry, 2020, Auclert et al., 2020]. According to this view, an intervention that stimulates credit should have a direct effect on investment. These models tend to abstract from corporate liquidity, assuming that cash is equivalent to negative debt. This contrasts with a long-standing focus in dynamic corporate finance to relate external financing to liquidity management (see for example Bolton et al. [2011]).

To investigate this, we examine quarterly changes in firms' balance sheets around bond issuance. We compare firms that issued between March 23 and June 30, 2020 to "normal times", defined as 2010-2019. Importantly, we trace out the effects on firms' balance sheets through early 2021, up to one year after the intervention. We run an *event study analysis* by regressing firm balance sheet quantities on dummy variables for each of the five quarters

[16] Interestingly, while banks reported tightened lending standards in 2020, they cited deterioration of fundamentals rather than conventional balance sheet constraints as the primary reason. According to the Federal Reserve Senior Loan Officer Survey April 2020 Survey, while 60% of large banks tightened lending standards, less than 10 percent of respondents said it was due to a deterioration in their current/expected capital or liquidity position. Instead, the vast majority of banks cited a less favorable economic outlook or worsening of industry-specific problems as very important reasons for tightening credit.

leading up to issuance and the four quarters following issuance.

$$Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,q+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq} \quad (1)$$

We run the regression separately for issuance during normal times vs. issuance during COVID. Then we plot the time dummy coefficients, $\beta_m$, to visualize the pre- and post-trends of balance sheet quantities in both periods. The analysis exploits within-firm variation by including firm fixed effects in order to account for the selection of firms into bond issuance. We also include industry-year fixed effects. To capture firm heterogeneity, our main specification is run separately for IG and HY, while additional cross-sectional tests also consider different exposure to the COVID shock and pre-shock balance sheet strength measures such as liquidity and short-term leverage.

**Cash accumulation:** We first find striking evidence of cash accumulation following issuance. The top panel of Figure 2 shows the dynamic coefficients plots for cash as a ratio of prior year assets in both periods. Issuance during COVID is followed by a large increase in cash levels that is highly persistent. Importantly, the cash accumulated was still largely unspent four quarters after issuance in early 2021. In contrast, in normal times, cash holdings rise modestly and revert within two quarters following issuance.[17]

Both the safest investment-grade firms as well as high-yield issuers exhibit this behavior. Acharya and Steffen [2020b] first identified that the safest firms issued bonds to raise cash at the start of the COVID crisis. The Federal Reserve intervention appears to have enabled riskier firms to do the same, with cash levels staying persistently high throughout the year.

Note also during COVID, cash had started to increase in the quarter prior to bond issuance. This reflects that firms sought out alternative sources of cash (such as drawing down on a bank credit line) before the intervention. We provide novel evidence on the direct link between credit lines draw-downs and bond issuance extensively in Section 3.

[17] Figure IA.1 in the Internet Appendix shows that average cash accumulation after issuance during COVID was higher relative to the Global Financial Crisis, in line with the cash-flow shocks being larger and more sudden in 2020. See Xiao [2020] and Erel et al. [2012] for broad evidence on the GFC.

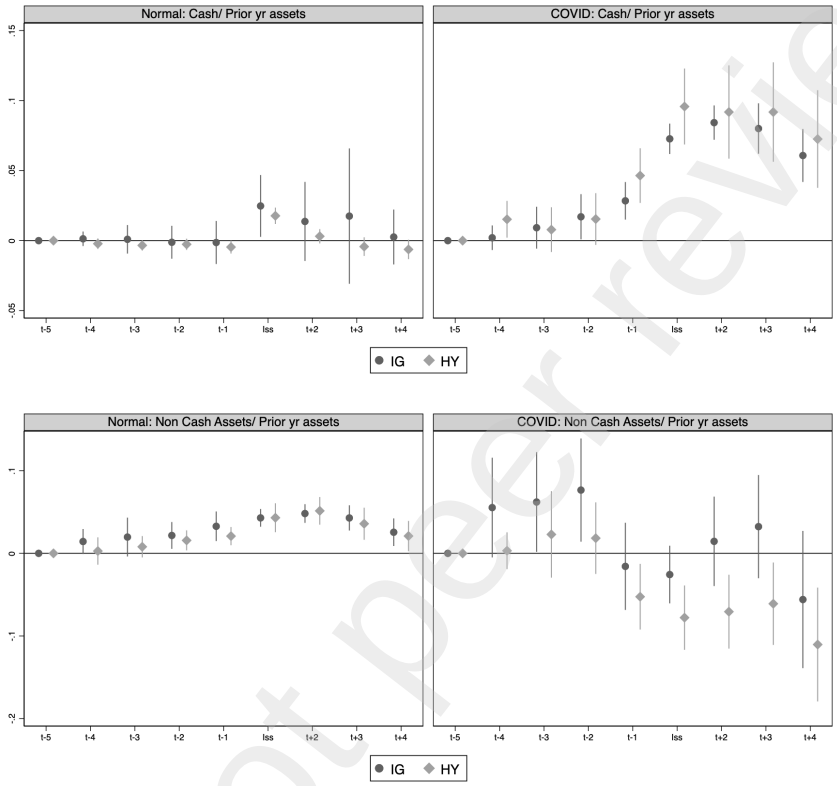



Figure 2 – Liquid Assets vs. Real Assets: Coefficient plots

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. "Cash" is cash and short term investments. "Non-cash assets" is total assets minus cash and short term investments. The circles are investment grade firms (rated BBB- and above), while the diamonds are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance. We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. All ratios are winsorized at the 1% level in the entire sample. To further limit the effects of outliers, variables are further winsorized at the 1% level for HY firms in the "Normal" times, as well as for IG firms' cash ratio in "Covid" times. "Normal" times includes bonds issued between 2010-2019, "Covid" times includes bonds issued March 23 - June 30, 2020.

**Real investment:** It is also apparent that real investment did not follow a similar pattern. The second panel in Figure 2 shows the dynamics of non-cash assets as a proxy for investment in operating activity. Prior to COVID, bonds are typically issued in periods in which the firm is growing and investing, in line with Becker and Josephson [2016] or Darmouni and Papoutsi [2020]. However, that is not the case during COVID: bond issuance does not coincide with an increase in real investment, even at a horizon of a full year. This is particularly stark for HY issuers that experience a persistent reduction in real assets throughout 2020.

Intuitively, these results are consistent with investment opportunities being depressed after March 2020 and many firms preferring to preserve cash in the face of uncertainty. An illuminating example is Chevron, which raised $650 million in bond capital on March 24th, and explicitly said that it would not use these funds for investment. Instead, it planned 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 was disconnected from any quick rebound in real activity.

These reduced-form results are striking but should nevertheless be interpreted with care. They do not imply that the intervention crowded-out real investment. Indeed, firms such as Chevron reported a lack of desire to invest. It is at least equally plausible that the intervention instead crowded-in investment: investment might have been even lower if firms did not increase cash balances through debt issuance.

One might expect that liquidity accumulation is concentrated in issuers that are more directly exposed to the shock. However, micro data suggest the pattern is more subtle. For instance, Hotchkiss et al. [2020] document a U-shaped relationship between cash flow shocks and external financing raised. Table IA.3 in the Internet Appendix delves further into this heterogeneity among bond issuers by running additional cross-sectional regressions. In our sample of COVID issuers, Column 1 of Table IA.3 shows that exposure to COVID, measured with industry abnormal employment decline in 2020Q1 as in Chodorow-Reich et al. [2020],

matters perhaps less than expected: more exposed firms only accumulate weakly higher cash balances. Firms with higher initial cash balances in fact tend to also increase cash relatively more. Having more debt due soon or less available undrawn credit has no predictive power.[18] In fact, dynamic corporate finance theories often emphasize that direct cash-flow shocks are not the only drivers of external financing, as we discuss next.

**Connection to existing theories:** Importantly, firm behavior was at odds with state-of-the-art macroeconomic models of monetary transmission [Kaplan et al., 2018, Ottonello and Winberry, 2020, Auclert et al., 2020]. These models assume that firms borrow to finance investment and would fail to match the striking pattern of debt issuance for the purpose of accumulating liquid assets. Because cash is equivalent to negative debt, borrowing to hoard cash has effectively no value.

However, dynamic corporate finance models have stressed the value of accumulating liquidity when facing cash-flows shocks and an increase in uncertainty, even if the immediate investment response is weak. In particular, they can explain the concurrent external financing and cash accumulation observed in the data. The models of Bolton et al. [2013], Eisfeldt and Muir [2016] or Acharya et al. [2020b] are among the clearest in illustrating this channel. Specifically, in the presence of time-varying financial conditions, firms have incentives to pre-emptively lock-in long-term financing when it is temporarily plentiful. Moreover, they use the funds to accumulate liquid assets instead of investing, as we observe in the data. This channel squares well with the fact that emergency measures by the Federal Reserve implemented in Spring 2020 significantly improved credit conditions for firms.

Conceptually, this suggests revisiting the micro-foundations of the transmission channel. Instead of the investment multiplier of classical macroeconomic models, these theories would stress *the value of corporate liquidity*: i.e. that in the presence of financial frictions, a dollar inside the firm can be worth more than a dollar outside. However, the marginal value of additional liquidity is theoretically declining in total financial slack available to the firm [Bolton

[18] In fact, firms with higher COVID exposure increase real assets relatively more, possibly because of increases in working capital. Higher initial cash balances also predict higher increases in real assets.

et al., 2011]. For this reason, it is important not to consider bond financing in isolation. Bond issuers are among the largest firms with access to other sources of financing. While directly measuring financial constraints in the data is notoriously difficult, our micro-data nevertheless contains information about other margins. As a first cut, we thus examine the dynamics of total debt on the balance sheet. The next two sections examine bank credit and equity payouts, respectively.[19]

**Debt dynamics:** The top panel of Figure 3 investigates to what extent bond proceeds were used to repay existing debt. Bond issuance in normal times is followed by a persistent increase in total debt of 10% of prior year assets. During COVID, however, changes in total debt after issuance were smaller. This is particularly striking for HY issuers: their debt level is surprisingly flat around bond issuance, in stark contrast to normal times. This suggests that these firms used a significant portion of new bond proceeds to pay back existing debt. The bottom panel of Figure 3 isolates the dynamics of bonds only. It is apparent that bonds grew more than total debt after the intervention. This suggests that these firms used a significant portion of bond proceeds to pay back *other* types of debt. Debt substitution was thus a key part of bond issuers' behavior after the Federal Reserve intervention. The next section explores this pattern in detail.

We make two additional observations regarding debt dynamics. First, comparing Figures 2 and 3, we see that the average net increase in bonds outstanding lines up closely with the increase in liquid assets, at about 10% of prior year's assets. This reinforces the quantitative importance of issuing bonds for cash accumulation in 2020.[20] Second, we investigate roll-over risk which was flagged as a major concern in the Spring 2020.[21] Not being able to issue a new bond could be costly for firms that have an existing bond due in 2020, especially for non-IG

[19]The corporate finance models cited above tend to model only equity financing for tractability reasons and abstract from different types of external financing. However, in 2020, large public firms like the ones that we study relied on debt financing [Halling et al., 2020a], while only smaller listed firms issued equity [Hotchkiss et al., 2020].

