Corporate Bond Purchases After COVID-19: Who Did the Fed Buy and How Did the Markets Respond?*

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Abstract

The Federal Reserve Bank and the U.S. Treasury bought several individual corporate bonds in response to COVID-19. We show that the program primarily purchased bonds that became highly information-sensitive due to the crisis, and especially bonds used as collateral in the repo market. It did not target bonds issued by firms that were hit harder by the pandemic or firms with a large employee base. On the policy announcement days, credit spreads on all corporate bonds came down significantly, but the effect was stronger for the purchased bonds. Further, primary dealers from whom large amounts of bonds were bought experienced significantly higher equity returns around the policy announcement days. Overall, these findings suggest that the program relaxed the funding constraints of intermediaries.

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1 Introduction

The U.S. Treasury and the Federal Reserve Bank have undertaken several policy measures to fight the adverse economic consequences of COVID-19. An important piece of these policy responses is the purchase of individual corporate bonds in the secondary market by a special purpose vehicle (SPV) sponsored by the Fed and the Treasury under the Secondary Market Corporate Credit Facility (SMCCF). What motivated the SPV to buy certain bonds and exclude others? What impact did the policy announcements have on debt and equity prices of U.S. corporations? A clear answer to these questions is an essential first step towards understanding the efficacy of this policy for reviving the U.S. markets and economy. Our paper takes a first look at this issue by analyzing the economic determinants of bond selection criteria under the program and the market's reaction to the announcements of the individual corporate bond purchase program.

The decision to buy specific bonds under the program crucially depends on the importance of various frictions such as segmentation in the bond market, the effect of government purchase on firm-specific bankruptcy costs and funding constraints in the secondary market.[1] Depending on the nature of the friction, it may be beneficial to target specific types of issuers or specific types of bonds. Empirically, the program only bought a little over one-fifth of all eligible bonds in the first wave of bond purchases conducted in June and July, 2020. Which frictions motivated the choice of picking these bonds while leaving the rest out?

Several firms suffered large valuation losses due to COVID-19. Concerns about corporate bankruptcies and employee layoffs were the primary driving forces behind a number of policy responses by the federal government and the Fed. Buying bonds issued by such firms in the secondary market is unlikely to provide them with any additional support compared to other firms in a frictionless market. However, there are at least two frictions that provide a rationale

[1] Krishnamurthy and Vissing-Jørgensen (2011) provide detailed discussions on different channels through which quantitative easing might affect the real economy. Brunnermeier and Krishnamurthy (2020) develop a model in which the effect of credit market intervention depends on frictions such as debt overhang, bankruptcy costs, and inefficient continuation by the subsidized firm.

for targeting bonds especially hit by the crisis. First, segmentation in the corporate bond market along with delays in moving capital across the segments can lower the cost of capital of the issuing companies disproportionately more (e.g., see Gromb and Vayanos (2002), Duffie (2010)). Prior research provides evidence that when a program targets assets in a specific class (for example, mortgages versus treasury bonds), it disproportionately affects the risk-premium for that class (see Krishnamurthy and Vissing-Jørgensen (2011)). However, even within corporate bonds, segmentation can occur along the lines of credit rating, maturity spectrum, or investor specialization (e.g., see Vayanos and Vila (2009), Chen, Lookman, Schürhoff, and Seppi (2014)). Therefore, targeting bonds issued by such firms is going to benefit them more directly. Second, the presence of government as one of the debtholders of the company is likely to alter the dynamics of debt restructuring in the event of distress. For example, the government's incentives is likely to be aligned more closely with the socially optimal restructuring plan compared to private debt-holders. Hence the government's presence in the renegotiations process are likely to cut down the costs of inefficient restructuring. In the presence of these frictions, it may be optimal to specifically target bonds issued by firms that need the most help, i.e., firms hit harder by the crisis, and firms with a larger employee base.

An alternative, though not mutually exclusive, motivation behind the corporate bond purchase is to improve the liquidity of key market participants by alleviating frictions in the secondary market funding. By buying corporate bonds used by intermediaries, such as primary dealers, in the repo market, the program can improve their ability to obtain fundings and improve financial stability. Dealer capital constraints are key to the provision of market liquidity in the corporate bond markets (Dick-Nielsen, Feldhütter, and Lando, 2012; Bao, O'Hara, and Zhou, 2018). Specifically, by buying bonds that are actively pledged as collateral in the repo markets, the program can alleviate frictions in raising funds in the secondary market, which is an important part of dealer financing (Brunnermeier and Pedersen, 2008; Macchiavelli and Zhou, 2019). Supporting the repo market may be especially important due to its large destabilizing effect on the financial system (Gorton and Metrick,

2012; Krishnamurthy, Nagel, and Orlov, 2014). Therefore, we expect to observe a higher probability of purchase for bonds that are actively used as collateral in the repo market as per this motivation.

Further, a key feature of the repo market is the "information-insensitive" nature of these contracts. In normal times, lenders such as money market mutual funds (MMMF) provide financing to the borrowers against adequate collateral, without worrying about the unobserved risk of the borrower. Safer and liquid bonds are more likely to be used for repo contracts as they help in making this market information insensitive. When concerns about observable as well as unobservable risk of the borrower or the issuer of the underlying collateral increases, the market ceases to function smoothly (Dang, Gorton, and Holmstrøm, 2010; Gorton and Metrick, 2012). In extreme cases, certain collateral may not be acceptable at all by the lender, and in less extreme cases the haircut and the repo rate may increase substantially. Therefore, we expect to see a higher probability of purchase for repo-eligible bonds that experience a large decline in their creditworthiness or liquidity due to the adverse effects of the crisis. Whether the program mainly focused on directly supporting firms that are hit harder by the pandemic or on alleviating the funding constraints of the intermediaries is an empirical question that we address in this paper.

Distinguishing between the motivations for Fed purchases is important for understanding what implications the credit facility has for the real economy, both from a theoretical as well as practical viewpoint. For instance, Brunnermeier and Krishnamurthy (2020) develop a model in which the effect of credit market intervention depends on frictions such as debt overhang, bankruptcy costs, and inefficient continuation by the subsidized firm. Additionally, industry observers have questioned the logic behind the Fed's decision to buy bonds issued by profitable firms such as Apple.[2] Investigating which firms' bonds were purchased by the credit facility provides a crucial input into this type of analysis.

[2]see https://www.cnbc.com/2020/06/29/the-fed-is-buying-some-of-the-biggest-companies-bonds-raising-questions-over-why.html

The SMCCF was announced on March 23, 2020 as part of a broader package of support to the financial system. The program laid out some broad eligibility criteria for the facility, and the Fed New York subsequently executed the mandate by selecting individual bonds. Broadly speaking, the program was restricted to bonds issued by domestic firms or firms with significant U.S. employees, bonds with less than 5 years of remaining maturity, and bonds that had an investment grade rating as of March 22, 2020. Within the set of eligible bonds meeting these criteria, we investigate the discretion used by the Fed in buying specific bonds.

Our empirical analysis focuses on the first wave of individual bond purchases by the SPV in June and July 2020 for which the Fed has released the data on the identity of purchased bonds at the time of this writing. In total, the program bought 406 out of a potential pool of 1812 bonds that met the broad eligibility criteria formulated under the SMCCF and are covered in standard databases required for our analysis (e.g., COMPUSTAT and CRSP databases). The eligible bonds were issued by 375 issuers; the purchased bonds represent 243 issuers. Since we have multiple bonds per issuer, in our tests we are able to identify the effects of bond characteristics, holding fixed the issuer characteristics.

In the first set of analyses, we show that safer bonds (measured with the credit spread) and longer maturity bonds were more likely to be bought under the program. There is no evidence that bonds issued by firms that were hit harder by the COVID-19 crisis or firms that employ a large number of employees were more likely to be bought under the SMCCF. Specifically, we compute the stock market return of the issuer around February 19 to March 23, 2020 as a proxy for the firm's sensitivity to the pandemic and find no association between the return and the probability of a bond's selection into the program. Using an issuer fixed-effects specification, we show that bonds with longer maturity, better credit risk, and larger issue size are more likely to be purchased by the facility. Thus, for the same issuer with multiple bonds, bonds that are safer (e.g., senior debt), have longer remaining maturity, and have larger volume outstanding in the market, are more likely to be bought by the program. Hence these results are not driven by firm-specific omitted factors.

In the next part of the analysis, we focus on the motivation to improve the secondary market liquidity. We collect data on all repo contracts used by primary dealers to obtain secured funding from the money market mutual funds (MMMF) using the information reported under Form NMFP-2 filings with the SEC. Of 1812 eligible bonds in our sample, 728 bonds are used as collateral in this repo market. Bonds used as collateral have about 6-7% higher probability to be included in the program. The estimate is economically important as well as statistically significant.[3] In addition, we find that the probability of purchase increase for bonds that are actively used as collateral as proxied by the amount of repo borrowing against the bond. These results hold in an issuer fixed-effect specification as well. Therefore, it is not an issuer specific characteristic, rather the bond's specific features, that drives the result.

Bonds used in the repo-market are systematically different from the non-repo bonds along some key dimensions. They tend to be more liquid, larger in terms of issue size, and relatively longer in maturity, and safer than the bonds not used in the tri-party repo contracts by the MMMF that we focus on. Therefore, we analyze whether bonds that became more illiquid and riskier were more likely to be purchased by this program. We find strong evidence in support of this hypothesis. Bonds that experienced a large increase in credit spread between Feb 19, 2020 and March 23, 2020 (i.e., just before the policy intervention) were significantly more likely to be bought by the program. Similar results hold for bonds that experienced a drop in liquidity. Together, these findings support the claim that the program targeted bonds that suddenly became information insensitive due to the crisis. Further, we find strong interaction effects: bonds that are used in the repo-collateral and became illiquid or riskier after the crisis were more likely to be bought under this program. Interestingly, our results show that non-repo bonds that experienced a large drop in liquidity or credit worthiness were not targeted by the program. These results paint a clear picture: the program primarily targeted bonds used by dealers for obtaining funds in the repo-market, and it focused on

[3]The unconditional probability of a bond purchase is 22% so the bonds used as collateral have about a 30% higher likelihood of being purchased.

bonds that became illiquid and riskier as a result of the crisis.

