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It's What You Say and What You Buy: A Holistic Evaluation of the Corporate Credit Facilities

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Abstract

We evaluate the impact of the Federal Reserve corporate credit facilities (PMCCF and SMCCF) on corporate bond markets. Conditions in primary markets improve once the facilities are announced, particularly for issuers that need to refinance before 2022. Issuance accelerates before spreads normalize. The secondary market points to a causal role for the facilities, with a differential impact on eligible issues and a significant effect of direct bond purchases, but less so for purchases through ETFs. We find evidence that dealers link the primary and secondary market recovery, with facilities affecting dealers’ willingness to underwrite issuances and intermediate in secondary markets.

Key words: corporate credit facilities, bond liquidity, credit spreads, purchase effects

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To view the authors’ disclosure statements, visit https://www.newyorkfed.org/research/staff_reports/sr935.html.

1 Introduction

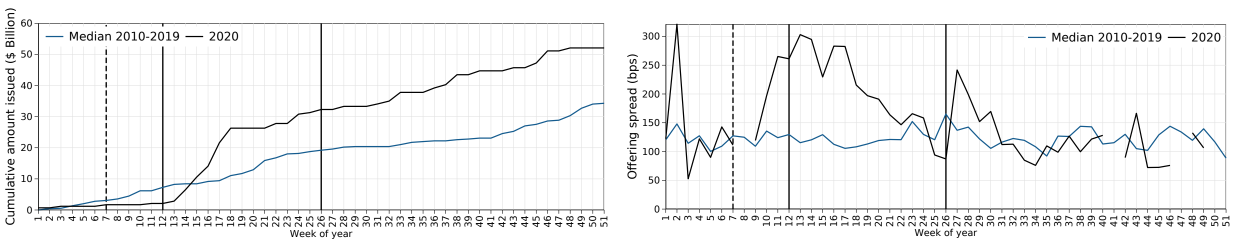
The corporate bond market experienced historic turmoil in March 2020. As investors shed risky assets in response to the COVID-19 pandemic and associated shutdowns, U.S. investment-grade corporate bond issuance slowed to levels not seen since the global financial crisis. On March 23, 2020, as part of an extensive set of measures to support the U.S. economy, the Federal Reserve announced its first ever corporate credit facilities (CCFs) in order to support the supply of capital market credit to the non-financial sector. The facilities were designed with a two-pronged approach, facilitating access to primary markets through direct lending in the Primary Market Corporate Credit Facility (PMCCF) and acting in secondary markets through purchases of individual bonds and exchange-traded funds (ETFs) through the Secondary Market Corporate Credit Facility (SMCCF).

In this paper, we document improvements in access to primary credit markets for non-financial corporations and show how they arise from facilities-related improvements in secondary market conditions and underwriter and dealer behavior. Figure 1 illustrates the pandemic-related slowdown and post-facility recovery of primary bond markets, comparing patterns of short maturity investment grade bonds in 2020 to the previous decade's historical median. An anemic market for shorter maturity investment grade bonds accelerated only following the announcement of the facilities. By the end of June, investment grade issuance was more than triple issuance by the same point in 2019. However, primary market pricing took much longer to normalize.

Simple issuance statistics mask substantial variation in the types of issuers. Adding issuer controls, we find facility-eligible (investment grade) issuers, even those without debt coming due, disproportionately access primary markets after the announcement, with a four-fold increase in the probability of issuance during the facility implementation period between March and June (announcement date through initiation of direct bond market purchases). While the probability of issuance by investment grade firms returns to pre-pandemic levels

Figure 1. Announcement of facilities restarts primary market for credit. This figure plots the cumulative amount of fixed coupon bonds with less than 5 year maturity issued by investment grade non-financial issuers in 2020 and the median issuance from 2010 to 2019, as well as the weighted average offering spread for investment grade issues. Offering spread computed relative to nearest-maturity on-the-run Treasury yield. Dashed line at February 22 (start of pandemic onset period). Event lines at March 22 (initial CCF announcement) and June 29 (PMCCF operational).

(a) Cumulative issuance **(b)** Offering spread



after the facility is operational, the probability of issuance by high yield firms is actually elevated relative to pre-pandemic levels, highlighting the slower dissemination of issuance opportunities to riskier borrowers.

Primary market prices take longer to recover. After the facility announcement, offering spreads for borrowers with refinancing needs remain substantially higher – up to 375 bps more for high yield issuers – than before the pandemic onset, even controlling for the default risk of the issuer. Eligible issuers disproportionately benefit after the announcement with offering spreads that increased much less than did those of high yield issuers, although some of that appears to reflect a differential relationship between default probabilities and offering spreads post pandemic onset. After the facility is operational, the offering spreads for eligible borrowers return to their pre-pandemic levels, while offering spreads for high yield issuers remain elevated. This highlights the slow pace of normalization of primary market conditions, especially for issuers not eligible for the facilities. Compensation earned by dealers is consistent with this – Gross spreads paid to underwriters do not disproportionately fall for eligible issuers until the facility is fully operational.

Given the many official sector interventions that occur around the time of the facilities, we turn to secondary market to establish more causal linkages through an event study approach with narrow time windows. Conditions in the secondary market pass-through to the primary market in two ways: *directly* through the benchmarking of primary market pricing to secondary market prices of similar bonds, and *indirectly* by increasing the willingness of dealers to underwrite bond issuance and increasing the demand from long-term investors.