[20]Table IA.4 in the Internet Appendix calculates aggregate flows for our sample of COVID issuers. In aggregate, they increased cash by over $470B and outstanding bonds by $336B in the first half of 2020.

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

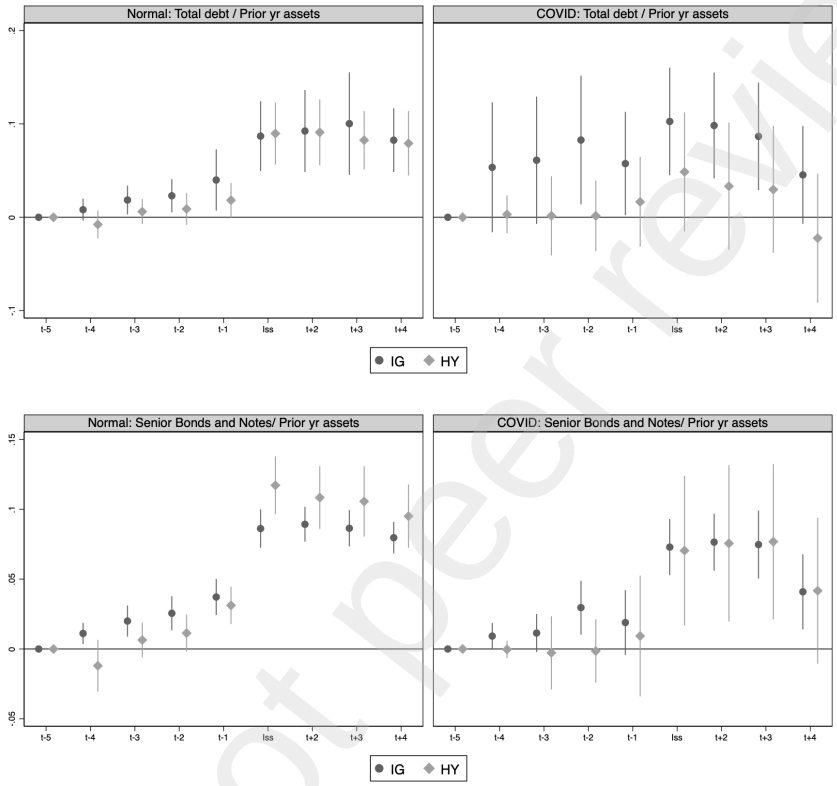



Figure 3 – Debt dynamics: Coefficient plots

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-4}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. Total debt is total long term debt plus debt in current liabilities. Senior bonds and notes are from Capital IQ. The circles are investment grade firms (rated BBB- and above), while the diamonds are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance. We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. All ratios are winsorized at the 1% level in the entire sample. To further limit the effects of outliers, senior bonds and notes are further winsorized at the 1% level for IG firms. "Normal" times includes bonds issued between 2010-2019, "Covid" times includes bonds issued between March 23 - June 30, 2020.

firms that might get cut off from the market. We find evidence suggesting that immediate rollover risk, while important for some firms, was less likely to be the primary decision factor for issuance during COVID than initially thought. Table IA.5 in the Appendix shows that less than a third of Spring 2020 issuers had a bond coming due later that year. Moreover, over 80% of these issuers were rated investment-grade. Overall, HY issuers with a bond maturing in 2020 made up only 5% of all issuers and 17% of HY issuance volume in Spring 2020. Additional cross-sectional tests in Table IA.3 as well as below confirm that current-debt-to-assets ratios have little to no significant explanatory power in our sample.[22]

# 3 Bonds vs. Bank Loans

To understand the benefits of the liquidity accumulation documented in Section 2, it is important not to consider bond financing in isolation. The marginal value of additional liquidity is higher for firms that have less financial slack. Large firms have access to multiple sources of financing, including bank loans and bonds, and can substitute between the two. Indeed, even the largest bond issuers have large credit lines with banks [Sufi, 2009, Acharya et al., 2020a, Greenwald et al., 2020] and in recent years, while term loans did not keep up with bond issuance, undrawn credit lines have grown significantly [Berg et al., 2020].

Classical theories in fact predict that bank debt is more attractive to borrowers facing liquidity needs.[23] Impaired loan supply would however lead firms to turn to the bond market [Becker and Ivashina, 2014]. Given that the 2020 shock originated outside of the banking sector, the conventional view suggests that credit line draw-downs should dominate bond issuance in this period, in line with the evidence of extensive borrowing by large firms [Li et al., 2020, Greenwald et al., 2020, Chodorow-Reich et al., 2020].

This section sheds new light on this question by focusing directly on the revealed preference

[22] Section 4 discusses the evidence on early refinancing of bonds that mature at later dates.

[23] Different (non-exclusive) channels have been proposed: in Holmström and Tirole [1998], credit lines committed in advance provide liquidity insurance; in Kashyap et al. [1996] and Gatev and Strahan [2006], having a deposits franchise decreases the cost of providing liquidity; in Diamond [1991] or Rajan [1992], banks have superior monitoring ability.

of firms choosing between bonds and bank credit using micro-data on bank loans. We match our issuance data with information on each issuer's debt composition from Capital IQ.[24] These data contain information on amount outstanding of different debt instruments, including drawn amounts on revolving credit lines and total bank debt. It also includes information on undrawn (off-balance sheet) credit lines that were available as the COVID crisis unfolded. As debt composition data is reported only at quarter end, we approximate flows by computing differences between quarters. We break down the COVID part of the analysis into two periods: (i) the first quarter of 2020 (early part of the crisis) and (ii) the second quarter of 2020 (later part of the crisis, after the intervention).

## 3.1 Issuing Bonds when Bank Credit was Already Committed

We first show that many firms left their existing credit lines untouched in the first quarter of 2020 and issued bonds instead. To start, we lay out aggregate credit flows for all firms that issued bonds during COVID in Table 1. We split firms into three separate categories based on their credit ratings. Investment grade issuers with BBB credit ratings had $340 billion in available credit committed by their banks as of end of 2019. By March 2020, these firms only drew down on $88 billion in aggregate, roughly one quarter of the total amount available. These firms instead opted to raise capital in bond markets, issuing $263 billion of bonds. The safest, A-rated firms exhibit a similar pattern, drawing down on 3.5% of credit available and opting to raise $209 billion in bonds instead. While the gap between bond issuance and credit lines is smaller for high yield firms, a large majority of funds raised in the bond market could similarly have come from drawing on existing credit lines. High yield firms in our sample issued over $104 billion in bonds in Q1 2020. These firms, in aggregate, had $116 billion in availability in bank credit lines as of the end of 2019. Figure IA.2 in the Internet Appendix illustrates this unused aggregate dry powder visually.

[24] For the COVID analysis, we can match 283 issuers to Capital IQ bank credit line data. Table IA.6 shows that in general bond issuers matched to Capital IQ seem to have identical characteristics relative to all issuers, in 2020 as well as in earlier periods.

Table 1 – Debt Composition: Aggregate Flows over 2020Q1

| | HY Billions of USD | IG, BBB Billions of USD | IG, A or above Billions of USD |
|---|---|---|---|
| Bond issuance | 104.2 | 262.9 | 209.1 |
| Credit line | 59.1 | 87.7 | 7.68 |
| All bank debt | 66.8 | 117.4 | 22.5 |
| Undrawn credit EOY 2019 | 115.7 | 339.4 | 220.6 |

**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 on Capital IQ Capital Structure Summary table (Rows 2 and 3). Undrawn credit EOY 2019 is the outstanding available Undrawn Revolving Credit at the end of 2019. Issuers include all U.S. firms that issued a bond March 23 - June 30 2020 that we could merge with Capital IQ information.

As an example, CVS had $6 billion of its credit line available at the beginning of 2020, yet it still issued $4 billion in BBB-rated bonds. We show that CVS was far from an isolated case, and strikingly, this behavior includes many riskier HY firms. Table 2 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 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.[25] The fourth row reports the share of firms that did not receive bank funding, in net, in the first quarter, aggregating all forms of bank debt. The fifth row reports average draw-down rates, defined as the ratio of additional revolving credit over available credit at the end of 2019.

For the riskiest firms that issued between March 23rd and June 30th, only 27% had maxed out their credit line by end of March, and the average draw-down rate was 47%. Looking beyond credit lines and including all potential sources of bank debt does not change the

[25]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, McDonald'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.

Table 2 – Bank borrowing in 2020Q1 for bond issuers

| | HY Share | IG, BBB Share | IG, A or above Share |
|---|---|---|---|
| Maxed out CL | 0.27 | 0.15 | 0.098 |
| Drew some CL | 0.44 | 0.37 | 0.20 |
| Did not draw CL | 0.28 | 0.48 | 0.71 |
| No net bank funds | 0.28 | 0.35 | 0.61 |
| Av. drawdown rate | 0.47 | 0.27 | 0.098 |

**Notes:** This table classifies bond issuers based on changes in outstanding debt for different credit instruments during 2020Q1, based on the Capital IQ Capital Structure Summary tables. Row 1 includes issuers that maxed out their credit lines, i.e. the increase in Revolving Credit is at least 90% of Undrawn Revolving Credit at the end of 2019. Row 2 includes issuers that drew some of their credit lines, i.e. the increase in Revolving Credit as a ratio of Undrawn Revolving Credit at the end of 2019 is between 0% and 90%. Row 3 includes issuers that did not draw, i.e. the increase in Revolving Credit is 0 or less. Row 4 includes issuers with no net bank funding, defined as the sum of Revolving Credit, Term Loans and Federal Home Loan Bank borrowings. Row 5 reports the average increase in the drawdown rate, defined as the ratio of Revolving Credit to the Undrawn Revolving Credit at the end of 2019. Bond issuers are all U.S. firms that issued a bond March 23 - June 30, 2020 that we could merge with Capital IQ.

picture: 28% 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 ex ante, that they decided not to use early on in 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, although there is still a risk gradient within this group. Among firms rated BBB (the riskiest IG issuers), 48% left their credit line untouched and 35% did not get any additional bank funds, in net, in the first quarter of 2020. For BBB firms that did draw down on their credit line, on average they only took advantage of 27% of available credit capacity. For the safest firms, rated A or above, 71% left their credit line untouched and the draw-down rate was only 10% on average.

This difference across rating categories is consistent with differences in draw-downs described in Acharya and Steffen [2020b] and predicted in Acharya and Steffen [2020a]. In addition to ratings, part of the heterogeneity across firms can also be explained by different exposure to the COVID shock. Table IA.7 in the Internet Appendix shows that exposure to

the COVID shock predicts credit line draw-downs in our cross-section of bond issuers. Moreover, firms with larger undrawn credit lines balances from 2019 were more likely to draw but less likely to max out. Other balance sheet characteristics, such as lower initial cash balances or higher current debt ratios, do not have much predictive power once accounting for other factors.

One possibility is that undrawn credit was in fact restricted by banks, for instance because of actual or potential covenant violations. Three pieces of evidence tend to speak against this interpretation: the extensive borrowing by large firms [Li et al., 2020, Greenwald et al., 2020, Chodorow-Reich et al., 2020], the apparent lack of enforcement around covenant violations in 2020 [Acharya et al., 2021], and the observation that riskier issuers drew more.