We investigate the effect of policy announcements on security valuations to shed further light on motivations behind this program. Since a number of policy initiatives have been undertaken since March 23, 2020, it is extremely difficult to separate the valuation effect of the corporate bond purchase program from all other policies. Therefore, we lean on two specific events that directly relate to policy initiatives under this program and then focus on a small window around these events to tease out the implication of the SMCCF. The first event date is April 9, 2020, when the program announced an expansion of the SMCCF facility size as well as the inclusion of high yield corporate credit in its ambit. The second event date is June 15, 2020, when the program made an important announcement to buy individual corporate bonds. We find significant evidence of segmentation in the market: credit spreads dropped significantly for bonds with less than 5 years of remaining maturity, investment grade rated bonds, and larger bonds. As mentioned earlier, the program targeted bonds with these characteristics, and the market's reaction shows a disproportionately larger reaction in the spread of these bonds. Even after controlling for these broad characteristics, or segments of the credit markets, credit spreads came down significantly for bonds that were eventually purchased by the program. Around a three-day window surrounding the events, the credit spread came down by almost 5% for bond there were eventually purchased by the program. Interestingly, when we analyze the changes in credit spread over a longer time period – starting before the crisis and ending on July 31, 2020, there is no difference in changes in credit spread across purchased bonds and the remaining set of bonds. These results are consistent with our earlier findings that the program targeted bonds that became information sensitive during the crisis. The program was able to improve their liquidity and the temporary drop in their pricing.

In terms of equity return, we do not find any meaningful differences across firms whose bonds were purchased versus the others. But primary dealers from whom most of these bonds were purchased experienced significantly higher equity return around these announcements.

This result further suggests that the program aimed at alleviating the funding constraints of these intermediaries by successfully bringing down the credit spread of bonds that had become riskier and information-sensitive during the crisis.

Our paper is related to a growing literature analyzing the fed policy responses to COVID-19 such as Haddad, Moreira, and Muir (2020); O'Hara and Zhou (2020); Brunnermeier and Krishnamurthy (2020) and others. The paper builds on the response of quantitative easing and non-conventional policy responses by the central banks after the subprime mortgage crisis and the European sovereign debt crisis such as Krishnamurthy and Vissing-Jørgensen (2011); Grosse-Rueschkamp, Steffen, and Streitz (2019). Finally, our paper relates to the literature on the functioning of repo markets and fricitons faced by market participants in this market (Hu, Pan, and Wang, 2015; Gorton and Metrick, 2012; Krishnamurthy et al., 2014).

2 SMCCF Program Details

In February 2020, the US economy and financial sector came under significant stress from the COVID-19 pandemic. On March 23, 2020, the trough of the market crash, the Federal Reserve announced several policy tools to provide support to the financial sector/economy. This announcement re-introduced many familiar facilities from the 2008 financial crisis, including the Term Asset-Backed Securities Loan Facility (TALF) and large scale asset purchases of Treasury and Agency debt. For the first time, however, the Fed announced the large scale purchase of corporate debt. These corporate debt purchases would take place through two facilities. The Primary Market Corporate Credit Facility (PMCCF) can purchase newly issued corporate bonds and loans, and the Secondary Market Corporate Credit Facility (SMCCF) can purchase outstanding corporate bonds in the secondary market both through purchase of individual bonds as well as Bond ETFs. Due to legal limitations on Fed investment in risky securities, the Treasury funded a first-loss equity tranche of these

investment facilities via a special purpose vehicle (SPV).

Initially, the SMCCF was allocated a $10B equity piece from the Treasury. With a 10:1 leverage, this enabled a total facility size of $100B. The facility was limited to only purchases of investment grade debt. On April 9, 2020, the Fed announced an expansion of the PMCCF and SMCCF to combined facility size of $750B with a $75B equity piece from the Treasury[4]. Additionally, this announcement came with the news that the fed could purchase 'fallen angels' – that is, corporations that were downgraded to junk grade but were rated investment grade prior to the facility's announcement[5].

The announcement effect alone from these emergency facilities helped support recovering asset prices (Smith and Fox, 2020). Following the announcement of these facilities, corporate borrowing costs fell, and by June 2020, they were below their pre-COVID levels (Rennison, 2020). The SMCCF began executing the bond purchases in May-June 2020. The first corporate bond ETFs were purchased on May 12, 2020. On June 15, 2020, the Fed provided more clarity on the individual bond component of the SMCCF. The SMCCF can purchase individual bonds within a range of eligible corporate issuers and issues. Broadly, eligible issuers are non-depository institutions organized in the US with a majority of employees based in the US. Eligible issuers must have an investment grade rating as of March 22, 2020. Within an eligible issuer's outstanding corporate bonds, only issues with less than five years remaining maturity are eligible for purchase by the SMCCF. The first individual bond purchases took place on June 16, 2020.

Within the set of eligible corporate issuers and issues, there is discretion on which bonds the SMCCF can purchase. For each issuer, the SMCCF can purchase up to the minimum of a) 10% of the issuer's historical outstanding corporate debt and b) 1.5% of the total combined CCF facility amount ($750B). Within these restrictions, the SMCCF has discretion on which

[4]The stated intial allocation between the two programs is '$50 billion toward the PMCCF and $25 billion toward the SMCCF'. However, the only legal restriction is on the combined size of the two programs.

[5]Although the fed can provide a 10:1 leverage when purchasing investment grade debt, the leverage is 7:1 for junk rated debt.

corporate bonds it purchases. For example, the Fed identified about 800 eligible issuers, but the SMCCF only purchased debt of 88 issuers in the first round of purchases as of June 17, 2020. By June 28, 2020, the SMCCF had purchased bonds of 332 issuers[6].

3 Data and Sample

We form a sample starting with the universe of outstanding corporate bonds. We define the corporate bond universe by taking the union of all corporate bonds traded on TRACE (Trade Reporting and Compliance Engine) during June 2020 and corporate bonds held by mutual funds in the CRSP holdings dataset. This results in a sample of 26,482 bonds. Table 1 details the number of bonds at each of the following sample steps. We retrieve bond characteristics from Refinitiv Datastream and restrict the sample to bonds with a valid maturity date and issue amount. Using Datastream, we retrieve credit ratings from Moody's and S&P, and restrict the sample to bonds with a minimum of a BB rating as of June 30, 2020 and at least a BBB rating as of March 22, 2020[7].

We merge this sample of bonds to their issuers in Compustat North America[8]. We require that the issuer has publicly traded common equity, which we retrieve data on from Datastream. Next, we subset the sample of Compustat issuers to those which are eligible issuers under the SMCCF's individual bond purchases[9]. Finally, in accordance with the individual bond eligibility requirements, we restrict the sample to bonds with less than five

[6]The 332 figure includes firms not covered by Compustat NA or without traded equity. Within our sample, the SMCCF purchased bonds of 243 distinct issuers.

[7]This sample requirement is imposed since the SMCCF can only purchase BB high yield bonds if they were rated above BBB before the peak of the COVID crisis.

[8]We merge these datasets using the six digit CUSIP. For subsidiary bond issuers, we manually match the issuer to the Compustat parent company.

[9]Broadly, the SMCCF individual bond eligibility criteria requires than an issuer is a US company with a majority of employees based in the US; had an investment grade rating as of March 22, 2020; and is not a depository institution. The full list of eligibility requirements are listed on the SMCCF term sheet, available at: `https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200615a1.pdf` We identify eligible bond issuers using the list provided by the NY fed at: `https://www.newyorkfed.org/markets/secondary-market-corporate-credit-facility/secondary-market-corporate-credit-facility-broad-market-index`

years remaining maturity as of July 10, 2020. This results in a sample of 1805 corporate bonds eligible for purchase by the SMCCF. We retrieve data on individual bond purchase transactions by the SMCCF and merge it to this sample[10]. Out of the 1812 eligible bonds in the sample, 406 were purchased by the Fed as of July 10, 2020[11].

The primary explanatory variables used in the analysis come from the datasets described above. Datastream provides information on bond characteristics including issue size, maturity dates, credit ratings, credit spreads. We measure firm credit ratings and credit spreads on Feb 19, 2020. We also construct a variable 'Δ Credit Spread', which is defined as the log change between the pre-COVID (Feb 19, 2020) credit spread and the credit spread at the peak of the crisis (March 23, 2020).

We also use Datastream to calculate issuer stock returns during the build up of the COVID financial crisis. Specifically, we define 'Covid Stock Return' as the issuer's stock return from February 19 to March 23, 2020 as a proxy for the firm's sensitivity to the pandemic. Compustat provides information on issuer level variables, including firm size, number of employees, firm leverage, country of domicile, and industry. We measure all of these firm specific variables as of fiscal year 2019. We use bonds covered by TRACE to compute volume-weighted bid-ask spreads before and during the COVID crisis[12]. We define 'Bid-Ask Spread' as the average bid ask spread in the pre-COVID period, from Jan 1, 2020 until Feb 19, 2020. We define 'Δ Bid-Ask Spread' as the log difference between average bid ask spread from the pre-COVID period and the bid ask spread during COVID shock period (Feb 20 - March 23, 2020)[13].

Finally, we augment our sample with information on corporate bond repos (repurchase

[10]Data is taken as of July 10, 2020 and available at `https://www.federalreserve.gov/publications/reports-to-congress-in-response-to-covid-19.htm?fbclid=IwAR3EjVU_oMVkxoiqa2E0HbJCY6ES8gvN1I5HA8M_fyocfDkCLusv0IVcFcc`.

[11]The fed purchased a total of 553 unique bonds as of July 10, 2020 but some of the these bonds fall out of the purview of our analysis since they are not covered by Compustat North America or do not have publicly traded common equity.

[12]We define bid-ask spreads following Bao et al. (2018).

[13]Credit Spread, Bid-Ask Spread, 'Δ Bid-Ask Spread' and 'Δ Credit Spread' are all winsorized at the 2% level.

agreements) from Form NMFP-2 filings with the SEC[14]. This dataset provides detailed information on repo contracts between corporate bond dealers and MMMF investors. In particular, the dataset includes bond level information on which corporate bonds are used as collateral in repo contracts. We use this information to construct an indicator variable 'Repo Collateral', which equals one if a bond is used as collateral in this sample of repurchase agreements during the months March-May 2020[15]. We also compute the variable 'Frac. Repo Collat', which measures the dollar amount that a bond has been pledged in this market scaled by the total dollar volume of all corporate bonds pledged over the same time period.