We estimate a dramatic improvement in average duration-matched secondary market spreads of almost 100 basis points in the three days after the initial announcement of the facilities with an additional differential impact of almost 70 basis points for eligible bonds. When the facility term sheet was revised and additional information provided, spreads fell by more than an additional 60 basis points. In order to attribute these spread improvements to the CCFs given other announcements, we estimate differences in the spread impact on eligible and non-eligible securities and for eligible and non-eligible issuers looking at changes around narrow windows around the announcement event dates. We further identify the causal impact of CCFs by using bonds of the same issuer but with different eligibility.

Facility purchases had a statistically significant impact as well, although the magnitudes are much smaller – spreads on bonds bought directly by the facility improved differentially by 6 basis points around each purchase date. The impact of direct cash bond purchases appears to be much higher than that of purchases through ETFs. This might not be surprising given that the empirical evidence on the transmission between corporate bond ETFs and the cash market focuses mainly on the impact of ETFs' redemptions on the cash market during ETF stress (e.g., Dannhauser and Hoseinzade, 2022, and Falato et al., 2021), and the extent of transmission under less stressed market conditions (such as those present in May and June 2020) remains an open question. When there is news about the closure of the facilities, we estimate a small (2 to 6 basis points) spread increase for eligible issues, driven mostly by the price of risk. We do not consistently find statistically significant impacts of exit on ineligible bonds, although we find some evidence that the announcement resulted in a repricing within issuers of eligible and ineligible bonds.

We delve into the possible reasons for the impact of purchases and conclude that dealer behavior matters, consistent with O'Hara and Zhou (2021)'s results around the initial facilities announcement. In the pandemic onset, dealers were less likely to buy SMCCF-eligible collateral, perhaps as their customers' sell-off of lower credit quality assets accelerated. We add to O'Hara and Zhou (2021) by looking at dealers' eligibility to trade with the SMCCF once the facility is operational. We find evidence of differential changes for dealers that were eligible to trade with the facilities, suggesting that the actual trades of the facility were necessary to change participation. Eligible dealers were both more likely to buy and bought significantly more dollars of bonds from their customers, especially of bonds that have been announced to be eligible for the facility. The magnitude of the impact is economically significant – 7-8 percent more, even after controlling for fixed differences in average amounts purchased by dealers and of given issuers.

This eligible dealer response to purchases suggests that dealers' willingness to underwrite and intermediate may have played a role in the slower speed of primary market recovery. We document that dealers not affiliated with U.S. bank holding companies required a higher offering day trading profit from underwriting SMCCF-eligible securities during both the pandemic onset and the facility implementation period, earning greater compensation for bearing underwriting risk during this period. For U.S. bank-affiliated dealers, instead, offering-day underwriting profits increase for securities not eligible for direct SMCCF purchases, suggesting that these underwriters are particularly reliant on well functioning secondary markets. Moreover, the average time-to-profitability for U.S. bank-affiliated underwriters increases during the pandemic onset period especially for SMCCF-eligible securities, and only goes back to pre-pandemic levels after the facility becomes operational.

D'Amico et al. (2020), Kargar et al. (2021), Haddad et al. (2021), Nozawa and Qiu (2021), and O'Hara and Zhou (2021) all study the disruptions in the secondary corporate bond market and the improvement in secondary corporate bond market functioning following the facilities announcement. To our knowledge, our paper is the first to document a pass-through of U.S. secondary market interventions to improvements in the primary market as well as the dealers' role in that transmission. Unlike Acharya and Steffen (2020), we find that issuance increased across the credit spectrum since the facilities announcement, and not just for issuers at the top of the credit spectrum. We also show the key role of dealers in improvements in the primary market, arguing that the reluctance of non-bank dealers to underwrite securities during the spring of 2020 may have contributed to the slow normalization of primary market spreads.

Our study adds to research on the impact of the CCFs in secondary markets along several dimensions: First, we use granular *bond-dealer-level* data to study multiple dimensions of the functioning of both primary and secondary markets, and we show that the improvements are not uniform across issuers and intermediaries. Second, we utilize the design of the facility, in particular, the eligibility criteria for direct purchases by the secondary market facility, to isolate the causal effect of the announcement from the overall improvements in market conditions. Gilchrist et al. (2020) confirm our findings of a significant differential improvement in secondary market spreads and liquidity for facility-eligible bonds. Third, we use the volume of purchases by the facility, both indirectly through ETF purchases and directly through cash bond purchases, to disentangle the effect of actual purchases. Fourth, we shed light on the role of banks' balance sheet constraints played in March dislocations and subsequent recovery by studying changes in the liquidity provision by different types of dealers in both the primary and the secondary markets.

Our paper is also related to the literature studying the impact of the European Central Bank's (ECB) Corporate Sector Purchase Programme (CSPP) on corporate bond markets in the European Union. Grosse-Rueschkamp et al. (2019) and Todorov (2020) document that the announcement on the CSPP reduces bond yields of firms with eligible bonds. (De Santis and Zaghini, 2019) find that this differential improvement in funding and trading conditions for eligible bonds incentivized issuers to modify characteristics of their issuance to match eligibility criteria. Relative to this literature, we show that, although secondary market functioning improved on the CCF announcement differentially more for facility-eligible bonds, liquidity improvements were not localized to eligible bonds, and issuers do not seem to tailor characteristics of newly issued bonds to facility eligibility criteria. This is perhaps not surprising: while the CSPP is a monetary policy tool, in the United States, the purpose of the CCFs is instead to improve the functioning of the private corporate bond market.