Our evidence suggests the link between credit lines and bond issuance might not be as simple as initially thought. The simplest view is that bond issuers first drew on credit lines and then issued bonds later because markets were shut off until the Federal Reserve intervention. However, this view is incomplete: the majority of bond issuers, including many riskier firms, left their credit lines untouched throughout the crisis. While primarily large firms drew on their credit lines during this episode [Li et al., 2020, Chodorow-Reich et al., 2020, Greenwald et al., 2020], not all chose to do so, and in particular, many bond issuers chose not to draw. Importantly, while not drawing down on credit lines preserves liquidity, this is a sign that many bond issuers had a significant amount of financial slack in Spring 2020.

## 3.2 Repaying Bank Loans After Issuing Bonds

Next, we examine whether firms use proceeds from bond issuance to repay bank loans. The previous section documents significant heterogeneity among bond issuers at the outset of the crisis: a minority of bond issuers did rely heavily on bank lending at first. In this section, we investigate changes in these firms' debt composition during the second quarter of 2020.

We find that a large share of firms that did borrow from their banks early in the crisis issued bonds in Q2 2020 to aggressively repay their bank loans. For example, Kraft Heinz, a

"fallen angel" which was downgraded from IG to HY in February 2020, drew $4 billion from its credit line between February and March. In May after the intervention, it issued $3.5 billion of bonds (up from a planned $1.5 billion, due to strong investor demand) and used these funds to repay its credit line in its entirety. Within the span of 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 not unique. Figure 4 illustrates the cross-section of repayment behavior by plotting credit line draw-downs in Q1 against draw-downs 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, like Kraft Heinz. These firms borrowed from available bank credit lines only to pay back 100% of bank borrowings following a bond issuance. 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 firms borrowing more in the second quarter.

Table IA.8 in the Internet Appendix provides more detail on the distribution of credit line repayments. Panel A shows that among all HY issuers, 72% of these repaid some amount of credit line after their bond issuance. In fact, 40% actually repaid their credit line *in full*, and only a few borrowed additional funds from banks in the second quarter. Panel B shows the distribution of credit line repayment as a fraction of either (1) Q1 draw-down or (2) bond issuance, conditional on repaying. Among HY issuers repaying bank loans, the median firm paid back 100% of its Q1 borrowing, representing 54% of their bond issuance. These patterns are similar for IG firms, although a smaller share drew on their credit lines in the first place. 91% of BBB firms that drew down on their bank credit line in Q1 repaid their bank in Q2 following bond issuance, with the median also repaying 100%. The safest, A-rated firms exhibit a similar pattern, with the vast majority (over 77%) of firms repaying 100% of Q1 credit line borrowings in Q2 following bond issuance. Table IA.9 in the Internet Appendix provides some aggregate magnitudes. We estimate that at least $111 billion was repaid by

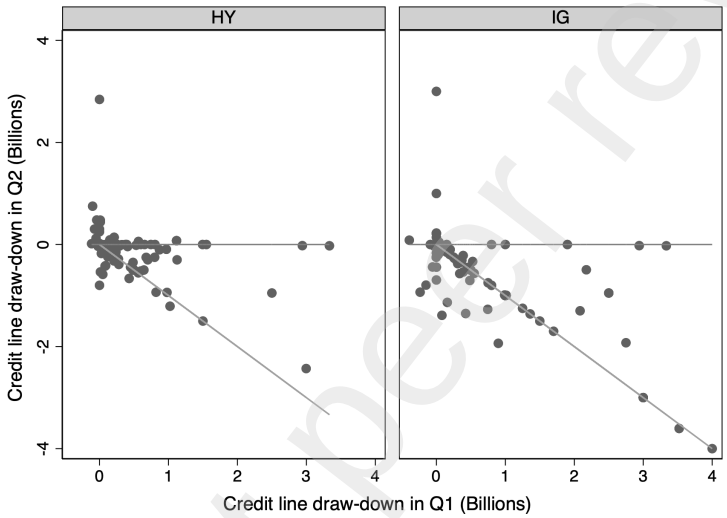



Figure 4 – Loan-bond substitution: Credit line draw-downs in 2020Q2 vs. 2020Q1

**Note:** This figures plots credit line repayment in 2020Q2 against 2020Q1 credit line draw-downs, based on Capital IQ Capital Structure Summary tables, separately for 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). Issuers include all U.S. firms that issued a bond March 23 - June 30 2020 that we could merge with Capital IQ information. For clarity, the plots excludes large outliers Volkswagen, Ford, and GM.

bond issuers to banks between April and June 2020 alone.[26]

Again, while repaying credit lines does preserve liquidity, this is another sign that bond issuers had significant financial slack in Spring 2020. It is plausible that issuers expected other shocks to materialize in the future, making this additional dry powder more valuable. Nevertheless, at least conceptually, the marginal value of additional liquidity is lower if firms have access to more financial slack.

## 3.3 Mechanism

Overall, the evidence in this section suggests that the main narrative for bond-loan substitution in bad times should be revisited. Indeed, the conventional view is that the key driver of bond issuance in bad times is weak balance sheets of banks, based on compelling evidence from the GFC [Becker and Ivashina, 2014, Crouzet, 2017]. In 2020, bonds appeared to be largely *revealed-preferred* to loans although banks' balance sheets were strong and access to credit lines was largely unimpeded for large firms.[27]

The simplest alternative explanation would be that bonds became cheaper relative to loans during this time. This is in fact not as obvious as it is may sound, since it is not sufficient that bond yields have fallen, which is well documented, since loan interest rates have also fallen. It is also well-known that bonds tend to be more expensive than loans.[28] Nevertheless, it is possible that the bond-loan spread shrank during this time. To gauge the potential for this simple explanation, we provide a back of the envelope estimate of the relative cost of

[26]Debt substitution occurs following bond issuance in normal times as well, but to a much smaller extent. Of course, in normal times, liquidity needs are significantly smaller and far fewer firms draw on or repay their credit lines. Figure IA.3 in the Internet Appendix shows the estimates of a dynamic within-firm regression similar to Figure 2 but for credit line draw-downs for a two year window around issuance. Table IA.10 and Figure IA.4 in the Internet Appendix summarize the magnitudes of draw-downs and repayments for the first half of 2019 rather than 2020. No IG bond issuers maxed out on their credit lines, and only 1.7% of HY firms maxed out on their credit lines; 58% of the riskiest bond issuers did not draw down on their credit lines.

[27]Of course, our results should not be interpreted as bank lending being unimportant for firms' access to liquidity. In fact, many firms do not have access to bond markets and crucially rely on bank funding. For example, Halling et al. [2020b] argue that while there has been an emphasis on loan-bond substitution in recessions, bank financing still increases for the average US public firm during these times.

[28]This is in large part because bonds are junior to bank loans. Schwert [2020] uses firm-level variation to estimate the level of the loan-bond spread in a sample of U.S. firms.

bonds vs. loans during this time period. In fact, in aggregate data it is not obvious that the bond-loan spread shrank significantly, consistent with emergency measures affecting both loans and bond markets. Looking at changes between February 14 (before the crisis) to June 30, 2020 (end of our COVID issuance sample, after the market panic and Fed intervention), bond yields were not much lower. For AA rated bonds, yields on ICE BofA US Corporate Index went from 2.18% to 1.57%, an 61bps decrease. For BBB bonds, the fall was even smaller, at 24bps (2.92% to 2.68%), while for BB HY bonds yields actually increased by 159bps (3.52% to 5.11%). Figure IA.5 in the Appendix confirms this pattern using micro-data on bond yields within issuer.

Estimating changes in loan rates is more challenging. One approach followed by Acharya et al. [2021] is to calculate loans spreads using loans traded in the secondary market as part of the U.S. Leveraged Loan Index. Strikingly, they find that if anything, loan spreads *fell more* than bond spreads for firms with rating BB or above in the months following the intervention. A potential limitation though is that credit lines rarely trade in secondary markets. An alternative approach is to directly look at credit line contracts and pricing. On that front, 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 100 to 150bps as the Federal Reserve returned to the zero lower bound. This is about two times greater than the drop in bond yields for highly rated firms. Moreover, micro-data on loan pricing at the firm-level also suggests that it is unlikely that bonds became cheaper than loans: in the sample of COVID issuers for which we were able to find loan pricing in Dealscan, the yield on their 2020 bond was on average 172bps higher than the LIBOR spread of their credit line (176bps for the median). While these different approaches all point against bonds having become obviously cheaper than loans during this time, this is however not definitive evidence and a more thorough analysis of loan vs bond spreads is warranted.[29]

[29]It is well understood that credit line pricing is complex and that the micro-data quality is imperfect. We are able to find all-in-drawn spread information for only 116 out of the 313 firms that composed our main

Nevertheless, differences in other contract terms, such as maturity, interest rate fixation, or covenants could explain the substitution even if relative prices did not change much. Indeed, the core logic is to lock-in funds for as long as possible. Firms' preferences for bonds could thus be explained by them having significantly longer maturities than loans and/or being more likely to be fixed-rate. These differences are well documented for both bonds issued in 2020 and prior years.[30]

As a concrete example, consider again Kraft Heinz. Their May 2020 bond issuance included three tranches with maturity ranging from seven to thirty years, priced at 3.9% to 5.50%. This is a 15-60 basis point higher yield relative to their previous issuance in September 2019 (priced between 3.75% and 4.9%). While the pricing of their credit line is more complex, its maximum spread (accounting for its rating downgrade) was 1.75% over the benchmark rate, which was 1.5% in March and then fell dramatically in spring 2020. The interest expense associated with drawing down on their bank credit line was thus likely lower than issuing bonds, and declined even further in spring 2020. However, their bank loan had a time to maturity between three and four years.[31] Kraft Heinz seemed to prefer the longer-maturity source of funds (bonds) even though it did not appear to have become relatively cheaper.

Finally, it is also possible that bonds having less restrictive covenants than loans might have

sample of March 23-June 30 issuers. Nevertheless, the all-in-drawn spread, although widely used, is only a proxy of the marginal cost of drawing in bad times. Interest rates floors can limit the pass-through, although Roberts and Schwert [2020] estimate that LIBOR floors on loans originated after 2018 are smaller than 50bps. Performance pricing provisions or covenant violations can lead to an increase in loan spreads as borrower creditworthiness deteriorates. On the other hand, the all-in-drawn spread often includes fees that are paid irrespective of drawn amounts, and must thus be deducted to estimate the marginal cost of drawing. There is unfortunately too little data on floors, performance pricing, and fees in our matched sample to conduct a high-frequency analysis of loan pricing in spring 2020. For more details on loan pricing in the United States and data limitations, see Berg et al. [2016].

[30] While the typical loan maturity for a bond issuer is four years [Schwert, 2018], the median IG bond issued in 2020 is 10 years, and 7 years for the median HY bond. Halling et al. [2020a] argue that bond maturities did not significantly shorten during COVID, in spite of the Federal Reserve intervention incentivizing short maturity, contrary to prior evidence [Erel et al., 2012].