Table 2 provides the summary statistics of all the variables used in the study. As shown in the first row of the Table, the program bought 22% of corporate bonds out of the pool of all eligible bonds meeting our sample selection criteria. 38% of all bonds in the sample (i.e., all eligible bonds) were rated "A" (any A-rating) by at least one of the rating agency as of June 30, 2020, 59% were rated "BBB", and the remaining were below the investment-grade rating. The average "COVID stock return", measuring stock market return between Feb 19 to March 23, 2020 (i.e., a month before the intervention) is -37% capturing the large drop in stock prices in the immediate aftermath of the crisis. The Table also shows a large increase in illiquidity and credit risk for the sample: average bid-ask spread increased by 121%, whereas the average credit spread by 179% around the crisis. Finally, 40% of bonds in our sample were pledged as collateral by primary dealers to obtain funds from the MMMF in the tri-party repo market, providing us a balanced set of bonds across repo and non-repo group.

[14]For an exhaustive overview of this dataset, see Krishnamurthy et al. (2014)

[15]We merge the NMFP-2 dataset to the bond sample using the maturity date, bond coupon, and manually checking the name of the issuers.

4 Results

In our tests, we estimate linear regression models for the decision to purchase a specific bond conditional on its eligibility for SMCCF. We begin with an analysis of issuer and bond specific factors and then focus on repo-specific factors: the bond's information sensitivity and its role in the repo market. We use the linear regression model throughout our paper, instead of the binary choice models such as a Probit or a Logit regression, since it allows us to use fixed effects that are necessary to tease out bond-specific variation, holding fixed the issuer characteristics.

Table 3 relates the decision to buy a bond to firm-specific characteristics, namely, it's size, number of employees, and sensitivity to the COVID-19 shock, and key bond level features such as its issue size, remaining maturity, and credit risk as measured by credit spread as of Feb 19, 2020. We also include two indicator variables to capture whether the firm is a foreign or financial firms.[16] There is no meaningful relation between the probability of bond purchase and a firm's size, employee base or sensitivity to COVID-19 shock.

Safer bonds as measured by the credit spread, bonds with longer maturity (within the fiver-year maturity limit for the eligible bonds), and bonds with larger issue size have significantly higher probability of being selected under the program. Since we standardize all continuous variables to mean zero and standard deviation of one, we can compare their economic magnitude based on the estimated coefficients. Amongst the significant predictors of bond purchase, the size of the bond issue has economically the largest impact. One standard deviation larger issue size is associated with almost 13% higher probability of purchase, whereas one standard deviation higher maturity with 6.6% higher probability. One standard deviation higher credit spread of the bond is associated with 3.7% lower probability of purchase. The results show that the selection criteria did not favor issuing firms that are hit harder by the crisis or firms with larger employee base.

[16]Note that the program required the issuer to be a firm registered in the US with a majority of employees US based. Also, the program excluded depository institutions, but other financial firms remained eligible.

In Table 4 we turn our attention to features of bonds that make them attractive to the repo market: their information sensitivity. We focus on both the liquidity of the bonds, as measured by their bid-ask spread over Jan 1, 2020- Feb 19, 2020, and their credit spread. The bid-ask spread is likely to widen when bonds value becomes more sensitive to the seller's information. In addition, riskier securities' value is more sensitive to information asymmetry. Columns (1) - (4) of the Table shows that liquid bonds and safer bonds are more likely to be purchased by the program, and the effects are almost independent of the firm-specific factors such as its size or sensitivity to COVID-19.[17] The economic magnitude of these effects are large. Compared with an unconditional purchase probability of 22%, one standard deviation lower bid-ask spread and credit spread increases the probability of purchase by 3.4% and 3.7%, respectively.

Safer and liquid bonds are more likely to be purchased by the program. Columns (5) - (8) analyzes the effects of changes in these two features of the bond due to the crisis and its impact on the probability of purchase. We find that bonds that became more illiquid due to the crisis, measures as the difference between bid-ask spread between (Jan 1, Feb 19) and (Feb 20, March 23), were more likely to be purchased. Similarly bonds that became riskier, as measured by the changes in credit spread over Feb 19 to Mar 23, were more likely to be bought by the SPV. The economic magnitude is large as well: one standard deviation increase in illiquidity and credit risk is associated with 2.0% and 3.8% higher probability of purchase. These effects are almost orthogonal to the issue size and bond maturity as evident from the coefficients on these variables in models with and without the inclusion of liquidity and credit risk variables.

[17]The results presented in Column (2) of the Table is the same as the results in Table 3. However, we reproduce it here for expositional clarity and comparison with other columns of the Table.

4.1 Within-Issuer Analysis

A concern with our analysis so far can be the heterogeneity across firms that are safer or liquid. Our empirical setting allows us to directly address this issue since we have multiple eligible bonds issued by the same firm. In our next analysis, we use an issuer fixed-effects model to exploit variation across different bonds issued by the same issuer. Depending on the bond's seniority, security, and other features (such as covenants and holders of the bond), bonds issued by the same firm can have different liquidity, credit risk, maturity, and issue size. We present the issuer fixed-effect regression results in Table 5. For this analysis, we are limited to issuers with at least bond issues, and naturally we are unable to estimate the effects of firm-specific factors on the purchase decision.

In the issuer fixed-effect model, we provide results in "pairs", i.e., we first provide results without issuer fixed-effects on the same sample that we use for the model with fixed-effects. This allows us to compare the coefficients across the two models without any concerns of sample selection, namely issuer with multiple bonds versus one bond. Columns (1) and (2) present the results for the effect of liquidity. As shown in Column (1), one standard deviation lower bid-ask spread is associated with 3.3% higher probability of purchase for this sample. Inclusion of fixed-effect, in Column (2), increases the coefficient on bid-ask spread to 4.0%. Thus, when multiple bonds were available from the same issuer, the program picked bonds with higher liquidity in the pre-COVID period. The Table also reports the within R^2 of 11.3% for this mode, suggesting that bond specific factors within the same issuer contributed significantly to the Fed's decision to purchase them under the SMCCF.

Columns (3) and (4) of the Table reproduce the above analysis for credit spreads. The results are stark. Without issuer fixed-effects, we find a coefficient of 3.1% on the credit spread variable, and it increases substantially to 8.6% when we used the fixed-effect model. The results show that, within a set of bonds issued by the same firm, the program specifically targeted bonds that were safer before the crisis. Together these results show that for the

same issues, the program picked safer and liquid bonds, measured before the onset of the crisis. Columns (5) - (8) extends this analysis to understand how changes in these variables due to the COVID-19 shock affected the program's decision. Specifically, we analyze whether bonds that became more illiquid and riskier were more likely to be bought by the program. Our analysis provides an affirmative answer to this question. As shown in Column (6), bonds that experienced one standard deviation increase in illiquidity from bid ask spreads of 25 cents to 48 cents were 2.5% more likely to be included in the SMCCF. Similarly, bonds that experienced one standard deviation increase in credit spreads around this period were 4.4% more likely to be purchased.

Overall these results show that the program targeted bonds that were safer and liquid before the crisis, but at the same time it focused on bonds that were becoming riskier and illiquid in the aftermath of the crisis, i.e., bonds that became information sensitive due to crisis. These results naturally lead us to our next test that focuses on whether bonds were eligible for repo markets or not. Repo markets function based on liquid and safe collateral.

4.2 Repo Effects

Figure 3 provides the univariate relation between probability or purchase of a bond under the SMCCF and whether a bond is pledged as collateral, i.e., the "Repo Collateral" variable. Bonds that are not used as collateral in the market has approximately 16% probability of purchase compared to a 31% probability for the repo collateral category. The difference is economically large and statistically significant. More formally, in Table 6, we relate the probability of purchase to whether the bond was used as collateral in a repo contract by the primary dealers in obtaining short-term funding from the MMMF. As shown in Columns (1) and (2), bonds pledged as collateral have significantly higher probability of purchase under the program. Depending on the model specification, the effect varies from 14.9% higher probability for the model without any control variables to 7.1% for the model with a rich set

of controls. Column (3) exploits within-issuer variation, and shows that for the same issuer the probability of purchase increases by 7.3% for a bond that is used as collateral in this market compared to other bonds. The effect is not explained away by issue size or maturity.

Columns (4) - (6) include the volume of bonds used as repo collateral, in addition to the indicator variable used in the earlier specification. Across specifications, the message is clear: bonds that are used extensively in the repo market have higher purchase probability. One standard deviation higher volume of repo collateral is associated with 3.6% to 4.8% higher probability of purchase, depending on the model specification.

To establish the information-sensitivity channel, in Table 7 we ask whether the effect is stronger for bonds that are used as repo collateral *and* became illiquid or riskier after the shock. We find an interesting pattern: the interaction of whether the bond is used as collateral and changes in liquidity and credit spread are one of the strongest predictors of purchase.

Columns (1) and (2) of the Table includes the interaction of "Repo Collateral" and the level of "Credit Spread" before the crisis. We find a positive and significant coefficient on both "Repo Collateral" and "Credit Spread", but the interaction effect is not significant. Thus there is no evidence that repo bonds that were safer (within the universe of all eligible bonds) were purchased at a higher rate. However, when we interact "Repo Collateral" with $\Delta CreditSpread$, we find a strong positive coefficient on the interaction variable as shown in Columns (5) and (6). The interaction term has a coefficient of 7.1% in the issuer fixed-effects regression model. Therefore, the program specifically targeted bonds, within bonds issued by the same firm, that were being used in the repo market and became riskier.

A similar pattern holds for changes in liquidity. As shown in Columns (3) and (4) the interaction between "Repo Collateral" and "Bid-Ask Spread" is negative and marginally significant, i.e., the program bought bonds used in the repo market that were liquid before the crisis. But the interaction between "Repo Collateral" and "ΔBid-Ask Spread" is positive

(8.1%) and significant in Column (7). Therefore the program targeted bonds that were used in the repo market and became illiquid after the crisis. These results are consistent with an objective to support the repo market by targeting bonds that were becoming informationally sensitive after the crisis.