More broadly, this paper is related to the literature on the effect that intermediary constraints play in market liquidity provision (see e.g. Gromb and Vayanos, 2002; Brunnermeier and Pedersen, 2009; Gromb and Vayanos, 2010). In the corporate bond market in particular, Adrian et al. (2017) document that the relationship between balance sheet constraints and liquidity provision in the secondary corporate bond market changes after the implementation of post-crisis banking regulation. We contribute to this literature by measuring the extent to which liquidity facility announcements and purchases pass through facility counterparties to the both the primary and secondary corporate bond markets.

Finally, this paper contributes to the literature studying the value of underwriter relationships in the primary market (e.g., Fang, 2005, Yasuda, 2005, Andres et al., 2014). Consistent with existing literature (e.g., Fernando et al., 2012, Dick-Nielsen et al., 2021), we show that when these relationships are tested in the face of distress episodes, underwriting by dealers affiliated with U.S. BHCs is more stable than that by small dealers especially in longer-maturity and high-yield bonds.

The paper proceeds as follows: In Section 2, we describe the facilities and related announcements. Section 3 describes the data used in this paper. In Section 4, we study the impact of the facilities on primary market functioning, and on secondary market credit spreads and liquidity in Section 5. Section 6 explores how changes in market intermediation lead to improvements in both primary and secondary markets. Finally, we conclude in Section 7. Additional results and technical details can be found in the Appendix.

2 Corporate Credit Facilities

On March 23, 2020 the Board of Governors of the Federal Reserve System announced a number of interventions to respond to the economic and market dislocations of the pandemic and related shutdowns. With respect to capital markets corporate credit, pursuant to the Board's authorization, the Federal Reserve Bank of New York established the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF).[1] We summarize the key dates of announcements related to the corporate credit facilities in Appendix Tables A.1 (PMCCF timeline) and A.2 (SMCCF timeline). The facilities were designed to work together to support market functioning for corporate bonds and syndicated loans, with an overarching goal of facilitating credit provision to the non-financial corporate sector of the U.S. economy. The announcement included term sheets for both facilities that outlined key terms and applicability. Key features of the term sheets included the following eligibility conditions for issuers: rated investment-grade by at least one nationally recognized statistical rating organization (NRSRO) and, if rated by multiple NRSROs, investment-grade rated by at least two of them, headquartered in the United States and with material operations in the United States. Issuers must not receive direct financial assistance under pending federal legislation. The SMCCF would purchase bonds up to a 5 year maturity, while the PMCCF would purchase new debt with up to a 4 year maturity. In addition, the SMCCF announced that it would purchase eligible bond portfolios in the form of exchange traded funds (ETFs).

At the same time the Federal Reserve announced a number of actions including: 1) purchasing Treasuries and Agency securities, 2) establishing the Term Asset-Backed Securities

[1] Both facilities were authorized by the Board under the authority of Section 13(3) of the Federal Reserve Act, with approval of the Treasury. To implement these facilities, the New York Fed formed a special purpose vehicle (SPV) and the Treasury, using funds appropriated to the Exchange Stabilization Fund (ESF) through the CARES Act, made an equity investment in the SPV. Under the PMCCF and the SMCCF, the New York Fed will lend to the SPV, and the SPV will use the proceeds of such loans to purchase eligible assets. The New York Fed's loans to the SPV will be secured by all the assets of the SPV, including the Treasury's equity investment in the SPV.

Loan Facility (TALF), 3) establishing the Primary Dealer Credit Facility (PDCF), 4) expanding the Money Market Mutual Fund Liquidity Facility (MMLF) to include a wider range of securities, including municipal variable rate demand notes (VRDNs) and bank certificates of deposit, and 5) expanding the Commercial Paper Funding Facility (CPFF) to include high-quality, tax-exempt commercial paper as eligible securities and reduced the pricing of the facility.

We also identify dates on which the Federal Reserve shared additional details about key terms or execution of the corporate credit program, focusing on statements which affect the eligibility of certain issues or issuers. On April 9, 2020, the size of the combined facilities became larger with an increase in Treasury capital from $10 billion to $75 billion. Updated term sheets added concentration limits and clarified the definition of eligibility to include firms that were rated investment-grade as of March 22, 2020 but no lower than BB- when purchased by facility ("fallen angels"). The SMCCF also extended purchase eligibility to high yield ETFs.[2] The SMCCF began purchasing ETFs on May 12, 2020 and cash bonds on June 16, 2020. The PMCCF was launched on June 29, 2020, concurrent with an update to the PMCCF term sheet.

On November 19, it was announced that the facilities would not be extended past the December 31, 2020 date. The facilities were closed on December 31, 2020, and had exited all holdings by August 31, 2021. A more in-depth discussion of the operational details and design of the facilities can be found in Boyarchenko et al. (2021).

[2]The updated term sheets also made certain changes to the eligibility requirements. They specified that issuers must not be insured depository institutions, depository institution holding companies, or subsidiaries of such holding companies; nor must they have received specific support pursuant to the CARES Act or any subsequent federal legislation. In addition the term sheets added a requirement that the issuer must satisfy the conflict of interest requirements under section 4019 of the CARES Act.