[31] More details are available in their annual report `https://www.sec.gov/ix?doc=/Archives/edgar/data/1637459/000163745921000009/khc-20201226.htm`. The credit line pricing is complicated by the fact that there was a floating rate multi-currency loan (and thus has multiple base rates) and that the spread depended on their rating without the formula being disclosed. A conservative estimate is 3.25%, coming from taking both the highest benchmark rate value in March 2020 and the highest spread. In reality, this is likely to be an upper bound.

played a role. While loans have covenants that give lenders discretion to reduce credit before maturity, bond covenants are less intrusive and much more rarely triggered passively (they more rarely include "maintenance" covenants, relying instead on "incurrence" covenants).[32] 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. This is well understood in practice.[33] Nevertheless, how much weaker bond covenants really are is the subject of active research: incurrence covenants impose restrictions on firm behavior [Bräuning et al., 2021], and banks did not seem to strictly enforce covenants violations in 2020 [Acharya et al., 2021].

While the implication of these differences in contract terms is intuitive, they are nevertheless absent from the classical models that rationalize banks' comparative advantage in providing liquidity relative to the market [Holmström and Tirole, 1998, Kashyap et al., 2002, Gatev and Strahan, 2006, Acharya et al., 2020a].[34]

[32]For more on covenants violations on bank loans, see Sufi [2009], Murfin [2012], Chodorow-Reich and Falato [2017], Lian and Ma [2018], Greenwald [2019], Acharya et al. [2014], Berlin et al. [2020]. For bond covenants, see Green [2018], Becker and Ivashina [2016], Rauh and Sufi [2010]. Table IA.11 in the Internet Appendix confirms this difference in covenants, in line with Bradley and Roberts [2015] that use an earlier sample.

[33]" '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.' " Source: "Companies Issue New Bonds to Pay Down Short-Term Debt Amid Pandemic", *Wall Street Journal*, September 2nd 2020. Note also that this could potentially explain part of the surge in convertible bond issuance witnessed in 2020, as Kahan and Yermack [1998] and Rauh and Sufi [2010] show the almost complete absence of covenants in convertible issues. Note however that this argument essentially assumes that covenants on a firm's existing loans do not apply if the loan is not drawn i.e. springing covenants [Berlin et al., 2020]. More generally, this relates to the role of different types of creditors in insolvency outcomes [Djankov et al., 2008].

[34]Interestingly, the economics behind bond issuance thus seem quite different from commercial paper, which is typically seen as the main source of market-based liquidity for firms. The very short-term nature of commercial paper makes it a poor option to lock-in funds and build liquidity buffers.

# 4 Equity Repurchases

Finally, we explore whether firms use bond proceeds to pay out shareholders. Bond issuers are generally among the less financially constrained firms in the economy. There is therefore a potential concern that loose monetary policy can lead to leveraged payouts, instead of stimulating corporate investment [Acharya and Plantin, 2021]. Note that in normal times, it is not uncommon for bond issuance to finance share repurchases [Farre-Mensa et al., 2018, Ma, 2019].

To shed light on this issue, we conduct an event study analysis similar to Section 2 looking at firms that issued bonds between March 23 and June 30, 2020. The variable of interest is a dummy for whether the firm conducted share repurchases in a given quarter.[35] Figure 5 shows dynamic coefficients plots around issuance. It confirms that bond issuance is often associated with share repurchases in normal times.

However, the dynamics during COVID are more nuanced. On the one hand, issuers were on average significantly less likely to purchase equity following bond issuance. The probability of repurchase after issuance falls by about 20 percentage points. These results are consistent with the hypothesis that many firms aim to preserve cash on their balance sheets, and both issued bonds and scaled back on equity purchases to do so. High-profile examples of reductions in shareholder payouts were widely covered in the news.[36] Nevertheless, share repurchase activity resumed normally quite rapidly, within a few quarters following issuance.

Despite the overall reduction, 47% of issuers still repurchased shares between March and June 2020. Given the general level of uncertainty, this is quite striking. This evidence points to an important group of issuers that, at face value, do not appear to highly value inside liquidity at the margin. Table IA.4 estimates that over $160B was spent on share repurchases between March and December 2020 in our sample of COVID issuers.[37] For this group of firms, the large

[35] We exclude normal dividends from this measure given firms' well-know reluctance to cut them; on the other hand, share repurchases are more discretionary in nature. See Farre-Mensa et al. [2018] for more details.

[36] For example, 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.

[37] This is in line with the broad analysis of equity issuance by Hotchkiss et al. [2020] that finds that in

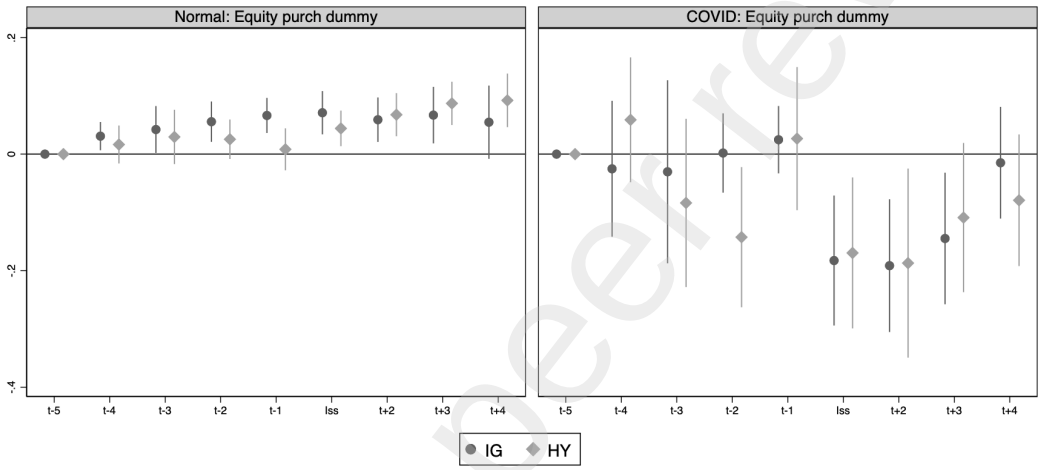



Figure 5 – Equity repurchases: Coefficient plots

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. "Equity purchase dummy" is an indicator for positive purchases of common or preferred shares in that quarter. The circles are investment grade firms (rated BBB- and above), while the diamonds are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance. We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. All ratios are winsorized at the 1% level. "Normal" times includes bonds issued between 2010-2019, "Covid" times includes bonds issued between March 23 - June 30, 2020.

reduction in yields following the intervention might have unintentionally fueled opportunistic issuance. Table IA.12 in the Internet Appendix investigates heterogeneity in the cross-section of Spring 2020 bond issuers. High cash balances from 2019Q4 are the only strong predictor of repurchases after March 2020. Credit ratings and being in a sector exposed to COVID have no significant explanatory power, confirming that payouts were pervasive.

**Early bond refinancing:** A related possibility is that bond issuance was used to retire existing bonds early. While this is distinct from equity payouts, it does share the feature of choosing to pay back existing investors as opposed to keeping funds inside the firm. While this happened to some degree, Becker and Benmelech [2021] argue that call activity did not exceed prior years.[38] This refinancing activity was likely concentrated towards the end of the year: Figure 3 shows a dip in bonds outstanding a few quarters after the intervention, in line with aggregate net debt financing turning negative at the end of 2020 [Hotchkiss et al., 2020]. Moreover, some early bond retirements might have been primarily motivated by maturity extension rather than interest savings. For example, between May and October 2020, Kraft retired over $3B of existing bonds, through a mix of tender offer and debt redemption. Interestingly, the retired bonds did not typically have higher yields, but instead much shorter maturities, with most coming due in 2021 or 2022. This is consistent with the evidence in Xu [2018] that shows that speculative-grade firms tend to refinance their corporate bonds early to extend maturity rather than to save on interest payments, particularly under accommodating credit supply conditions.[39]

**Late issuers:** Finally, we investigate the behavior of firms that issued bonds later in the year, specifically between July 1 and December 31, 2020. By early July, uncertainty had receded compared to the peak of March-April,[40] but the Federal Reserve continued to purchase bonds until the end of December of 2020. In the interest of understanding heterogeneity among

aggregate, large companies paid out more to their equity holders than they raised.

[38] In line with their evidence, we were only able to find 21 COVID issuers that engaged in early bond refinancing using Mergent FISD data up to October 2020.

[39] See also Brunnermeier and Yogo [2009] for the role of maturity choice in liquidity risk management.

[40] For example, the VIX indexed fell to 28 on June 29th, which is comparable to the 2018 peak of 30 but significantly below the 2020 peak of 65.

bond issuers, we first look at the joint dynamics of issuance and yields. By revealed preference, a firm that is willing to issue earlier at a higher yield likely values liquidity more at the margin relative to a firm that waits longer.

We note that while bond yields dropped across the board in 2020, the big drop in yields occurred months earlier for safer issuers than for riskier firms. Figure IA.6 in the Internet Appendix shows a time series of weekly issuance volume and bond yields, aggregated by rating categories (the yield series extend to 2021 for clarity). It is clear that IG yields quickly reached low levels: by May-June they were already below their 2019 value. On the other hand, it took until September for HY yields to be below their 2019 value. They also kept falling for the rest of the year, while IG yields flattened out. These differential yield dynamics line up with issuance dynamics: while it is clear that issuance slowed down, the drop was less pronounced for HY firms. Yield dynamics can thus potentially explain why the number of HY issuers was below trend early in the crisis [Becker and Benmelech, 2021, Hotchkiss et al., 2020] and picked up in late summer.

A natural prediction is that late issuers value liquidity less relative to early issuers. Thus, we would expect to see firms that issued bonds in July - December 2020 to accumulate less cash and exhibit more opportunistic behavior compared to firms that issued bonds in the spring of 2020, when uncertainty was higher. Figure IA.7 in the Internet Appendix lends support to this view: firm-level dynamic regressions suggest that late issuers were relatively less likely to accumulate cash or cut share repurchases, and were not more likely to increase real investment.

# 5 Discussion and Implications

At a general level, evaluating the aggregate effects of the intervention requires estimating a quantitative macroeconomic model. This is necessary to run the counterfactual of what would have happened absent the intervention. The first objective of this section is thus to inform

the micro-foundations of such a model in light of the firm-level evidence presented above.

The events of 2020 show that a closer integration of corporate finance and macroeconomic models is important to understand the transmission of unconventional monetary policy. For instance, state-of-the-art models of monetary transmission assume that firms borrow to finance investment [Kaplan et al., 2018, Ottonello and Winberry, 2020, Auclert et al., 2020]. To rationalize the pattern of debt issuance for the purpose of accumulating liquid assets, these models must be extended to incorporate an explicit role for liquid assets and long-term financing, so that cash is not equivalent to negative debt. Nevertheless, there has been some effort to incorporate corporate liquidity in macroeconomic models [Xiao, 2020, Arellano et al., 2019, Kiyotaki and Moore, 2019, Rocheteau et al., 2018, Jeenas, 2019, Kim, 2021].[41] Moreover, the active choice of bonds over bank loans implies modeling explicitly this margin, going beyond existing models that tend to focus on shocks to banks' balance sheets [Crouzet, 2017, De Fiore and Uhlig, 2015]. Finally, given that we observe many firms issuing bonds to repurchase equity, incorporating joint debt issuance and payouts in models of unconventional monetary policy is an important avenue for future research [Acharya and Plantin, 2021].[42] More generally, the rising importance of corporate bond markets calls for refining the monetary policy toolbox.