4.3 Valuation Effects

In this part of the paper, we investigate the valuation effects of bond purchase on credit spreads and equity returns of the issuing firms as well as the equity returns of intermediaries that are active in the repo market. Our results so far show that the program didn't pick firms that are likely to benefit by the secondary market purchase of their bonds, e.g., firms hit harder by the COVID-19 shock. We do find strong evidence that the program supported the functioning of the repo market. These results suggest that the bond purchase program is unlikely to benefit the shareholders of the issuing firm. But it is likely to benefit the shareholders of primary dealers who received a relaxation in their funding constraints.

Since a number of policy initiatives have been undertaken since March 23, 2020, it is extremely difficult to separate the valuation effect of the corporate bond purchase program from all other policies. Therefore, we lean on two specific events that directly relate to policy initiatives under this program, and then focus on a small window around these events to tease out the implication of the SMCCF. The first event date is April 9, 2020, when the program announced expansion to include high yield corporate credit in its ambit. The second event date is June 15, 2020, when the program made an important announcement to buy individual corporate bonds. For each of these event dates, we compute Cumulative Abnormal Return (CAR) of the firm's equity with respect to market return around an event window of (-1,+1) day. For bond spreads, we compute the log change in credit spread around the same window,

As shown in Figure 1, credit spreads on corporate bonds started to increase since February 19, 2020 and peaked on March 23, 2020. Soon after the initial broad policy announcement

on March 23, the spread have steadily come down, especially around the announcement on April 9, 2020. In our next set of tests, we explore the cross-sectional variation in these spreads as a function of whether the bond was purchased by the program or not, and its key characteristics such as credit rating, maturity and issue size.

For firm level analysis, we break all sample firms into two groups: those whose bonds were bought and those whose bonds were not bought even if they were eligible, and estimate the following regression model.

$$ret^{i}_{-1,+1} = \alpha + \beta Purchased_i + \epsilon_i \tag{1}$$

ret denotes either the equity return or bond spread in a (-1,+1)-day window around the announcement date. $Purchases_i$ is an indicator variable that equals one for firms that were included in the program, zero otherwise. In an alternative specification, we also use the extent of bond purchased by computing the ratio of the bond purchase amount to the issuer firm's total assets. In this regression, α represents the average return around the announcement day for all firms, and β represents the extra return earned by firms targeted by the program.

Effect on credit spreads:

Table 8 provides the results for April 9th intervention in Panel A, and June 15th in Panel B[18]. As shown in Column (1) of both panels, credit spreads came down significantly for investment grade rated firms on both days: 2.9% reduction on the first day and 3.5% on the second. On April 9th, the announcement was made to include high yield bonds as long as the bond was investment-grade rated before the crisis. Around this policy intervention, credit spreads on the BB-rated bonds came down significantly as well. In addition, on both event announcement days, credit spread decreased for bonds with less than 5 years of remaining maturity. Finally credit spreads on larger bonds came down by more. Overall these results

[18]In this table, we loosen the sample restrictions to include bonds with at least a B rating and any maturity provided they are covered in covered by Compustat with traded common equity.

show that bonds that were targeted, in terms of credit rating and maturity, experienced larger decline in credit spreads, compared to other bonds. These results are consistent with a segmented market, where capital flows in a specific segment has disproportionate impact on prices in that segment compared to other markets. Figure 2 shows market returns around these even dates across different segments of the credit market, where segments are formed on the basis of maturity, ratings and size of the issue. Consistent with the segmentation theory, the figure shows that the policy announcement had disparate impacts on different segments.

Columns (2)-(4) in the Table shows that even after controlling for these broad characteristics (ratings, maturity, and size), bonds that were purchased by the program experienced almost 4.8% decline in credit spread on both days. Since these bonds are more likely to be used as repo-collateral as shown in our earlier tests, it is not surprising to see that bonds used in the repo market experienced significant decline in credit spread as well. In Panel A of Table 9, we estimate a regression model with bond segment fixed effect to tease out the impact of policy intervention on purchased bonds, holding fixed the segment they belong to. In this analysis, we restrict the sample to SMCCF eligible bonds and test for the differential impact on the purchased bonds. Bond segments are formed using two bond rating categories (IG/HY), three quantiles of bond issue size, and 2 categories of bond maturity (above/below 2.5 years maturity) for a total of 12 buckets. As shown in the table, purchased bonds experienced a decline of 3.2% to 3.3% in credit spreads even after including these fixed effects.

Next, we investigate whether this effect is bond specific or all issuer's bonds benefit. Since a firm may issue multiple bonds, we can test this question via the inclusion of a bond issuer fixed effect. In Panel B, we rerun the previous specification but include an issuer fixed effect in addition to the bond segment fixed effects. This specification tests whether there is a differential impact on credit spreads within the set of an issuer's eligible bonds. Within an issuer's bonds, credit spreads of purchased bonds decline by 3.4% around April 9th and 4.4% on June 15.

These results show that the policy was successful in bringing down the credit spreads in the market, and especially so for the targeted segments of the market and bond there were bought. Since these bonds are the ones used extensively in the repo market, the policy was successful in alleviating the funding constraints for intermediaries in the market. In our final test on credit spreads, we investigate the longer term effect on credit spreads for purchased bonds. For this exercise, we compute changes in credit spreads from Feb 19 (i.e., before the initial stress from the crisis was felt in the market) to July 31, and report the results in Table 10. There is no difference in changes in credit spread across purchased bonds and other bonds over this long horizon. The result shows that the program alleviated immediate liquidity constraints, and brought back the credit spread of purchased bonds lower in the immediate aftermath of the policy. But in the long run, it has no differential effect. All these findings go in favor of our argument that the primary goal and outcome of the policy was to alleviate the liquidity and funding constraints in the secondary market.

Effect on equity return: Table 11 presents the results. As shown in Column (1), around the April 9 window, the coefficient on $Purchased_i$ variable is insignificant, both in economic and statistical terms. The constant term α is 2.23%, that is economically large and statistically highly significant. The results show that the announcement of this program resulted in large positive returns to all firms, but there was no difference across firms that were targeted versus those that were not targeted. We find similar result for the second event window around June 15. The overall return is positive and significant at 0.9%, but there is no difference between the purchased and other firms. Similar results hold when we use the extent of bond purchase as the variable of interest. Overall these results are consistent with our earlier results: the benefit of the program did not reach to specific firms. Rather, it affected markets in general in a significant positive way.

Effect on intermediaries equity return: In our next analysis, we focus on the primary dealer's stock return. While we have relatively smaller number of primary dealers (17) in the sample, this is an economically meaningful sample to study to shed light on the funding

constraints channel. A program that alleviates financing constraints of these intermediaries is likely to benefit their stockholders. We compute the dollar value of bonds purchased by the SMCCF from specific primary dealers[19]. We compute 'SMCCF Purchase Frac' by dividing the dealer bond purchase amount by the total SMCCF purchase amount. Additionally, we compute 'High' SMCCF Purchase' as an indicator for whether a primary dealer's 'SMCCF Purchase Frac' is above sample median.

Using the same methodology as we used for firm level return analysis, in Table 12 we show that primary dealers with large fraction of bond purchased under the SMCCF experienced large positive returns around both announcement windows. On April 9, 2020, primary dealers with large (above median) bond purchase earned 4.9% higher returns than the remaining primary dealers. The difference was 3.1% for the June 15 window. These results suggest that the alleviation of funding constraints helped intermediaries who were more active in raising money from the MMMF.

5 Conclusions

We analyze the determinants of bond purchase by the Federal Reserve Bank and the Treasury under their SMCCF. Our findings show that the program targeted bonds that were used heavily in the repo market. Firm specific factors, such as shock to COVID-19 or the number of employees they have, played no role in this decision. Consistent with this motivation, we find no difference in the stock market return of firms whose bonds were purchased and those left out from the program. However, primary dealers who benefitted most from the purchase experienced significantly higher stock returns around specific policy announcements related to the program.

[19]Data on the dollar amount from bond purchases from specific primary dealer is taken as of July 10, 2020 and available at `https://www.federalreserve.gov/publications/reports-to-congress-in-response-to-covid-19.htm?fbclid=IwAR3EjVU_oMVkxoiqa2E0HbJCY6ES8gvN1I5HA8M_fyocfDkCLusv0IVcFcc`.

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Figure 1: BBB Bond Credit Spread During COVID-19 Crisis

Figure 1 plots the BBB credit spread over time during the COVID-19 Crisis. The y-axis is the BBB credit spread in percentage points. The dotted lines corresponds to the end of the Pre-Crisis period (Feb 19), the peak of credit spreads (Mar 23), SMCCF Expansion Announcement (Apr 9), and Individual Bond Purchase Announcement (June 15). Source: ICE BofA BBB US Corporate Index Option-Adjusted Spread from FRED.