3 Data

3.1 Primary market issuance

We use data from Mergent FISD to measure the volume and offering terms for new bond issuances, underwriter information and credit rating. We exclude bonds issued in foreign currency, bonds issued as either Yankee or Canadian bonds, convertible and asset backed bonds, as well as bonds that remain unrated more than 2 weeks after the initial offering date. We focus on bonds issued by non-financial issuers.[3] Finally, we only retain senior and senior secured bonds issued by issuers domiciled in the U.S. We measure the volume of issuance in dollar terms. Since the market convention is to price offering yields as spreads to nearest-maturity on-the-run Treasury yield, our measure of primary market spreads is the spread of the offering yield to the corresponding nearest-maturity on-the-run Treasury yield, as described in Appendix A.4. For the subset of securities for which it is available in Mergent FISD, we also study the gross spread on the issuance, which is the difference between the price that the issuer receives for its securities and the price that investors pay for it. We normalize the reported gross spread by the face value to bring the gross spread to basis points.

In addition to characteristics from Mergent FISD, we obtain one year expected default frequencies (EDFs) from Moody's KMV,[4] available at the bond-day level. EDFs measure the probability of a firm's bond experiencing a credit event (failure to make a scheduled principal or interest payment) over the following year, constructed from a Merton (1974)-style model. EDFs thus provide a timely measure of the credit worthiness of both the firm as a whole and the firm's individual bonds.

Finally, we proxy for exposure to potential primary market credit stress faced by issuers

[3] Results for financial issuers are available on request.

[4] See `https://www.moodysanalytics.com/-/media/products/edf-expected-default-frequency-overview.pdf`.

due to the COVID-19 epidemic. At the issuer level, we consider firms that had corporate bonds maturing within the next 2 years (through March 2022) as those most likely to have refinancing needs and thus most likely to be affected by any credit shortages. Table 1, Panel A reports the summary statistics for primary market offering terms for the full 2020 sample.

3.2 Dealers' primary market net profits

We use data from the regulatory version of Corporate TRACE (Trade Reporting and Compliance Engine) to calculate profits earned by dealers who provide underwriting services. These data include price, uncapped trade size, trade direction, the identity of registered FINRA members in the trade, and other trade terms. Registered FINRA dealers are identified by a designated Market Participant Identifier, and non-FINRA members are identified either as C (for client), or as A (for a non-member affiliate). Starting in March 2010, the TRACE data also includes a trading market indicator that flags whether the trade is a secondary market trade or primary market trade executed at market price (S1), or if the trade is a primary market trade that qualifies as a List or Fixed Offering Price Transaction or a Takedown Transaction (P1).[5] In the regulatory version of TRACE cancelled and corrected records are linked with a control number, so we keep the most up to date record of the trade. We also address multiple reporting of interdealer trades, as well as trades that were executed through a non-exempt Alternative Trading System as described in Appendix A.1.

The majority of plain vanilla U.S. corporate bonds are brought to the market as fixed or list price offerings. Therefore, to calculate profits of underwriting syndicate member dealers who allocate the offering among investors in the secondary market, we condition on reportable primary market trades (P1) on the day of issuance, where the dealer is the seller. By definition, P1 trades are expected to occur *on* offering date. [6] We augment the Mergent

[5]Note that "S1" trades are subject to 15-minute reporting requirement, while "P1" trades are subject to $T + 1$ reporting.

[6]In the TRACE data, however, there are P1 trades that are reported either before or after the offering day. Such trades are result of either a entry error in TRACE or a reference data issue. For P1 trades that are reported *after* offering date, it is also possible that it is a result of an issuance that was upsized. Yet, for

FISD offering date with the offering date from Bloomberg, and keep P1 records if their offering date equals either the one recorded in Mergent FISD or in Bloomberg. As for entry data errors, we exclude P1 trades where the reported price is not equal to the offering price.[7]

We construct two metrics of dealer compensation to underwrite new issuances: offering day trading profits (losses) and time to first trading profit. We calculate the offering day profit as the sum of two components. The first is the profit at the dealer-bond-level from P1 trades that is calculated as the difference between the offering amount (divided by the number of book runners) and the allocated amount times the offering price. The second is the profit for S1 trades on the offering day, computed as the difference between the quantity sold times the sell price and the quantity bought times the buy price. After the offering day, we cumulate the daily profit from S1 trades at the dealer-bond-level of underwriting dealers up to one trading month (21 trading days) post-issuance. The number of days before the cumulative profit (including profits from both P1 and S1 trades on the offering day) becomes positive for the first time is the time to first trading profit.

3.3 Secondary market corporate bond data

For the analysis of traded secondary market prices and quantities we again use the regulatory version of Corporate TRACE. We focus on the universe of corporate bonds with issue and issuer information in Mergent FISD, allowing us to control for bond specific characteristics. As in the primary market analysis, we exclude bonds issued in foreign currency, bonds issued as either Yankee or Canadian bonds, convertible and asset backed bonds, as well as bonds that remain unrated more than 2 weeks after the initial offering date and focus on bonds issued by non-financial issuers. We apply the same cleaning steps as described in Section 3.2 and in Appendix A.1, and we keep trades that are flagged with secondary (S1) market indicator. Using this set of transactions, we construct two bond-day level measures of priced

U.S. corporate bonds this would be rare.

[7] Recent papers that use P1 trades, Bessembinder et al., 2021 and Goldstein et al. (2021), consider P1 trades within a [-1,+1]-window around the offering date. Our results are robust to such alternative treatment of data errors.

spreads: duration-matched spreads as in Gilchrist and Zakrajšek (2012) and the component of duration-matched spreads adjusted for bond and issuer characteristics and expected default frequencies from Moody's KMV ("default-adjusted" spreads). Details of both of these calculations are available in Appendix A.2. Table 1, Panel B reports the summary statistics for duration-matched spreads, default-adjusted spreads, 1y expected default frequencies, and bid-ask spreads for the full 2020 sample.