Our evidence suggests that the main benefit of the intervention is linked to the value of corporate liquidity, as opposed to a direct investment multiplier. Estimating how large this value is for bond issuers is thus key for future policy analysis. Importantly, our second and third main findings highlight forces that are important to size this value. First, while not

[41] In particular, Xiao [2020] presents a model where firms borrow to save based on evidence from the Great Recession. The mechanism stresses gradually resolving uncertainty and imperfect debt and asset adjustments, through the interaction of a *negative* credit supply shock with an increase in the volatility of idiosyncratic productivity. Interestingly, the mechanism of Bolton et al. [2013] can explain borrowing to save when financing conditions *improve*.

[42] Note that this pattern represents a challenge to many corporate finance theories of liquidity management: firms typically raise funds when cash is low but pay out when cash is high, but do not do both at once. Acharya and Plantin [2021] present a model of corporate finance with agency frictions that predicts that loose monetary policy can lead to leveraged payouts. More generally, models of market timing such as Ma [2019] can also explain this pattern with shifts in relative valuation between debt and equity markets; see also Baker and Wurgler [2002], Baker et al. [2003], Pegoraro and Montagna [2021]. For other theories of debt-financed payouts, see Farre-Mensa et al. [2018]. Macroeconomic models that predict debt-financed payouts in good times include Jermann and Quadrini [2012], Begenau and Salomao [2019], Covas and Den Haan [2011].

tapping credit lines preserves liquidity, bond issuers were typically far from their credit limit. Conceptually, theory suggests that the marginal value of additional liquidity is declining in total financial slack available to the firm. Moreover, equity payouts are a direct sign of a low value of funds inside the firm relative to outside. Our evidence thus makes it clear that to assess the potential real effect of the intervention it is crucial to not just look at market data, such as yields and issuance volumes, but also at firms' balance sheets and operations.

A practical challenge for central banks is thus how to target unconventional policy actions aimed at the bond market. As a group, bond issuers are the least financially constrained firms in the economy. While some issuers exhibited behavior consistent with low liquidity, such as maxing out their credit lines and cutting equity payouts, our evidence suggests that many firms did not. While a welfare analysis is beyond the scope of this paper, targeting firms with the highest value of liquidity may minimize the risk of opportunistic issuance.[43]

With that in mind, dissecting the Federal Reserve's actual corporate bond portfolio yields two interesting observations. On the one hand, while the market reaction was large, actual purchases have been small. By the end of the eight-months program in December 2020, they amounted to only $14B out of the potential $750 billion proposed, while over $500B was issued in March-June alone. The program was much smaller in scope relative to the ECB, which purchased bonds for over five years, accumulating a portfolio of over 300B €.[44] The amount of public dollars spent was thus limited. On the other hand, the composition of the portfolio was highly skewed towards safer firms that appear less constrained: IG bonds made up as much as 87% of the total purchased. Moreover, 11% of the firms and 20% of the volume of the Federal Reserve's portfolio issued bonds in spring 2020 and subsequently repurchased equity.[45] Nevertheless, the broad market reaction observed in the data seemed to have benefited many

[43]The extent to which debt-driven payouts lead to inefficiencies is an open question. In the model of Acharya and Plantin [2021], payouts inefficiently crowd out real investment, while Almeida et al. [2016] provide causal evidence of share repurchases reducing employment and investment. Nevertheless, estimating the magnitude of this crowding out in a time when investment opportunities are depressed like 2020 is an important avenue for future research.

[44]As of December 31, 2021, the ECB held just under 310B € from purchases via the CSPP.

[45]Includes firms that issued bonds March 15 - June 30, 2020 and subsequently repurchased equity at some point in 2020 that were also included in the December 2020 Federal Reserve Broad Market Index.

firms. In this paper, we take the market response as given; however, understanding what drives these announcements effects is an important avenue for future research.[46]

Interestingly, our evidence also points to the 2020 Federal Reserve program having a different transmission mechanism relative to what prior work has identified for the 2016 Corporate Sector Purchase Program in Europe (CSPP). While both programs had similar effects on markets by reducing yields and stimulating issuance, the transmission to real effects differs significantly. Grosse-Rueschkamp et al. [2019] report a strikingly different impact of the CSPP on firms' balance sheets. They find no effect on credit lines balances, cash holdings, or share repurchases. Instead, BBB-rated firms repaid term loans while highly-rated firms increased acquisitions. On the other hand, the Fed program seemed to have been more about a direct effect on issuers through increasing their available liquidity. At a broad level, both programs led to bond-loan substitution, but in quite different ways.[47] Our evidence is thus a key piece of drawing a complete picture of how corporate bond purchases by central banks transmit to the real economy.[48]

Overall, one might ask which lessons can generalize beyond this specific recent episode. Each crisis is indeed different and many factors determine the effects of public intervention, such as the source of the shock or the state of the banking sector. Nevertheless, our findings are rooted in trends in corporate financing for large firms that are likely here to stay. First, the

[46]What is the right underlying mechanism is an open question. Hanson et al. [2020] highlight the response of investors' beliefs to central bank announcements, and Haddad et al. [2021b] provide high-frequency evidence that the Fed announcements shifted investor's beliefs of future intervention in bad states of the world. Another potential mechanism is the feedback loop between secondary bond market liquidity and firms' probability of default in He and Xiong [2012]. Investor expectations of fiscal policy changes may also factor into the announcement effects [Xu and You, 2021].

[47]The ECB program helped banks relax their lending constraints, allowing them to lend to smaller firms [Grosse-Rueschkamp et al., 2019, Arce et al., 2021, Ertan et al., 2019]. As of now, there is little evidence that corporate bond purchases by the Federal Reserve have benefited smaller borrowers: it seems that small firms were largely unable to borrow from banks during the spring of 2020 [Chodorow-Reich et al., 2020, Greenwald et al., 2020, Kapan and Minoiu, 2021]. Grosse-Rueschkamp et al. [2019] argue that bank balance sheet constraints were key for the transmission of the CSPP. This logic thus suggests that the strength of U.S. banks at the start of 2020 can potentially explain the difference. Note however that the repayment of existing loans was not an explicit goal of the U.S. intervention, unlike for the ECB program.

[48]Note that recent work by Pegoraro and Montagna [2021] argue that European issuers timed the market after the CSPP, changing the characteristics of their bonds such that they are eligible for the program. They find little effect on investment and some effect on cash balances.

paramount importance of bond financing in corporate finance: bonds have not just replaced bank loans for the purpose of funding investment in good times [Berg et al., 2020], they are also used to accumulate liquidity buffers in bad times, and in fact were preferred to bank credit lines or commercial paper. Second, the bond market should not be considered in isolation: large bond issuers have access to significant quantities of off-balance sheet credit from banks. Third, debt-financed payouts, defined as concurrent debt issuance and share repurchases, are pervasive among large firms.

# 6 Conclusion

This paper studies firm behavior in the wake of the unprecedented policy support to the corporate bond market in 2020. While bond issuance surged, real investment did not, as funds were mainly used to accumulate liquid assets, repay other loans, or repurchase shares. Moreover, most bond issuing firms had access to credit lines from banks that they chose not to use, even though the crisis did not originate in the banking sector. Interestingly, the effect of the intervention on firms' balance sheets was different from that of corporate bond purchases carried by the ECB in 2016, even if both programs lowered spreads and stimulated issuance.

Our evidence highlights the value of studying firms' balance sheets, beyond the market rebound, to better understand potential real effects of bond purchases and inform the micro-foundations of macroeconomic models. The rich interactions between corporate debt and the macro-economy is a promising agenda going forward [Brunnermeier and Krishnamurthy, 2020]. Just as the GFC showed that financial intermediation was more complex than previously thought and needed a proper place in macro-finance models, the market turmoil in 2020 highlights the complexity and central place of bond markets and corporate finance for the macro-economy.

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# Internet Appendix - Additional Figures and Tables

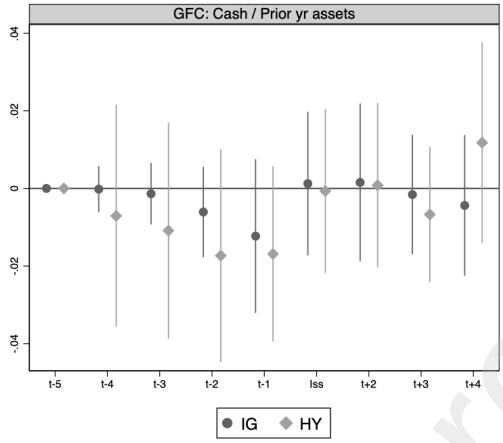


Figure IA.1 – Liquid Assets: Coefficient plots – Global Financial Crisis

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. Cash is cash and short term investments. The circles are investment grade firms (rated BBB- and above), while the diamonds are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. All ratios are winsorized at the 1% level. GFC times includes bonds issued October 1, 2007 - June 30, 2009.

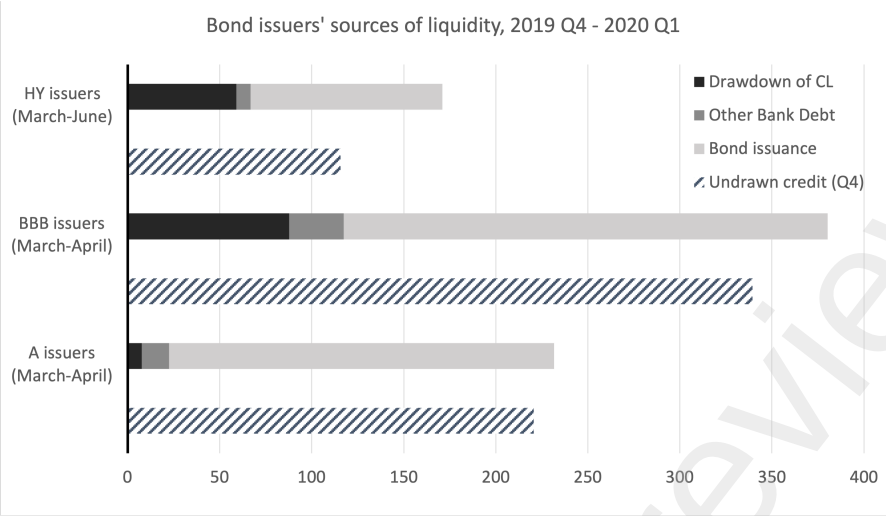


Figure IA.2 – Visualizing dry powder: Debt Composition Aggregate Flow

**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 1 for underlying numbers. Issuers include all U.S. firms that issued a bond between issued March 23 - June 30, 2020 that we could merge with Capital IQ information.