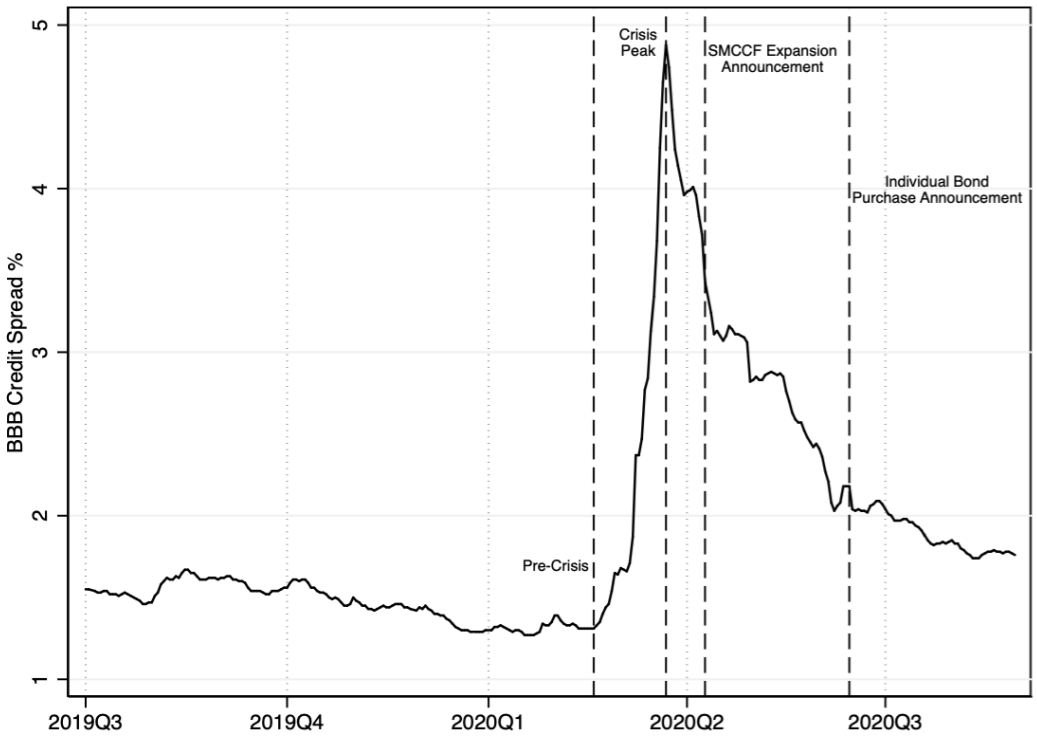
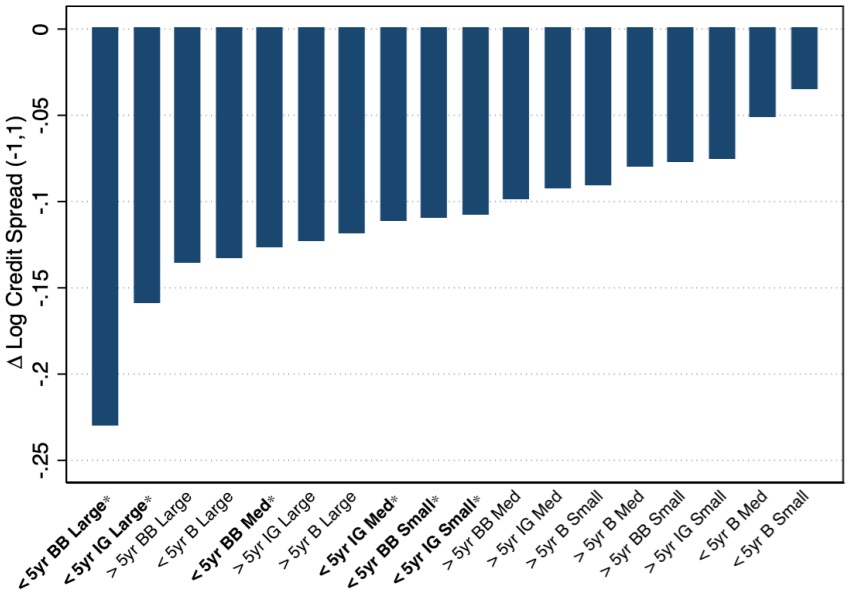


Figure 2: Bond Credit Spread Event-Study Reaction by Segments

Figure 2 plots in the change in bond credit spreads around SMCCF announcements by bond segments. The sample consists of outstanding bonds with at least a B rating as of June 2020 issued by firms covered by Compustat with traded common equity. Bond segments are formed using three bond rating categories (IG/BB/B), three quantiles of bond issue size, and 2 categories of bond maturity (above/below 5 years maturity) for a total of 18 buckets. The bond segments are plotted on the x-axis. Small, Med, and Large corresponds to bottom, middle, and top terciles of bond issue size, respectively. IG, BB, B indicates any investment grade rating, BB rating, or B rating, respectively. Bolded categories with an asterisk indicate a segment was targeted by the individual SMCCF purchases. Each bar corresponds to the average change in credit spreads for bonds in a given segment.

(a) Panel A: April 9, 2020 (High Yield (BB rating) Inclusion Announcement)



(b) Panel B: June 15, 2020 (Individual Bond Purchase Announcement)

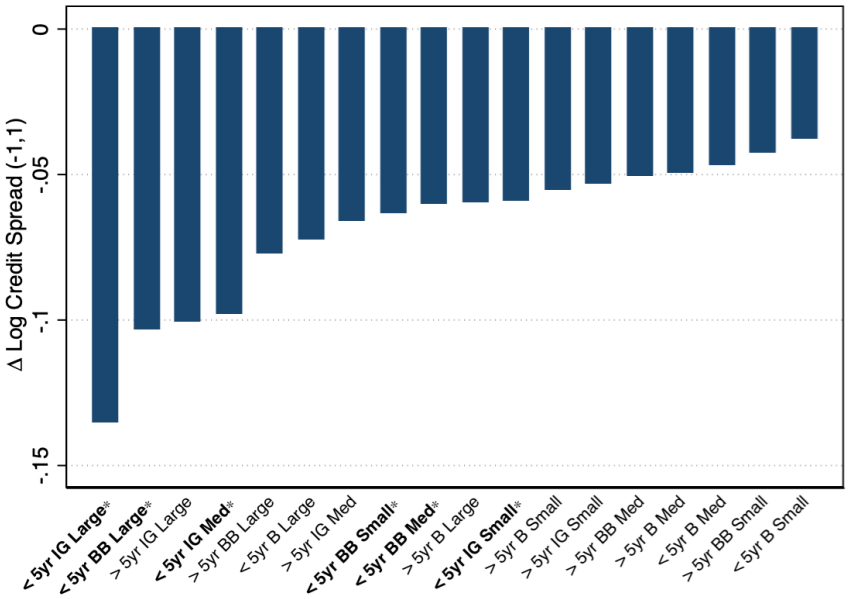


Figure 3: Unconditional Effect of Repo Collateral

Figure 3 plots the effect that a bond is pledged as repo collateral on the probability that bond is purchased by the SMCCF. Repo Collat. is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during March-May 2020.The marginal effects are estimated from a bivariate linear probability model. Lines around point estimates correspond to 95% confidence intervals. Standard errors are clustered at the bond issuer level.

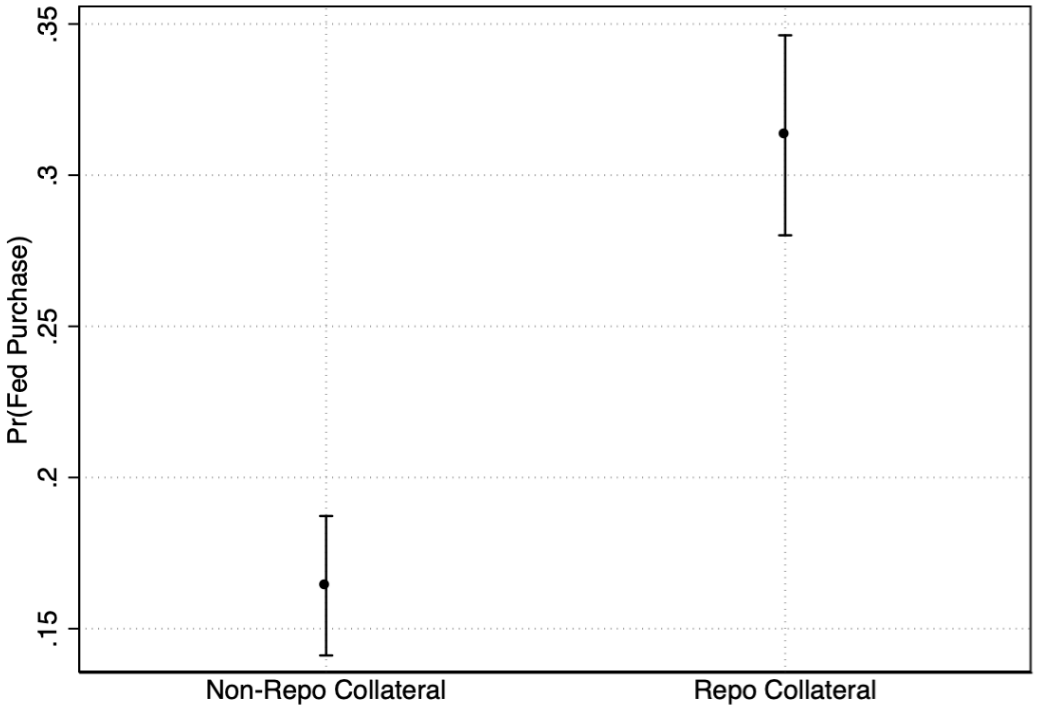


Figure 4: Repo Collateral and Information Sensitive Debt

Figure 4 plots the effect that a bond is pledged as repo collateral interacted with a measure of the information sensitivity of that debt. Repo Collat. is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during March-May 2020. Low/High Info Sens. indicates whether the bond's. Δ Bid-Ask Spread is below/above sample median Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. The marginal effects are estimated from a linear probability model using only Repo Collat., High Info Sens, and their interaciton. Lines around point estimates correspond to 95% confidence intervals. Standard errors are clustered at the bond issuer level.