In addition to bond and issuer characteristics from Mergent FISD, for time-varying bond characteristics, such as the amount outstanding and the credit rating of the bond, we use information contemporaneous with the trading date. We coalesce bond-level ratings by multiple rating agencies into a single number based on the plurality rule: if a bond is rated by more than one agency, we use the rating agreed upon by at least two rating agencies and use the lowest available rating otherwise. Following the facility term sheets, we define a bond as being eligible for direct purchases by the facility if the bond is investment-grade rated, is not issued by a bank or a bank subsidiary, and has less than 5 years remaining to maturity. Starting on April 9, we also include bonds that were investment grade rated as of March 22 and were subsequently downgraded to no lower than BB-. At the issuer-level, instead of using bond-level credit ratings to determine CCF eligibility, we use issuer-level credit ratings (see details in Appendix A.3).

3.4 Secondary market bid-ask spread data

Given that many corporate bonds are not traded frequently, we utilize CMA Datavision Bonds data that collects aggregated levels for quoted bonds that are based on over-the-counter communications between top-tier, credit-focused buy-side trading desks, including hedge funds, asset managers and proprietary and correlation desks at investment banks, and their counterparties.

The aggregation process begins on the buy-side desk by collecting a sample of quotes from which to perform an aggregation. The aggregation set is determined by looking within a minimum window set to 60 minutes from the last observed quote. If at least three observable quotes are found in this window, all the quotes are used to determine aggregation set. If not, quotes are added in time priority order to the aggregation set until there are at least three quotes available from the sample. For the very illiquid names, two quotes may be used. All quotes in the aggregation set are time weighted and a median calculation is performed to determine the "contribution". CMA applies a further level of aggregation from the contributed buy-side quotes sent to CMA Datavision in the above process to calculate the final published consensus level. For some of the aggregated quotes we also observe the associated trade size (which gives more credence to the validity of the quote; the trade sizes are $\geq$\$1 million for high-yield bonds, and $\geq$ \$5 million for investment-grade). Since our analysis is at the bond-day-level, we use the last ticks available of the bid and the ask for the day.

4 Effects on primary market issuance

The goal of the corporate credit facilities is to stabilize market functioning in order to support the provision of credit to U.S. non-financial corporations. Therefore, we begin by studying the evolution of the access to primary credit markets over the course of 2020 to see if the facilities have achieved that goal, focusing on the dollar amount of corporate bonds issued since the start of the year and the offering spreads paid by the issuers.

The relatively low frequency of corporate bond market primary issuance prevents us from undertaking evaluating the facility impact with a narrow time window event study approach. Instead, we focus on three sub periods: (1) the month preceding the facility announcement ("Pandemic Onset") (2) the period between announcement and implementation of the facility on June 29 when the PMCCF was operational along with ETF purchases ("Facility Implementation")[8] and (3) the operational period of the facility where the SMCCF was purchasing corporate bonds directly and the PMCCF was open ("Facility Operational").

[8]Results are similar if we define the operational period as starting on May 12, the date at which the facilities began purchasing ETFs.

A key measure of primary market functioning is the composition of issuers that are able to issue. The simple graphs shown in Figure 1 underestimate the deterioration in primary market conditions because only higher quality borrowers are able to issue during periods of stress. We thus evaluate the effect that the announcement and implementation of the facilities had on both the extensive margin of issuance – which issuers had access to the primary market – and the intensive margin – conditional on having access to the primary market, at which terms were issuers able to issue.

4.1 Extensive margin: who issues?

Figure 2 plots the cumulative amount issued by non-financial corporations in the primary corporate bond market since January 1, 2020, together with the median cumulative amount issued by the same week in each of the preceding 10 years (2010 – 2019). In March 2020, prior to the facilities' announcement, issuance by investment-grade rated issuers in maturities below 5 year was lagging relative to the pre-pandemic median pace of issuance. The announcement of the facilities spurred a dramatic increase in the pace of investment-grade issuance, for both below five year (Figure 2a) and above five year (Figure 2b) maturities. High-yield-rated issuance ceased entirely for almost a month, and resumed after the facility announcement albeit more slowly (Figure 2c). Thus, although the facilities announcement improves primary market conditions across the board, the improvement for issuers not eligible for the facilities was more gradual.

We look at this more formally in the first two columns of Table 2 which report estimates from a probit regression for the probability of issuer f issuing in week t as a function of the issuer's credit rating, the weighted average time-to-maturity of the issuer's outstanding debt, and sub-period dummies:

$$\mathbb{P}_t\left(\text{Issuance}_f\right) = \alpha + \sum_{i=1}^{3} \beta_i \text{Subperiod}_{it} + \varphi_{cr}\text{IG}_{ft} + \sum_{i=1}^{3} \gamma_i \text{Subperiod}_{it} \times \text{IG}_{ft} + \vec{\varphi}_m \mathbf{X}_{ft} + \epsilon_{ft}, \tag{1}$$

where Subperiod_{it} is a dummy equal to 1 if the issuance occurs during the pandemic on-set period ($i = 1$), or during the facility implementation period ($i = 2$), or during the facility operational period ($i = 3$), and IG_{ft} is a dummy equal to 1 if the issuer is investment grade rated as of the time of issuance. $\mathbf{X}_{ft}$ is a vector of issuer characteristics, which includes the weighted average maturity and total amount outstanding of existing bonds of the issuer and a fixed effect for the issuer's 2 digit NAIC industry. The probit regression also includes month-of-year fixed effects to control for seasonalities in issuance.