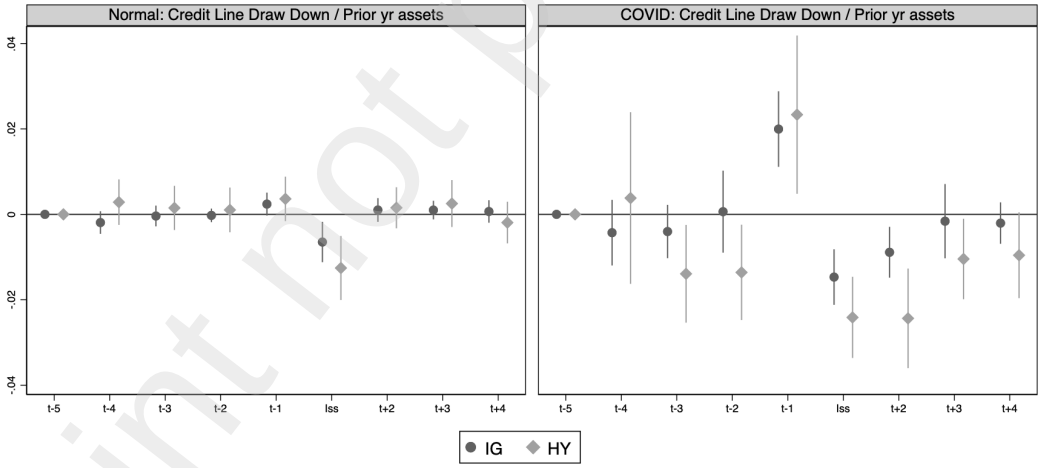


Figure IA.3 – Drawn amount on credit lines: Coefficient plots

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. Credit Line Drawn Down is the amount drawn down on bank credit line at quarter end (negative values are repayments). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance. We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. "Normal" times includes bonds issued between 2010-2019, "Covid" times includes bonds issued March 23 - June 30, 2020.

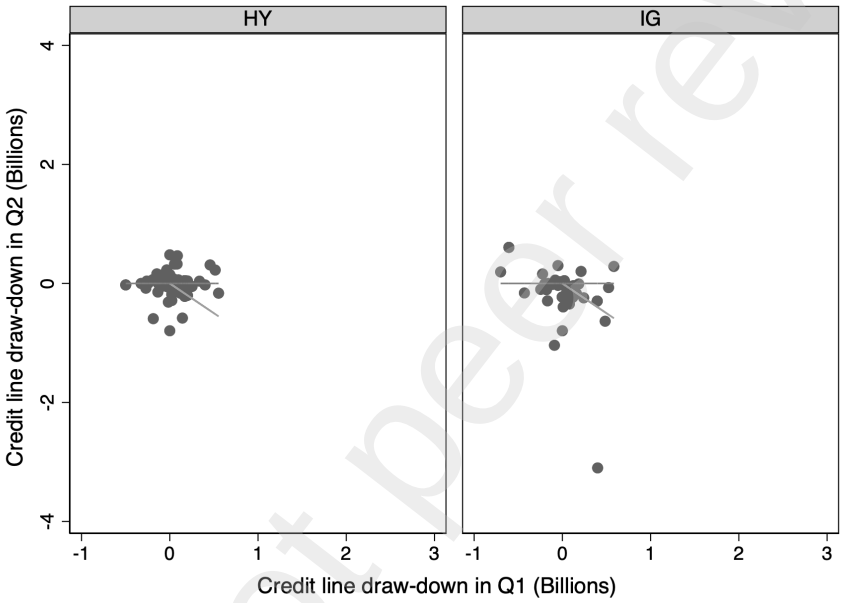


Figure IA.4 – Visualizing crowding out: Credit line draw-downs in 2019Q2 vs. 2019Q1

**Note:** This figures plots credit line repayment in 2019Q2 against 2019Q1 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 firms that did not draw down in 2019Q1, and excludes the outlier HCA Inc.

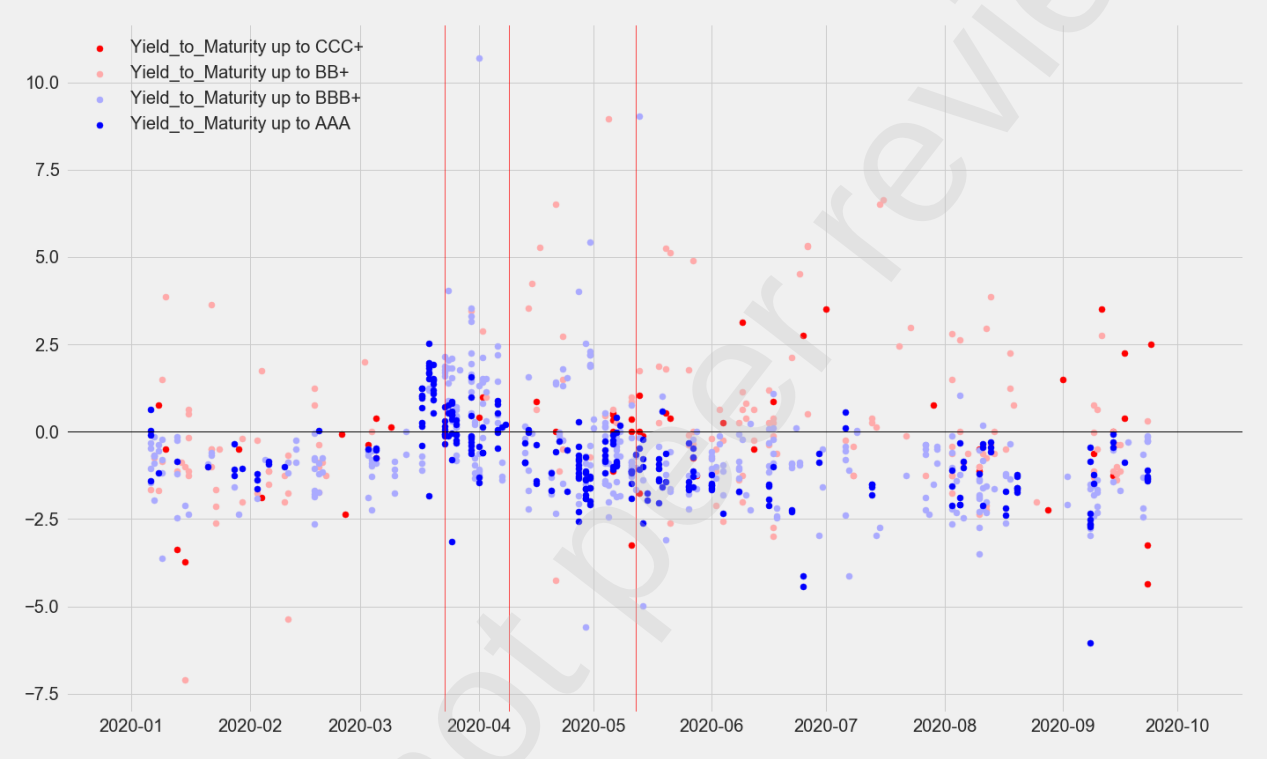


Figure IA.5 – Yield to maturity vs. most recent issuance by same issuer

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

**Note**: Each point is the yield to maturity on a new issuance, net of the yield to maturity 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).

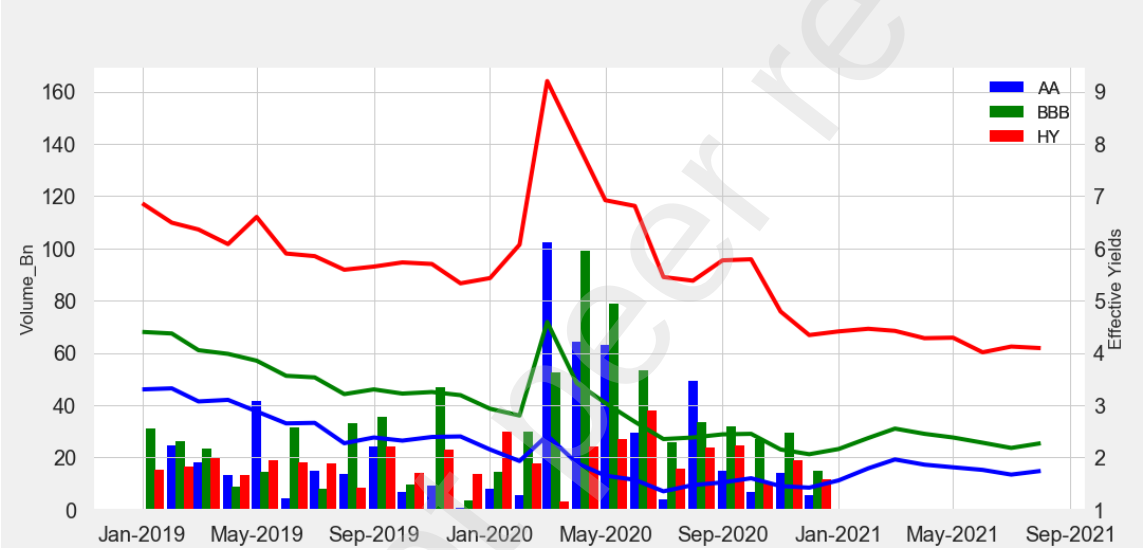


Figure IA.6 – Bond Issuance volume and yields through 2020

**Notes:** Bars represent monthly issuance volumes, in billions of dollars, for rating categories AA and above, BBB- to BBB+, and high yield (BB+ and below). Lines represent yields for the ICE Bank of America U.S. Indices for U.S. dollar denominated corporate debt publicly issued in the U.S. domestic market in the same three ratings categories, as pulled from the Federal Reserve Economic Data.