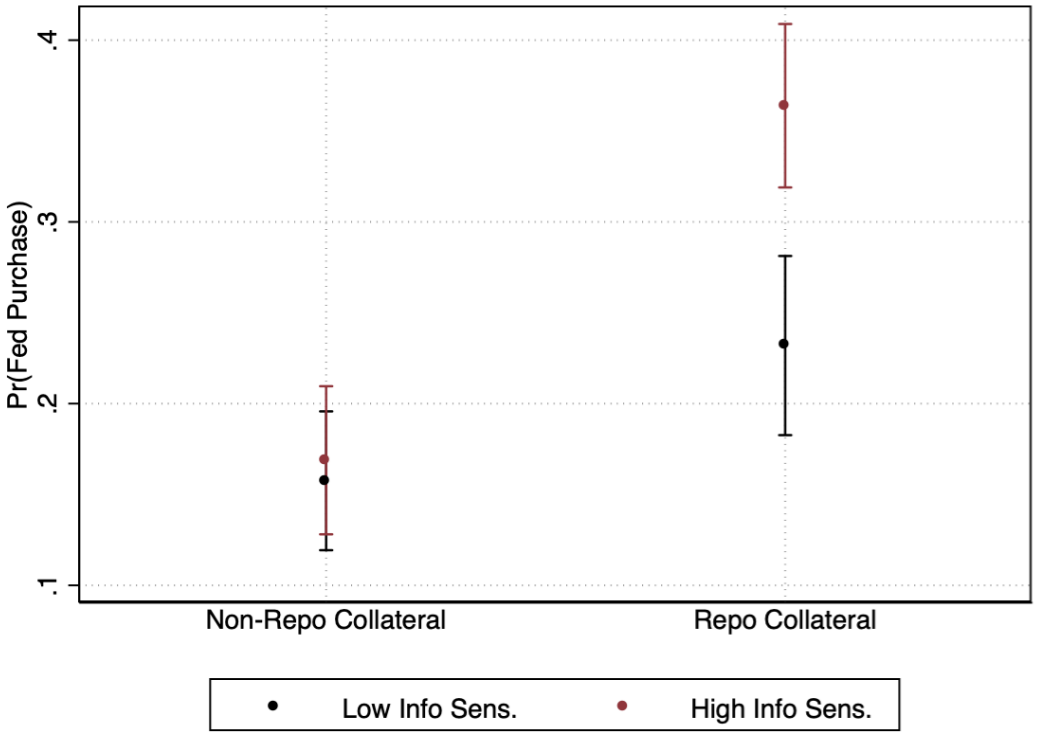


Figure 5: Event Study

Figure 5 plots the event study reaction of primary dealer to SMCCF announcements. The y axis variable is the cumulative abnormal returns of NY Fed primary dealers over a (-1,1) event horizon using a market model (estimated using the S&P 500 as the market benchmark). In the first panel, the event study is estimated around the April 9th announcement of the expansion of SMCCF to include purchases of high yield credit. In the second two columns, the event study around the June 15th announcement of the broad market index and purchase of individual corporate bonds. High Bond Purchase Dealers is the sample of primary dealers with above median corporate bond purchases from SMCCF as of June 28, 2020. Low Bond Purchase Dealers consists of dealers below sample median.

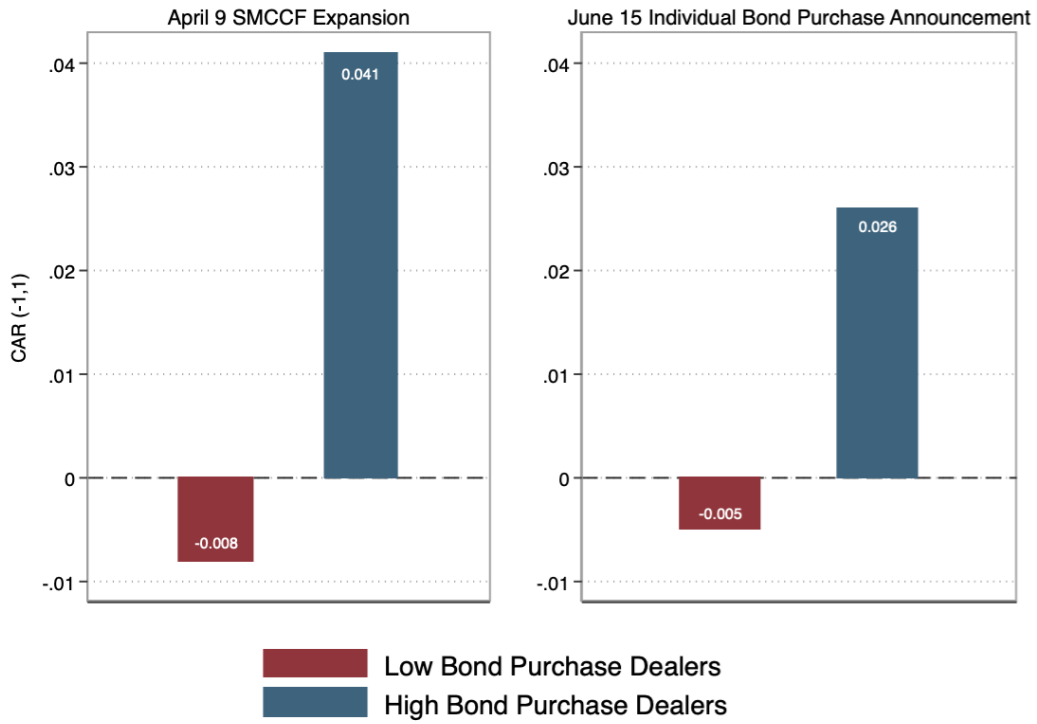


Table 1: Bond Sample Formation

Sample Step	Total
Universe of Outstanding Corporate Bonds from CRSP Holdings/TRACE	26,482
Covered by Datastream; Valid Issue Amount, Maturity Date	22,852
At Least BB Rating from Moody's / S&P; At Least BBB Rating as of March 22	15,989
Compustat NA Coverage, Traded Common Equity	5,653
SMCCF Eligible Issuer	4,359
Less Than 5 Years Remaining Maturity	1,812

Table 2: Summary Statistics

Table 2 presents summary statistics on individual bond characteristics. The sample consists of outstanding bonds issued by SMCCF eligible firms with at least a B rating as of June 2020 and BBB rating as of March 22 2020 with less than 5 years remaining maturity. Only bond issuers covered by Compustat North America with traded common equity are included. Bond issuer country, industry, number of employees, total assets, and leverage are taken from Compustat. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Credit Spread is the difference between the bond's yield and the corresponding benchmark rate of the same maturity measured on Feb 19, 2020. Δ Credit Spread is the log difference between a bond's credit spread in Feb 19 2020 and the credit spread on Mar 23, 2020. Fed Purchase is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. Time Maturity is the number of years until maturity from June 2020. An issuer's credit rating is taken as the minimum of Moody's and S&P's rating. Any A Rating is indicator equal to 1 if an issuer has an A rating or better and zero otherwise. BBB Rating is an indicator variables for whether an issuer has a BBB rating. Bid-Ask Spread is the volume-weighted bid-ask spread estimated from TRACE over Jan 1 - Feb 19 2020. Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. Covid Stock Return is a bond issuer's cumulative stock return over Feb 19 - March 23. Repo Collat is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during the months March-May 2020. Frac Repo Collat is the dollar amount that a bond was pledged as collateral over March-May 2020 scaled by the total dollar volume of bonds pledged as collateral during the same period.

	Mean	SD	Min	P25	P50	P75	Max	N
Fed Purchase	0.224	0.417	0.000	0.000	0.000	0.000	1.000	1812
Foreign	0.090	0.286	0.000	0.000	0.000	0.000	1.000	1812
Financial	0.140	0.347	0.000	0.000	0.000	0.000	1.000	1812
Employees	112.829	214.808	0.000	13.450	49.500	137.000	2200.000	1812
Firm Leverage	0.384	0.156	0.015	0.283	0.383	0.482	1.001	1812
Total Assets	114994	145495	1387	19509	51803	157728	896552	1812
Amount Issued	788737	656941	227	400000	600000	1000000	11000000	1812
Time to Maturity	2.509	1.428	0.008	1.318	2.433	3.729	4.978	1812
Credit Spread	0.609	0.336	0.121	0.368	0.554	0.770	1.669	1664
Any A Rating	0.378	0.485	0.000	0.000	0.000	1.000	1.000	1812
BBB Rating	0.589	0.492	0.000	0.000	1.000	1.000	1.000	1812
BB Rating	0.033	0.178	0.000	0.000	0.000	0.000	1.000	1812
Bid-Ask Spread	0.247	0.236	0.037	0.116	0.172	0.277	2.081	1515
Covid Stock Return	-0.373	0.144	-0.847	-0.472	-0.362	-0.289	0.094	1812
Repo Collateral	0.402	0.490	0.000	0.000	0.000	1.000	1.000	1812
Frac. Repo Collat	0.001	0.002	0.000	0.000	0.000	0.000	0.029	1812
Δ Bid-Ask Spread	1.205	0.956	-1.603	0.681	1.279	1.815	3.204	1402
Δ Credit Spread	1.786	0.629	0.558	1.341	1.779	2.183	3.215	1660

Table 3: Bond Level Inclusion: Firm Characteristics

Table 3 estimates a linear model of the probability that a corporate bond is purchased by the SMCCF. The outcome variable is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. The sample is the same as in Table 2. Bond issuer country, industry, number of employees, and total assets are taken from Compustat. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Credit Spread is the difference between the bond's yield and the corresponding benchmark rate of the same maturity measured on Feb 19, 2020. Time Maturity is the number of years until maturity from June 2020. Covid Stock Return is a bond issuer's cumulative stock return over Feb 19 - March 23. All continuous variables are standardized for ease of interpretation. All standard errors are clustered at the bond issuer level.

	Pr(Fed Purchase)		
	(1)	(2)	(3)
Foreign	0.047	0.048	0.026
	(1.32)	(1.35)	(0.75)
Financial	0.041	0.040	0.046
	(1.27)	(1.25)	(1.44)
Log(Employees)	-0.007	-0.004	-0.026*
	(-0.52)	(-0.28)	(-1.95)
Log(Size)	-0.015	-0.017	-0.006
	(-1.17)	(-1.25)	(-0.45)
Issue Size	0.130***	0.130***	0.117***
	(9.26)	(9.20)	(7.77)
Log(Time Mat)	0.066***	0.066***	0.064***
	(8.53)	(8.54)	(7.63)
Covid Stock Return		-0.007	
		(-0.73)	
Credit Spread			-0.037***
			(-4.05)
Constant	0.214***	0.214***	0.198***
	(20.91)	(20.73)	(17.59)
Observations	1812	1812	1664
R^2	0.118	0.118	0.110

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 4: Bond Level Inclusion: Information Sensitivity of Debt

Table 4 estimates the effect of debt information sensitivity on the likelihood of SMCCF purchase. All specifications are linear model of the probability that a corporate bond is purchased by the SMCCF. The outcome variable is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. The sample is the same as in Table 2. Bond issuer country, industry, number of employees, and total assets are taken from Compustat. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Credit Spread is the difference between the bond's yield and the corresponding benchmark rate of the same maturity measured on Feb 19, 2020. Δ Credit Spread is the log difference between a bond's credit spread on Feb 19, 2020 and the credit spread on Mar 23, 2020. Time Maturity is the number of years until maturity from June 2020. Bid-Ask Spread is the volume-weighted bid-ask spread estimated from TRACE over Jan 1 - Feb 19 2020. Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. Covid Stock Return is a bond issuer's cumulative stock return over Feb 19 - March 23. All continuous variables are standardized for ease of interpretation. Credit Spread, Bid-Ask Spread, Δ Bid-Ask Spread and Δ Credit Spread are winsorized as the 2% level. All standard errors are clustered at the bond issuer level.