In addition to the full sample of issuers, in Table 3 we follow the intuition of Almeida et al. (2011) and split the sample into two types of corporate bond issuers. One set of issuers has outstanding bonds maturing within two years (i.e. issuers that at the beginning of the pandemic had debt maturing between March 2020 and March 2022) and are thus more likely to face refinancing risk during the pandemic. We call the second set of issuers "opportunistic", as they do not have an imminent need to refinance outstanding bonds. For simplicity we do not consider the effect on a possibly larger universe of potential issuers that may want to raise capital but do not have any outstanding bonds.

Beginning in the first column of Table 3 with issuers that need to refinance, the onset of the pandemic is marked by a dramatic reduction in the probability of high yield issuance from a pre-pandemic average weekly probability of issuance of 39 basis points for high yield issuers to essentially 0 during the pandemic onset period.[9] Instead, even after controlling for expected default frequencies, the probability of issuance for investment grade issuers slowed only modestly (by 10 bps) from a pre-pandemic average of 74 bps. All issuers are more likely

[9]To make the probit estimates in Tables 2 and 3 interpretable, we compute marginal probabilities, holding the non-categorical variables at their realized values.

to issue after the facility announcement, with the probability of high yield issuers with a need to refinance issuing increasing to 88 bps per week, and the probability of investment grade issuers with a need to refinance issuing increasing to 221 bps per week during the facility implementation period.

The overall issuance impact in the facility implementation period is positive and differentially so for eligible issuers. Surprisingly, we find that the issuance impact of the facility announcement is strongest on eligible opportunistic issuers (i.e. investment grade). Eligible opportunistic issuers are disproportionately accessing primary markets after the announcement, with a more than three-fold increase in the probability of issuance during the facility implementation period (from 42 bps pre-pandemic to 136 bps). Finally, while the probability of issuance by investment grade firms returns to pre-pandemic levels during the facility operational period, the probability of issuance by high yield firms with refinancing needs is actually elevated relative to pre-pandemic levels, highlighting the slow dissemination of issuance opportunities to riskier borrowers.

It is important to note that increased issuance does not necessarily translate into increased real activity, such as investment. Firms can issue new bonds while simultaneously calling existing bonds or re-paying credit from other sources, thereby re-optimizing their overall debt costs without changing materially their overall debt liabilities. In addition, firms can use bond issuance to build liquidity buffers in anticipation of future cash-flow shocks, self-insuring against future distress. We leave the study of the uses of funds raised through the unprecedented corporate bond issuance since March and how those uses compare to the uses of funds raised in “normal” recessions for future research.

4.2 Intensive margin: at what terms?

Beyond the extensive margin of which issuers are able to access the primary market for corporate bonds, key measures of market functioning are the price and quantity at which issuers are able to issue debt. In the remaining columns of Tables 2 and 3, we estimate how offering terms changed over 2020 for firms that were actually able to issue. While we did not estimate a disproportionate impact of the facility announcement on issuance probability, eligible issuers are issuing much greater amounts of debt after the facility announcement, but even before the PMCCF was fully operational to provide a full backstop. The differential increase in offering amount is even higher after controlling for issuer risk.

In particular, for bond b of firm f issued in week t, we estimate

$$\text{Off. term}_{b(f),t} = \alpha + \beta_d \text{Sub-period dummy}_t + \beta_{IG}\text{IG}_{b,t} + \beta_{d,IG}\text{Sub-period dummy}_t \times \text{IG}_{b,t} \tag{2}$$

$$+ \lambda \text{Mills ratio}_{f,t} + \vec{\varphi}_m \mathbf{X}_{ft} + \vec{\gamma}\mathbf{Y}_{b,t} + \epsilon_{b(f),t}$$

where the Mills ratio is the predicted Mills ratio from the corresponding first stage in Table 2 and 3, $\mathbf{X}_{ft}$ are issuer characteristics including the weighted average maturity and total amount outstanding of existing bonds of the issuer and a fixed effect for the issuer's 2 digit NAIC industry, and $\mathbf{Y}_{ft}$ are bond characteristics including dummies for callable, shelf-registered and secured bonds. In each regression, we control for the other three offering terms; thus, for example, the regression for the log offering amount controls for the offering spread, offering maturity and gross spread. Note that there was no high yield issuance by firms with maturing debt in the pandemic onset period thus we do not estimate a coefficient on the interaction of IG and Pandemic onset. In the facility implementation period, investment grade firms with refinancing needs were able to issue bonds with larger offering amounts, on average nearly doubling the offering amount relative to the offering amounts in the pre-pandemic period.

Turning to maturity, in Figure 2aand 2b, we see that the acceleration in the pace of issuance triggered by the announcement of the CCF is not concentrated in the five year or less maturities that are eligible for purchases by the secondary market facility. Instead, issuance in the more than 5 years maturity category in 2020 is nearly double that issued during the same period in 2019 ($630 billion in 2020 vs $320 billion in 2019). Similarly, the issuance of bonds with maturity of five years or below in 2020 is also nearly double that of the same period in 2019 ($52 billion in 2020 vs $25 billion in 2019). These results suggest that issuers are not issuing debt specifically targeting SMCCF purchase eligibility, as was the experience with the European Central Bank's Corporate Sector Purchase Program (CSPP) (see e.g. De Santis and Zaghini, 2019). If anything, we estimate in Table 2 that eligible issuers are extending maturities once the facility becomes operational, even though only short term debt is eligible for the facilities.