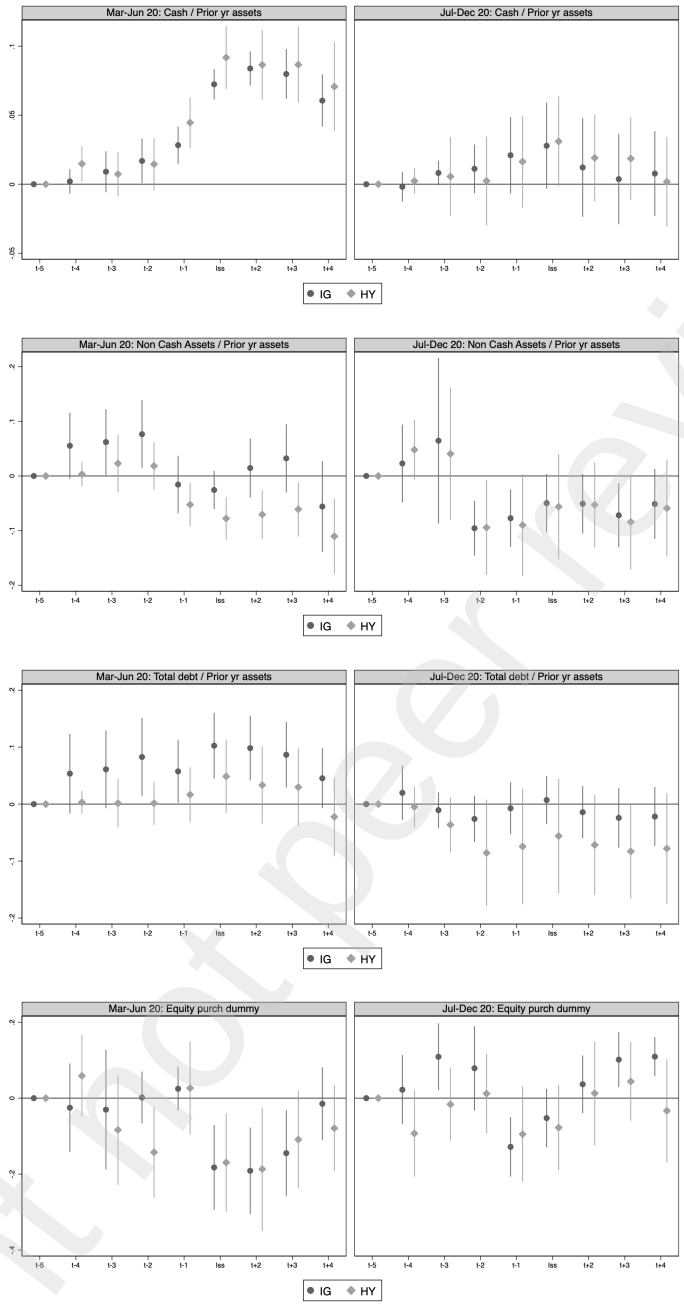


Figure IA.7 – Coefficient plots – Early vs. late issuers

**Notes:** Each point is an estimate of $\beta_{t+m}$ from the regression $Y_{fq} = \sum_{m=-5}^{4} \beta_m Issue_{f,t+m} + \alpha_f + \alpha_{ind \times year} + \epsilon_{fq}$, with 95% confidence intervals. "Cash" is cash and short term investments. "Non-cash assets" is total assets minus cash and short term investments. "Total debt" is total long term debt plus debt in current liabilities. "Equity purchase dummy" is an indicator for positive purchases of common or preferred shares in that quarter. The circles are investment grade firms (rated BBB- and above), while the diamonds are high yield firms (rated below BBB-). Observations are firm-quarters up to five quarters prior to a bond issuance and four quarters following a bond issuance. "Iss" denotes the quarter ending immediately after issuance. Left panels include U.S. firms that issued bonds March 23 - June 30, 2020. Right panels include U.S. firms that issued bonds July 1 - December 31, 2020. We include firm and industry-year fixed effects. Standard errors are clustered by 2-digit industry level. All ratios are winsorized at the 1% level in the entire sample. To further limit the impact of outliers, cash ratios of the March-June sample is further winsorized at the 1% level.

Table IA.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 | 15.2 | 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% |
| 2020-06-01 | 12 | 24.4 | 12.0 | 14.9 | 156 | 2.35% |
| 2020-06-08 | 8 | 9.1 | 10.4 | 13.8 | 180 | 2.62% |
| 2020-06-15 | 15 | 30.6 | 11.4 | 14.4 | 196 | 2.60% |
| 2020-06-22 | 6 | 10.1 | 11.7 | 15.8 | 156 | 2.25% |
| 2020-06-29 | 3 | 8.8 | 18.7 | 14.0 | 170 | 2.62% |
| 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% |
| 2020-06-01 | 14 | 10.7 | 6.7 | 9.7 | 569 | 6.43% |
| 2020-06-08 | 13 | 9.4 | 7.4 | 9.2 | 454 | 5.49% |
| 2020-06-15 | 19 | 13.2 | 7.4 | 9.1 | 542 | 6.34% |
| 2020-06-22 | 9 | 8.2 | 7.6 | 9.2 | 586 | 7.45% |
| 2020-06-29 | 5 | 3.0 | 7.2 | 7.2 | 658 | 7.08% |

**Source:** Mergent FISD, retrieved via WRDS October 21, 2020.
**Note:** Summary table includes all U.S. dollars (USD) corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in USD. 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 IA.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% | 4.7% | 19.9% |
| Cash/Assets (Q1) | 0.5% | 4.9% | 20.2% | 1.3% | 7.5% | 22.3% |
| Debt/Assets (prior Q4) | 16.8% | 38.1% | 64.1% | 22.2% | 39.8% | 68.1% |
| Debt/Assets (Q1) | 18.5% | 39.5% | 63.3% | 24.9% | 43.1% | 72.7% |
| Current debt/Debt (prior Q4) | 0.0% | 2.9% | 15.4% | 1.0% | 5.5% | 15.9% |
| Log assets (prior Q4) | 7.2 | 9.1 | 10.9 | 8.1 | 9.7 | 11.3 |
| Cash flow metrics | | | | | | |
| Sales growth | -18% | -1% | 17% | -26% | -5% | 10% |
| Profit growth | -187% | -29% | 116% | -325% | -30% | 105% |
| Cash flow growh | -137% | -43% | 69% | -149% | -58% | 44% |
| Cash growth | -47% | -1% | 94% | -24% | 17% | 362% |
| Bond metrics | | | | | | |
| Amount per bond (MM) | 300.0 | 500.0 | 1160.0 | 400.0 | 600.0 | 1395.0 |
| Credit spread (bps) | 92.0 | 245.0 | 518.1 | 148.0 | 320.0 | 718.4 |
| Yield | 3.271% | 5.125% | 7.824% | 2.192% | 4.074% | 8.513% |
| Tenor (years) | 5.0 | 8.0 | 13.2 | 5.0 | 8.0 | 11.0 |
| Coupon | 2.875% | 5.000% | 7.675% | 2.172% | 4.000% | 8.613% |
| Rating | 7.0 | 12.0 | 16.0 | 8.0 | 13.0 | 17.0 |
| Days since last issuance | 178.8 | 561.0 | 2224.8 | 128.0 | 431.5 | 1860.5 |
| Days to next maturity | 34.0 | 647.0 | 3959.0 | 133.9 | 491.5 | 1693.2 |

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

**Note:** Summary table includes all USD corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in USD. “COVID" refers to bond issuers from March 1 - June 30, 2020. “Normal" refers to bond issuers from March 1 - June 30, 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 IA.13 for mapping of credit ratings to the numerical aggregation shown here.

Table IA.3 – Cash, Real Assets, and Total Debt: Cross-sectional regressions

| | (1) Delta Cash / Assets 2019 Q4 | (2) Delta Non-Cash assets / Assets 2019 Q4 | (3) Delta Total Debt / Assets 2019 Q4 |
|---|---|---|---|
| Exposure to COVID shock | 0.00898* | 0.0201*** | -0.00208 |
| | (0.00456) | (0.00569) | (0.00433) |
| HY | 0.0120 | 0.0209 | -0.00347 |
| | (0.0136) | (0.0154) | (0.0134) |
| IG, BBB | -0.00584 | -0.00195 | 0.0264** |
| | (0.0106) | (0.0134) | (0.0119) |
| Cash/Assets (2019Q4) | 0.176** | 0.193*** | 0.158*** |
| | (0.0741) | (0.0589) | (0.0475) |
| Current Debt/Assets (2019Q4) | 0.0487 | -0.0601 | -0.0799 |
| | (0.0973) | (0.145) | (0.0924) |
| Undrawn credit EOY 2019 / Assets (2019Q4) | 0.0658 | -0.0813 | 0.194* |
| | (0.0700) | (0.0871) | (0.116) |
| Observations | 271 | 260 | 271 |
| R-squared | 0.0893 | 0.119 | 0.0886 |

**Notes:** This table reports cross-sectional regressions of our sample of bond issuers on different balance sheet variables. Delta Cash / Assets is the firm-level change in cash and short term investments between 2019Q4-2020Q2 divided by the total assets in 2019Q4. Delta Non-Cash assets / Assets (2019Q4) and Delta Total Debt / Assets (2019Q4) are computed similarly, using total assets minus cash and short term investments, and total long term debt plus current liabilities, respectively, in the numerator, and total assets in 2019Q4 in the denominator. Exposure to COVID is constructed as per Chodorow-Reich et al. [2020] using abnormal employment decline in 2020Q1 at the industry level according to BLS data. The omitted category for ratings dummies is IG, A-rated or above. Issuers include all U.S. non-financial firms that issued a bond March 23 - June 30, 2020 that we could merge with Compustat data.

Table IA.4 – Aggregate Flows for COVID issuers

| | Aggregate flow |
|---|---|
| Amt Issued (March 23-June 30th 2020) | 576.23 |
| Cash Increase (2019Q4 to 2020Q2) | 473.82 |
| Non-Cash Increase (2019Q4 to 2020Q2) | -254.75 |
| Bank Debt Increase (2019Q4 to 2020Q2) | 74.05 |
| Total Debt Increase (2019Q4 to 2020Q2) | 506.54 |
| Total Sr Bonds and Notes Increase (2019Q4 to 2020Q2) | 336.56 |
| Share Repurchase (2020Q2-2020Q4) | 162.26 |

**Notes:** This table reports aggregate numbers for firms that issued a bond during the COVID period (March 23rd- June 30th), in billions of USD. The first row, amount issued denotes FISD bond issuance volumes. Rows 2 through 5 rows report the change between 2019Q4 quarter end and 2020Q2 quarter end. "Cash" (cheq) is cash and short term investments. "Non cash assets" is total assets minus cash and short term investments. "Total debt" (dltt + dlc) is total long term debt plus debt in current liabilities. Cash, non-cash and total debt are all reported from Compustat. "Bank Debt" and "Total Sr Bonds and Notes" are based on Capital IQ Capital Structure Summary tables. Finally the last row reports share repurchases (prstkcy), from Compustat, as the aggregate repurchases from 2020 Q2 through 2020 Q4.

Table IA.5 – Spring 2020 bond issuers with a bond due later in the year

| | All | IG | HY |
|---|---|---|---|
| Number of issuers (Spring 2020) | 314 | 195 | 125 |
| Issued amount (Spring 2020) | 582 | 477 | 105 |
| Number issuers with upcoming maturity | 91 | 77 | 16 |
| Amount issued by firms with upcoming maturity | 261 | 243 | 18 |
| Total amount maturing in 2020 for Spring 2020 issuers | 182 | 137 | 36 |

**Notes:** Includes all USD corporate bond issuance March 23 - June 30, 2020 of over $100 million in size issued by U.S. domiciled companies or companies that report in U.S. dollars and have a credit rating.

Table IA.6 – Sample Summary Statistics: All bond issuers versus. Capital IQ

| | Bond issuers: 2000-2020 | CIQ Sample: 2000-2020 | Bond issuers: COVID | CIQ Sample: COVID |
|---|---|---|---|---|
| Total Assets (log) | 9.25 | 9.26 | 9.90 | 9.91 |
| Leverage | 0.46 | 0.46 | 0.46 | 0.46 |
| Cash / Assets | 0.06 | 0.06 | 0.06 | 0.06 |
| Total bonds issued | 7.54 | 7.88 | 2.00 | 2.03 |
| Average bond size ($MM) | 515.27 | 533.18 | 780.11 | 784.85 |
| Credit Rating | 11.23 | 11.19 | 12.56 | 12.57 |
| Average tenor (years) | 9.31 | 9.26 | 10.44 | 10.45 |
| Bonds issued 2019 (#) | 0.49 | 0.54 | 1.06 | 1.07 |
| Bonds issued 2019 ($MM) | 407.43 | 455.68 | 924.17 | 941.99 |
| Bonds issued COVID (#) | 0.37 | 0.41 | 1.49 | 1.51 |
| Bonds issued COVID: ($MM) | 360.35 | 407.39 | 1454.86 | 1484.73 |
| Number of firms | 1623.00 | 1425.00 | 402.00 | 391.00 |

**Source:** Mergent FISD, retrieved via WRDS October 21, 2020, Compustat, and Capital IQ retrieved via S&P Global March 1, 2021.