	Pr(Fed Purchase)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bid-Ask Spread	-0.058***	-0.034***						
	(-8.00)	(-4.45)						
Credit Spread			-0.034***	-0.037***				
			(-3.71)	(-4.05)				
Δ Bid-Ask Spread					0.036***	0.020*		
					(3.42)	(1.90)		
Δ Credit Spread							0.054***	0.038***
							(5.50)	(3.61)
Foreign		0.044		0.026		0.036		0.029
		(1.01)		(0.75)		(0.87)		(0.84)
Financial		0.041		0.046		0.037		0.061*
		(1.21)		(1.44)		(1.01)		(1.88)
Log(Employees)		-0.018		-0.026*		-0.017		-0.016
		(-1.17)		(-1.95)		(-1.08)		(-1.16)
Log(Size)		-0.024		-0.006		-0.023		-0.013
		(-1.56)		(-0.45)		(-1.46)		(-0.93)
Issue Size		0.126***		0.117***		0.140***		0.112***
		(8.77)		(7.77)		(9.79)		(7.22)
Log(Time Mat)		0.063***		0.064***		0.053***		0.062***
		(7.15)		(7.63)		(6.25)		(7.62)
Constant	0.214***	0.207***	0.201***	0.198***	0.221***	0.207***	0.201***	0.195***
	(19.80)	(17.32)	(19.35)	(17.59)	(19.84)	(16.74)	(19.00)	(17.67)
Observations	1515	1515	1664	1664	1402	1402	1660	1660
R^2	0.020	0.113	0.007	0.110	0.008	0.103	0.018	0.110

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 5: Bond Level Inclusion: Issuer FE

Table 5 estimates a linear probability model using bond issuer fixed effects. In models without the issuer fixed effects, the sample is restricted to valid observations from the following fixed effects model. The outcome variable is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. The sample consists of outstanding bonds issued by SMCCF firms with at least a BB rating as of June 2020 and BBB rating as of March 22 2020 with less than 5 years remaining maturity. Only bond issuers covered by Compustat North America with traded common equity are included. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Credit Spread is the difference between the bond's yield and the corresponding benchmark rate of the same maturity measured on Feb 19, 2020. Bid-Ask Spread is the volume-weighted bid-ask spread estimated from TRACE over Jan 1 - Feb 19 2020. Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. Credit Spread, Bid-Ask Spread, Δ Bid-Ask Spread and Δ Credit Spread are winsorized as the 2% level. All continuous variables are standardized for ease of interpretation. All standard errors are clustered at the bond issuer level.

	Pr(Fed Purchase)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Issue Size	0.107***	0.154***	0.106***	0.127***	0.121***	0.174***	0.103***	0.127***
	(8.36)	(7.48)	(8.09)	(5.15)	(9.14)	(9.41)	(7.40)	(4.97)
Log(Time Mat)	0.070***	0.062***	0.070***	0.074***	0.060***	0.053***	0.067***	0.062***
	(7.81)	(5.83)	(8.47)	(8.26)	(6.89)	(5.08)	(8.43)	(6.36)
Bid-Ask Spread	-0.033***	-0.040***						
	(-3.97)	(-3.41)						
Credit Spread			-0.031***	-0.086***				
			(-3.25)	(-4.91)				
Δ Bid-Ask Spread					0.025**	0.025**		
					(2.29)	(1.98)		
Δ Credit Spread							0.027**	0.044***
							(2.57)	(3.19)
Constant	0.209***		0.202***		0.206***		0.202***	
	(19.59)		(20.38)		(18.86)		(20.08)	
Observations	1424	1424	1580	1580	1312	1312	1576	1576
Issuer FE	No	Yes	No	Yes	No	Yes	No	Yes
R^2	0.102	0.256	0.103	0.249	0.098	0.252	0.102	0.245
Within R^2		0.113		0.108		0.109		0.103

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 6: Bond Level Inclusion: Repo Collateral

Table 6 examines whether the extent that a bond is pledged as collateral in the repo market affects for SMCCF purchase decisions. The outcome variable is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. The sample is the same as in Table 2. Repo Collat is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during the months March-May 2020. Frac Repo Collat is the dollar amount that a bond was pledged as collateral during March-May 2020 scaled by the total dollar volume of bonds pledged as collateral during the same period. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Time Maturity is the number of years until maturity from July 2020. All continuous variables are standardized for ease of interpretation. All standard errors are clustered at the bond issuer level.

	Pr(Fed Purchase)					
	(1)	(2)	(3)	(4)	(5)	(6)
Repo Collateral	0.149***	0.071***	0.073***	0.116***	0.048**	0.048*
	(7.22)	(3.32)	(2.95)	(5.33)	(2.21)	(1.92)
Frac. Repo Collat				0.048***	0.036***	0.041***
				(3.36)	(2.72)	(2.97)
Issue Size		0.120***	0.139***		0.118***	0.136***
		(8.30)	(5.79)		(8.20)	(5.77)
Log(Time Mat)		0.063***	0.058***		0.060***	0.054***
		(8.17)	(6.41)		(7.95)	(6.18)
Financial		0.040			0.043	
		(1.25)			(1.36)	
Foreign		0.044			0.046	
		(1.18)			(1.17)	
Log(Employees)		-0.005			-0.007	
		(-0.38)			(-0.54)	
Log(Size)		-0.018			-0.018	
		(-1.37)			(-1.38)	
Constant	0.164***	0.186***		0.178***	0.194***	
	(14.00)	(14.27)		(14.08)	(14.62)	
Observations	1812	1812	1722	1812	1812	1722
Issuer FE	No	No	Yes	No	No	Yes
R^2	0.031	0.124	0.242	0.042	0.130	0.249
Within R^2			0.119			0.128

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 7: Bond Level Inclusion: Channels

Table 7 examines the channels behind the SMCCF bond purchases. When indicated, issuer fixed effects are included. In models without the issuer fixed effects, the sample is restricted to valid observations from the preceding fixed effects model. The outcome variable is an indicator variable equal to 1 if the SMCCF purchased the individual bond as of June 28, 2020. The sample is the same as in Table 2. Information on bond issuance size, maturity, credit rating, and credit spread are taken from Refinitiv Datastream. Credit Spread is the difference between the bond's yield and the corresponding benchmark rate of the same maturity measured on Feb 19, 2020. Δ Credit Spread is the log difference between a bond's credit spread on Feb 19 2020 and the credit spread on Mar 23, 2020. Time Maturity is the number of years until maturity from June 2020. Bid-Ask Spread is the volume-weighted bid-ask spread estimated from TRACE over Jan 1 - Feb 19 2020. Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. Repo Collat is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during the months March-May 2020. Credit Spread, Bid-Ask Spread, Δ Bid-Ask Spread and Δ Credit Spread are winsorized as the 2% level. All standard errors are clustered at the bond issuer level.

	Pr(Fed Purchase)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign		0.015		0.038		0.018		0.023
		(0.42)		(0.84)		(0.50)		(0.51)
Financial		0.057*		0.054		0.072**		0.050
		(1.69)		(1.48)		(2.10)		(1.31)
Log(Employees)		-0.021		-0.010		-0.010		-0.002
		(-1.56)		(-0.66)		(-0.69)		(-0.10)
Log(Size)		-0.008		-0.023		-0.015		-0.025
		(-0.58)		(-1.48)		(-1.02)		(-1.51)
Issue Size	0.121***	0.103***	0.145***	0.113***	0.121***	0.103***	0.170***	0.127***
	(4.99)	(6.88)	(6.82)	(7.58)	(4.81)	(6.64)	(8.77)	(8.39)
Log(Time Mat)	0.070***	0.064***	0.059***	0.062***	0.060***	0.062***	0.053***	0.056***
	(7.68)	(7.49)	(5.42)	(6.68)	(5.95)	(7.42)	(5.14)	(6.42)
Repo Collat.	0.060**	0.073***	0.047*	0.052**	0.056**	0.060***	0.051*	0.059***
	(2.53)	(3.48)	(1.84)	(2.34)	(2.42)	(2.91)	(1.96)	(2.65)
Credit Spread	-0.075***	-0.041***						
	(-4.08)	(-3.74)						
Credit Spread × Repo Collat.	-0.022	-0.001						
	(-0.86)	(-0.04)						
Bid-Ask Spread			-0.028**	-0.020**				
			(-2.10)	(-2.28)				
Bid-Ask Spread × Repo Collat.			-0.051*	-0.045*				
			(-1.70)	(-1.91)				
Δ Credit Spread					0.019	0.017		
					(1.33)	(1.55)		
Δ Credit Spread × Repo Collat.					0.071***	0.051**		
					(3.18)	(2.58)		
Δ Bid-Ask Spread							-0.006	-0.004
							(-0.45)	(-0.40)
Δ Bid-Ask Spread × Repo Collat.							0.081***	0.073***
							(3.01)	(3.07)
Constant		0.163***		0.175***		0.164***		0.172***
		(12.18)		(11.77)		(11.89)		(11.26)
Observations	1580	1580	1424	1424	1576	1576	1312	1312
Issuer FE	Yes	No	Yes	No	Yes	No	Yes	No
R^2	0.254	0.118	0.260	0.115	0.255	0.119	0.262	0.115
Within R^2	0.114		0.119		0.115		0.121	

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 8: Bond Segments and Change in Credit Spreads

Table 8 estimates the change in SMCCF purchased bond credit spreads around SMCCF announcements. The outcome variable is log change in a bond's credit spread over a (-1,1) event horizon. The sample consists of outstanding bonds with at least a B rating as of June 2020 issued by firms covered by Compustat with traded common equity. Panel A estimates the model around the April 9th announcement of the expansion of SMCCF facility size and the inclusion of high yield credit. Panel B estimates the model around the June 15th announcement of the broad market index and purchase of individual corporate bonds. Repo Collat is an indicator variable equal to one if a bond was used as collateral in a MMF repurchase agreement during the months March-May 2020. Δ Bid-Ask Spread is the log difference between the bid-ask spread measured over Jan 1 - Feb 19 2020 and the bid ask spread measured from Feb 20 - Mar 23, 2020. 'Any SMCCF Purchase' is an indicator equal to 1 if the SMCCF purchased any of an eligible bond as of June 28, 2020. SMCCF Purchase Amt. is the total amount of bond's the SMCCF purchased. '≤ 5yr Mat' is an indicator variable equal to 1 if the bond's remaining maturity is less than 5 years. 'Investment Grade Rating' and 'BB Rating' are indicator variables equal to 1 if a bond has any investment grade rating or a BB rating, respectively. The omitted category is B rating. All continuous variables are standardized for ease of interpretation. Standard errors are clustered at the bond issuer level.