There are a number of reasons as to why we would not expect issuers to modify their offering maturity choices to issue only facility eligible debt. First, as shown in the next section, while there were larger reductions in credit spreads on shorter maturity bonds immediately following the announcement of the facilities, these were accompanied by large declines in the risk-free rate, all along the curve. Thus issuers were able to take advantage of historically low interest rates (not just spreads) – by issuing longer maturity bonds, they were able to lock in those low funding rates for longer periods of time. Indeed, we find that the largest maturity extension effects are concentrated among the opportunistic issuers – that is, those issuers that had no debt maturing within two years – suggesting that firms actively re-optimized their capital structure to take advantage of historically low rates. Second, the CCFs were announced with a termination date (September 2020 that was subsequently extended to December 2020), limiting the period of time over which issuers could accrue any potential benefits from tailoring issuance to facility eligibility requirements.

A key measure of market conditions is the offering price. After the facility announcement, offering spreads for borrowers with refinancing needs remain substantially higher – up to 500 bps more for high yield issuers – than before the pandemic onset, even controlling for the default risk (EDF) of the issuer. Eligible issuers disproportionately benefit after the announcement with offering spreads that increased much less than did those of high yield issuers, although some of that appears to reflect a differential relationship between EDF and offering spreads post pandemic onset. By the facility operational period, the offering spreads for eligible borrowers return to their pre-pandemic levels, while offering spreads for high yield issuers remain elevated. This highlights the slow pace of normalization of primary market conditions, especially for issuers not eligible for the facilities.

Finally in the last 2 columns, we look at gross spreads paid to underwriters which are one measure of the compensation required by dealers to underwrite bond offerings. [10] These do not disproportionately fall for eligible issuers, except marginally statistically significant during the facility implementation period. The amount appears small at around 12 basis points, however gross spreads are generally small in the first place, meaning that this is a sizable economic impact.[11]

We look further into the impact of underwriters by hand-matching each lead underwriter reported by Mergent FISD to the corporate parent and, if applicable, to the registered eligible seller. We split underwriters between those that are broker dealers affiliated with a US-headquartered bank and those that are not, reflecting the different regulatory environment and possible constraints of different underwriters as well as variation in the timing of dealer registration for the facility. We find that issues underwritten by eligible sellers post registration for the facility have offering spreads that are dramatically lower - more than 70 basis points. The impact on issuance terms of different types of underwriters is shown in detail in the Appendix (Table A.6).

5 Effect of facilities on secondary markets

The previous section documents the improvements in access and slow normalization of primary market conditions following the announcement of the corporate credit facilities. We now turn to examining potential mechanisms through which the normalization occurs, de-

[10] Underwriters also profit through underwriting fees which tend to be smaller for investment grade issuance but larger for high yield.

[11] Table 1a shows that the average gross spread in our sample is 6 bps and the median gross spread is 5 bps.

spite a lack of take-up of the PMCCF, by evaluating the evolution of conditions in the secondary market. Conditions in the secondary market pass-through to the primary market in two ways: *directly* through the benchmarking of primary market pricing to secondary market prices of similar bonds, and *indirectly* by increasing the willingness of dealers to underwrite bond issuance. In addition, daily prices in the secondary market allows for more causal interpretations as more narrow event windows can be examined.

5.1 Secondary market conditions over the course of 2020

We begin by examining the long sweep of the evolution of credit and bid-ask spreads over 2020, which allows us to take into account the potentially long-lasting impact of the facilities announcement on the secondary market. Our main object of interest is the *cumulative* change in each metric relative to the corresponding peak during the week of March 16 - 20, 2020. This approach also has the benefit of creating an apples-to-apples comparison to secondary market conditions prior to the start of the COVID-19-related market disruptions in March. In particular, for each metric M for bond b trade date t, we estimate the following regression

$$\Delta M_{b,t} = \alpha_t + \beta_{b,t}\text{SMCCF eligible}_{b,t} + \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b,t}, \tag{3}$$

where $\Delta M_{b,t}$ is the cumulative change in metric M relative to the peak in metric M for bond b during the week of March 16 - 20, 2020. Specification (3) thus estimates the improvements in secondary market pricing and functioning for each individual bond, as a function of bond and issuer characteristics. A negative estimate of $\beta_{b,t}$ indicates that secondary market conditions for bonds eligible for direct purchases by the facility have improved more relative to secondary market conditions for bonds not eligible for direct purchases. In addition to the eligibility dummy, we control for standard bond characteristics: log age, log amount outstanding, log offering amount, shelf registration dummy, callable dummy, and secured dummy. We estimate specification (3) as a repeated panel for each trading date in the sample.

Figure 3 reports the estimated average effect and the differential effect on SMCCF eligible bonds. Both duration-matched and default-adjusted spreads increased over February and March, with the increases only arrested by the announcement of the facilities on March 22. Following the facility announcement, credit spreads retraced, with spreads on SMCCF eligible bonds retracing more than spreads on the average bond. Indeed, the net benefit to the SMCCF eligible bonds only disappears at the closure of the facility at the end of 2020.

In contrast, bid-ask spreads on SMCCF eligible bonds increased less than those of the average bond ahead of the facilities announcement. The facility announcements and, in particular, the expansion of the facility on April 9, eliminates the differential liquidity the SMCCF eligible bonds had in the face of the pandemic. Instead, the bid-ask spreads for the average bond decline rapidly after the facility announcement on March 23.