**Note:** Capital IQ sample includes all bond issuers matched to the Capital IQ database where there is a reported value for Drawn Credit Line or Undrawn Credit Line. All bond issuers include USD corporate bond issuance of over $100 million in size issued by U.S. domiciled companies or companies that report in USD. "COVID" refers to bond issuers from March 1 - June 30, 2020. 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 IA.13 for mapping of credit ratings to the numerical aggregation shown here.

Table IA.7 – Credit line draw-downs in 2020Q1: Cross-sectional regressions

| | (1) Maxed out CL | (2) Did not draw CL | (3) Av. drawdown rate |
|---|---|---|---|
| Exposure to COVID shock | 0.121*** | -0.122*** | 0.168*** |
| | (0.0315) | (0.0251) | (0.0478) |
| HY | 0.134** | -0.321*** | 0.280*** |
| | (0.0664) | (0.0870) | (0.0786) |
| IG, BBB | 0.0196 | -0.186** | 0.133** |
| | (0.0541) | (0.0808) | (0.0576) |
| Cash/Assets (2019Q4) | 0.124 | 0.672* | -0.159 |
| | (0.250) | (0.377) | (0.298) |
| Current Debt/Assets (2019Q4) | 0.452 | -0.545 | 0.829* |
| | (0.523) | (0.587) | (0.477) |
| Undrawn credit EOY 2019 / Assets (2019Q4) | -0.779*** | -1.215** | -0.639 |
| | (0.281) | (0.534) | (0.478) |
| Observations | 263 | 263 | 237 |
| R-squared | 0.136 | 0.175 | 0.188 |

**Notes:** This table reports cross-sectional regressions of our sample of U.S. firms that issued a bond March 23 - June 30, 2020 that we could merge with Capital IQ information. Outcome variables include various credit line drawdown activities in 2020Q1, based on the Capital IQ Capital Structure Summary tables. "Maxed out CL" is a dummy variable that equals 1 if the bond issuers drew down at least 90% of its Undrawn Revolving Credit at the end of 2019, and equals 0 otherwise. "Did not draw CL" is a dummy variable that equals 1 if the bond issuer drew down 0% or less of Undrawn Revolving Credit at the end of 2019, and equals 0 otherwise. "Av. drawdown rate " is the amount drawn as a ratio of Undrawn Revolving Credit at the end of 2019. Exposure to COVID is constructed as per Chodorow-Reich et al. [2020], using abnormal employment decline in 2020Q1 at the industry level according to BLS data. The omitted category for ratings dummies is IG, A-rated or above. Cash, Current debt, and Assets are from Compustat.

Table IA.8 – Bond-loan substitution: Distribution of firms

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

| | Mean |
|---|---|
| HY | |
| Share Repaid some credit line in Q2, conditional on Q1 draw-down | 0.72 |
| Share Repaid all credit line in Q2, conditional on Q1 draw-down | 0.40 |
| IG, BBB | |
| Share Repaid some credit line in Q2, conditional on Q1 draw-down | 0.91 |
| Share Repaid all credit line in Q2, conditional on Q1 draw-down | 0.65 |
| IG, A or above | |
| Share Repaid some credit line in Q2, conditional on Q1 draw-down | 0.77 |
| Share Repaid all credit line in Q2, conditional on Q1 draw-down | 0.77 |

Panel B: Fraction of credit line repayment conditional on repaying

| | Mean | 25% | 50% | 75% |
|---|---|---|---|---|
| HY | | | | |
| Q2 CL repayment/Q1 CL drawdown (%) | 201.0 | 37.2 | 100 | 108.1 |
| Q2 CL repayment/Bond issuance (%) | 64.8 | 8.90 | 54.1 | 97.5 |
| IG, BBB | | | | |
| Q2 CL repayment/Q1 CL drawdown (%) | 154.7 | 98.4 | 100 | 102.7 |
| Q2 CL repayment/Bond issuance (%) | 79.8 | 30.0 | 65.0 | 100 |
| IG, A or above | | | | |
| Q2 CL repayment/Q1 CL drawdown (%) | 577.5 | 100 | 100 | 153.7 |
| Q2 CL repayment/Bond issuance (%) | 67.2 | 5.73 | 33.4 | 100 |

**Notes:** Panel A displays the share of HY, BBB-rated, and A-rated firms that issued bonds March 23 - June 30, 2020 and drew down on their credit lines in 2020Q1 that repaid some or all of their credit line balance 2020Q2, based on Capital IQ. Panel B displays the distribution of credit line repayment in 2020Q2 as a share of 2020Q1 credit line draw-downs (Row 1) or as a share of bond issuance in 2020 between March and June (Row 2), conditional on repaying some positive amount in 2020Q2.

Table IA.9 – Bond-loan substitution: aggregate flows over 2020Q1 vs. 2020Q2

| | HY<br>Billions of USD | IG, BBB<br>Billions of USD | IG, A or above<br>Billions of USD |
|---|---|---|---|
| Bond issuance March 23-June 30th | 104.2 | 262.9 | 209.1 |
| Credit line Q1 | 59.1 | 87.7 | 7.68 |
| Credit line Q2 | -16.2 | -52.4 | -6.88 |
| Total bank debt Q1 | 66.8 | 117.4 | 22.5 |
| Total bank debt Q2 | -20.4 | -75.4 | -16.1 |

**Notes:** This table classifies aggregate debt flows based on FISD bond issuance data (Row 1) as well as changes in outstanding debt for credit lines and total bank debt based on Capital IQ Capital Structure Summary tables. Rows 2 and 4 displays the change between 2019Q4 quarter end and 2020Q1 quarter end. Rows 2 and 4 displays the change between 2020Q1 quarter end and 2020Q2 quarter end. Issuers include all U.S. firms that issued a bond March 23 - June 30, 2020 that we could merge with Capital IQ.

Table IA.10 – Bank borrowing in 2019Q1 for bond issuers

| | HY<br>Share | IG, BBB<br>Share | IG, A or above<br>Share |
|---|---|---|---|
| Maxed out CL | 0.017 | 0 | 0 |
| Drew some CL | 0.40 | 0.24 | 0.12 |
| Did not draw CL | 0.58 | 0.76 | 0.88 |
| No net bank funds | 0.57 | 0.59 | 0.81 |

**Notes:** This table classifies bond issuers based on changes in outstanding debt for different credit instruments during 2019Q1, based on the Capital IQ Capital Structure Summary tables. Row 1 includes issuers that maxed out their credit lines, i.e. the increase in Revolving Credit is at least 90% of Undrawn Revolving Credit at the end of 2018. Row 2 includes issuers that drew some of their credit lines, i.e. the increase in Revolving Credit as a ratio of Undrawn Revolving Credit at the end of 2018 is between 0% and 90%. Row 3 includes issuers that did not draw, i.e. the increase in Revolving Credit is 0 or less. Row 4 includes issuers with no net bank funding, defined as the sum of Revolving Credit, Term Loans and Federal Home Loan Bank borrowings. Bond issuers are all U.S. firms that issued a bond in 2019Q1 that we could merge with Capital IQ information.

Table IA.11 – Non-Price Terms and Covenants

| | Bonds: | | | | Loans: | |
|---|---|---|---|---|---|---|
| | IG-normal | HY-normal | IG-covid | HY-covid | IG | HY |
| **Maintenance covenants:** | | | | | | |
| **Leverage test** | 0.0% | 0.0% | 0.0% | 0.0% | 64.3% | 46.2% |
| **Net earnings test** | 0.0% | 0.0% | 0.0% | 0.0% | 43.2% | 39.0% |
| **Maintenance net worth** | 2.4% | 7.2% | 0.0% | 0.0% | 7.1% | 4.2% |
| **Incurrence covenants:** | | | | | | |
| **Dividend related payments** | 0.1% | 35.7% | 1.0% | 28.6% | 13.2% | 30.7% |
| **Sale of assets** | 79.7% | 81.4% | 89.0% | 96.4% | 1.8% | 21.2% |
| **Senior debt issuance** | 0.0% | 0.0% | 0.0% | 0.0% | 1.4% | 17.0% |
| **Stock issuance issuer** | 0.0% | 10.1% | 0.0% | 0.0% | 0.4% | 4.2% |
| **Secured** | 0.5% | 9.4% | 1.9% | 23.2% | 9.3% | 66.7% |

**Notes:** This table computes (1) the percentage of bonds that report covenants that have each covenant and (2) the percentage of loans with each covenant. Bond statistics include all bonds issued 2010-2019 and March 23 - June 30, 2020 that also have loans available or outstanding as of end of 2019. Loan statistics computed over all bond issuers 2010-2019 and March-June 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 2010-2019, while "Covid" times includes bonds issued between March 23 - June 30, 2020. Source: Mergent FISD, retrieved via WRDS October 21, 2020 and Dealscan, retrieved October 18, 2020

Table IA.12 – Share repurchases in 2019-2020: Cross-sectional regressions

| | (1) 2019 Q4 Repurchase | (2) 2020 Q2 Repurchase | (3) 2020 Q3 Repurchase | (4) 2020 Q4 Repurchase |
|---|---|---|---|---|
| Exposure to COVID shock | 0.0673** | 0.0368 | 0.0273 | -0.0455 |
| | (0.0307) | (0.0341) | (0.0345) | (0.0339) |
| HY | -0.167* | -0.124 | -0.113 | -0.0169 |
| | (0.0854) | (0.0947) | (0.0908) | (0.0907) |
| IG, BBB | -0.0416 | -0.0465 | -0.0443 | 0.0878 |
| | (0.0770) | (0.0899) | (0.0886) | (0.0880) |
| Cash/Assets (2019Q4) | 0.826*** | 1.085*** | 1.012*** | 0.801** |
| | (0.307) | (0.326) | (0.329) | (0.318) |
| Current Debt/Assets (2019Q4) | -0.410 | 0.682 | -0.723 | -0.457 |
| | (0.623) | (0.668) | (0.688) | (0.653) |
| Undrawn credit EOY 2019 / Assets (2019Q4) | -0.922*** | -0.837** | -0.268 | -0.283 |
| | (0.338) | (0.402) | (0.444) | (0.441) |
| Observations | 277 | 277 | 277 | 277 |
| R-squared | 0.0820 | 0.0722 | 0.0482 | 0.0389 |

**Notes:** This table reports cross-sectional regressions on the probability to repurchase shares of our sample of U.S. firms that issued a bond March 23 - June 30, 2020 that we could merge with Capital IQ. Dependent variables in Columns 1-4 are dummy variables that equal 1 if the firm repurchased shares in 2019Q4, 2020Q2, 2020Q3, and 2020Q4, respectively, and equal 0 otherwise. Exposure to COVID is constructed as per Chodorow-Reich et al. [2020], using abnormal employment decline in 2020Q1 at the industry level according to BLS data. The omitted category for ratings dummies is IG, A rated or above. Equity repurchases, Cash, Current debt, and Assets are from Compustat.

Table IA.13 – 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 |
| D | D | D | 1 |