Panel A: April 9 SMCCF Expansion

	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)
Repo Collateral		-0.011*		
		(-1.95)		
Δ Bid-Ask Spread			-0.005*	
			(-1.92)	
Any SMCCF Purchase.				-0.048***
				(-3.37)
Investment Grade Rating	-0.029**	-0.034**	-0.008	-0.024*
	(-2.13)	(-2.43)	(-0.50)	(-1.77)
BB Rating	-0.048**	-0.049**	-0.046	-0.047*
	(-2.01)	(-2.02)	(-1.60)	(-1.96)
≤ 5yr Mat	-0.034***	-0.034***	-0.043***	-0.026***
	(-5.29)	(-5.25)	(-5.43)	(-4.05)
Issue Size	-0.036***	-0.034***	-0.042***	-0.033***
	(-6.00)	(-5.72)	(-5.41)	(-5.65)
Constant	0.414***	0.398***	0.482***	0.373***
	(4.97)	(4.81)	(4.51)	(4.56)
Observations	5205	5205	3706	5205
R^2	0.033	0.034	0.041	0.038

Panel B: June 15 Broad Index Ann.

	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)
Repo Collateral		-0.011**		
		(-2.51)		
Δ Bid-Ask Spread			-0.000	
			(-0.01)	
Any SMCCF Purchase.				-0.048***
				(-4.71)
Investment Grade Rating	-0.035***	-0.040***	-0.015	-0.030***
	(-4.07)	(-4.55)	(-1.63)	(-3.49)
BB Rating	-0.020*	-0.020*	-0.003	-0.019*
	(-1.87)	(-1.92)	(-0.24)	(-1.75)
≤ 5yr Mat	-0.022***	-0.021***	-0.028***	-0.013**
	(-4.42)	(-4.34)	(-4.67)	(-2.52)
Issue Size	-0.039***	-0.038***	-0.040***	-0.036***
	(-9.87)	(-9.48)	(-7.19)	(-9.30)
Constant	0.491***	0.476***	0.482***	0.448***
	(8.80)	(8.60)	(6.30)	(8.16)
Observations	5566	5566	3695	5566
R^2	0.040	0.041	0.033	0.047

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 9: Bond Level Event Study

Table 9 estimates the change in SMCCF purchased bond credit spreads around SMCCF announcements. The outcome variable is log change in a bond's credit spread over a (-1,1) event horizon. The sample is the same as in Table 2. Panel A estimates the model using bond segment fixed effects, and Panel B includes issuer fixed effects. In the first two columns, the event study is estimated around the April 9th announcement of the expansion of SMCCF facility size as well as the inclusion of high yield credit. In the last two columns, the event study around the June 15th announcement of the broad market index and purchase of individual corporate bonds. 'Any SMCCF Purchase' is an indicator equal to 1 if the SMCCF purchased any of an eligible bond as of June 28, 2020. SMCCF Purchase Amt. is the total amount of bond's the SMCCF purchased. Time Maturity is the number of years until maturity from June 2020. Bond segments are formed using two bond rating categories (IG/HY), three quantiles of bond issue size, and 2 categories of bond maturity (above/below 2.5 years maturity) for a total of 12 buckets. All continuous variables are standardized for ease of interpretation. Standard errors are clustered at the bond issuer level.

Panel A: Bond Segment FE

	April 9 SMCCF Expansion		June 15 Broad Index Ann.	
	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)
Any SMCCF Purchase.	-0.033**		-0.032***	
	(-2.06)		(-2.87)	
SMCCF Purchase Amt. / Bond Issue Size		-0.017**		-0.014***
		(-2.03)		(-3.34)
Issue Size	-0.020*	-0.021*	-0.028***	-0.030***
	(-1.86)	(-1.95)	(-2.93)	(-3.07)
Log(Time Mat)	-0.012	-0.012	-0.003	-0.003
	(-1.59)	(-1.58)	(-0.34)	(-0.36)
Observations	1710	1710	1778	1778
R^2	0.065	0.067	0.041	0.042

Panel B: Issuer Fixed Effects

	April 9 SMCCF Expansion		June 15 Broad Index Ann.	
	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)	% Δ CS (-1,1)
Any SMCCF Purchase.	-0.034**		-0.044***	
	(-2.25)		(-3.44)	
SMCCF Purchase Amt. / Bond Issue Size		-0.015**		-0.017***
		(-2.02)		(-3.55)
Issue Size	-0.010	-0.012	-0.009	-0.012
	(-1.13)	(-1.35)	(-1.09)	(-1.37)
Log(Time Mat)	-0.012	-0.012	-0.006	-0.006
	(-1.50)	(-1.53)	(-0.63)	(-0.65)
Observations	1616	1616	1687	1687
Bond Segment FE	Yes	Yes	Yes	Yes
Issuer FE	Yes	Yes	Yes	Yes
R^2	0.349	0.349	0.183	0.183

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 10: Long Run Bond Returns

Table 10 estimates the change in SMCCF purchased bond credit spreads during the COVID-19 crisis. The outcome variable is log change in a bond's credit spread over a give horizon. In columns (1)-(2), the change in credit spread is computed over March 23 (peak of credit spread spike) to July 31. In columns (3)-(4), the change in credit spread is computed over Feb 19 (pre-crisis) to July 31. The sample consists of outstanding bonds issued by SMCCF firms with at least a BB rating as of June 2020 and BBB rating as of March 22 2020 with less than 5 years remaining maturity. 'Any SMCCF Purchase' is an indicator equal to 1 if the SMCCF purchased any of an eligible bond as of June 28, 2020. SMCCF Purchase Amt. is the total amount of bond's the SMCCF purchased. Time Maturity is the number of years until maturity from June 2020. All specifications include bond segment fixed effects. Bond segments are formed using three bond rating categories (IG/BB/B), three quantiles of bond issue size, and 2 categories of bond maturity (above/below 2.5 years maturity) for a total of 18 buckets. When indicated, the specification includes a bond issuer fixed effect. All continuous variables are standardized for ease of interpretation. Standard errors are clustered at the bond issuer level.

	Change Since Peak		Change Since Pre-Crisis	
	% Δ CS	% Δ CS	% Δ CS	% Δ CS
Any SMCCF Purchase.	-0.098**	-0.111***	-0.021	-0.013
	(-2.35)	(-3.13)	(-0.82)	(-0.58)
Issue Size	-0.235***	-0.182***	-0.056**	-0.034
	(-4.68)	(-3.75)	(-2.52)	(-1.41)
Log(Time Mat)	-0.026	-0.092**	-0.206***	-0.228***
	(-0.65)	(-2.11)	(-6.06)	(-6.39)
Observations	1655	1561	1635	1544
Bond Segment FE	Yes	Yes	Yes	Yes
Issuer FE	No	Yes	No	Yes
R^2	0.260	0.575	0.127	0.538

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 11: Firm Equity Event Study

Table 11 estimates the stock market returns to eligible SMCCF firms around SMCCF announcements. The outcome variable is the cumulative abnormal returns of eligible firms over a (-1,1) event horizon using a market model (estimated using the S&P 500 as the market benchmark). In the first two columns, the event study is estimated around the April 9th announcement of the expansion of SMCCF facility size as well as the inclusion of high yield credit. In the last two columns, the event study around the June 15th announcement of the broad market index and purchase of individual corporate bonds. 'Any SMCCF Purchase' is an indicator equal to 1 if the SMCCF purchased any of an issuer's bond as of June 28, 2020. SMCCF Purchase Amt. is the total amount of bond's the SMCCF purchased from a given issuer as of June 28, 2020, and Firm Assets is the firms total assets taken from Compustat NA as of 2019. Standard errors are clustered at the bond issuer level.

	April 9 SMCCF Expansion		June 15 Broad Index Ann.	
	CAR (-1,1)	CAR (-1,1)	CAR (-1,1)	CAR (-1,1)
Any SMCCF Purchase.	0.003		0.001	
	(0.39)		(0.16)	
SMCCF Purchase Amt. / Firm Assets		0.000		0.000
		(0.74)		(0.29)
Constant	0.023***	0.022***	0.009***	0.009***
	(4.42)	(5.50)	(2.92)	(3.80)
Observations	363	363	363	363
R^2	0.000	0.002	0.000	0.000

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 12: Dealer Event Study

Table 12 estimates the stock market returns to NY Fed primary dealers around SMCCF announcements. The outcome variable is the cumulative abnormal returns of NY Fed primary dealers over a (-1,1) event horizon using a market model (estimated using the S&P 500 as the market benchmark). In the first two columns, the event study is estimated around the April 9th announcement of the expansion of SMCCF facility size as well as the inclusion of high yield credit. In the last two columns, the event study around the June 15th announcement of the broad market index and purchase of individual corporate bonds. SMCCF Purchase Frac. is the fraction of SMCCF corporate bond purchases (as of June 28, 2020) that were bought through a particular primary dealer. High SMCCF Purchase is an indicator variable equal to 1 if SMCCF Purchase Frac. is above sample median. Standard errors are clustered at the dealer level.

	April 9 SMCCF Expansion		June 15 Broad Index Ann.	
	CAR (-1,1)	CAR (-1,1)	CAR (-1,1)	CAR (-1,1)
SMCCF Purchase Frac.	0.030***		0.017***	
	(3.95)		(4.83)	
High SMCCF Purchase		0.049**		0.031***
		(2.49)		(3.29)
Constant	0.018*	-0.008	0.011**	-0.005
	(2.03)	(-0.53)	(2.48)	(-0.81)
Observations	17	17	17	17
R^2	0.423	0.295	0.450	0.414

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$