5.2 Effect of facilities announcements

We next isolate the direct effect of the facilities by examining a narrow window around key announcement dates. To test formally the facility announcement effects, we calculate the daily changes of metric $\mathcal{M}$ for bond b of firm f 3-days around the event date t, either the initial facility announcement or the facility expansion announcement. We then estimate the following empirical model:

$$\Delta\mathcal{M}_{b(f),t-1,t+3} = \alpha + \beta\text{SMCCF-eligible}_{b(f),t} + \vec{\gamma}_t\text{Bond characteristics}_{b,t} + \epsilon_{b(f),t}, \qquad (4)$$

where $\Delta\mathcal{M}_{b(f),t-1,t+3}$ is the changes of duration-matched spreads, default-adjusted spreads, 1-year EDF, or bid-ask spread; SMCCF-eligible is a dummy variable equals one if the bond meets the facility conditions of rating and maturity; Bond characteristics include log age, log amount outstanding, log offering amount, shelf registration dummy, callable dummy, and secured dummy. The β coefficient on SMCCF-eligible identifies the marginal improvements in secondary market conditions for bonds that are eligible for direct purchases by the SMCCF over and above the improvement in secondary market conditions for bonds that are ineligible for direct purchases. Issuers with multiple bonds may have both eligible and ineligible bonds, as bonds issued by the same issuer can have different maturity dates and different individual bond ratings. Thus, when adding issuer fixed effects to the baseline specification, we identify the marginal improvements in secondary market conditions for bonds that are eligible for direct purchases by the SMCCF over and above the improvement in secondary market conditions for bonds issued by the *same issuer* that are ineligible for direct purchases. For most of our exercises, the specification with issuer fixed effects has similar results as the specification without issuer fixed effects. In our discussion, we thus focus on the specification without issuer fixed effects and note if the results with issuer fixed effects differ materially.

Table 4 reports the results of this regression, focusing on the initial announcement. As we show in Figure 3, up until March 23, spreads had been steadily climbing as investors responded to the pandemic. Starting in panel (a), in Column (1) we look at the more than one thousand bonds that traded around the announcement and find that on average, duration-matched spreads fell by more than 90 basis points after the announcement (based on three times the coefficient on average daily 3 day changes of -31). If the only effect of the facilities were the direct effect on eligible bonds, we would not expect prices for all bonds to move dramatically. That said, highly rated bonds eligible for the SMCCF fell by 50 percent more than other bonds (an additional 52 basis points), implying a total effect of more than 140 basis points. Spreads on the riskiest bonds eligible for the SMCCF – those rated BBB+, BBB or BBB- and thus just above the high yield cut-off – fell the most, implying a total effect of more than 165 bps. In order to better identify the impact of the facility, we add issuer fixed effects in column (2) and still find an economically large, statistically significant coefficient. That is, spreads on bonds of the same issuer that mature before September 2025 had retraced more than spreads on bonds that have more than five years of maturity remaining, by almost 50 basis points, or 17 basis points on average for the three day event window. The spread impact also appears to be larger for eligible issuers in industries affected by the pandemic, but the difference is not statistically significant. Finally, in column (4) we narrow in on the issuers with rollover risk that we examined in Table 3 – BBB issuers with any debt maturing within two years that are eligible for the facility see a differential 75 basis point fall in spreads.

We turn now to the impact of the facilities on secondary market liquidity, shown in the last 4 columns of Table 4, Panel (a). Starting with the average effect α_t, improvements in average bid-ask spreads we observed in Figure 3 appear to be concentrated in eligible issuers. We see an immediate differential response in the prices of eligible bonds and improvement in secondary market liquidity but not for all bonds, with bid-ask spreads for higher rated eligible bonds falling over the three day event window by more than 45 cents and the spreads for BBB eligible bonds falling by more than 30 cents. As with the credit spreads, in order to better identify the impact of the facility, we add issuer fixed effects in column (5) and still find economically large, statistically significant coefficients. For riskier eligible issuers with debt maturing within 2 years, however, bid-ask spreads continue increasing even after the facilities announcement. The corporate credit appear to provide a "buyer of last resort" in the secondary market. That is, the announcement of the facilities on its own is sufficient to reduce fire sales incentives in the market though maybe not for issuers with immediate refinancing needs. For the subset of bonds that traded, bid-ask spreads were reduced presumably as dealers were more willing to make markets and demand improved (Section 6 explores the dealer response in more detail).

Decomposing credit spreads into default-adjusted spreads and the expected default frequency (EDF) allows to separate the impact of the facilities on the price of risk from the quantity of risk. Table 4b shows that the largest impact is eligible bonds for the default-adjusted spreads as well, suggesting that the improvements in spreads we saw in Table 4a and in Figure 3 are primarily due to a reduction in the default risk premium priced in corporate bond spreads. While Table 4b shows that the announcement of the facilities also led to a decrease in one year expected default frequencies, this is not differentially true for eligible bonds. Focusing first on the specification without issuer fixed effects, we instead see that overall EDFs fall more for the bonds of issuers in industries affected by COVID, but if anything less for eligible bonds. This may reflect that the overall effect of the economic implications of the COVID-response is stronger for non-investment-grade bonds which are closer to the default boundary. An exception is for issuers with debt maturing within two years, where the EDFs fall differently by -3.2 basis points for higher rated eligible bonds, and by -4.2 basis points for BBB rated eligible bonds.

Taken together, Table 4 shows that the main effect of the facilities announcement was to lower the price of risk, something that may explain the impact on primary market issuance quantities. Indeed, the estimated coefficient for eligible issues shows a larger differential decrease in default-adjusted spreads, bigger than in credit spreads themselves, consistent with larger decreases in credit risk premia. The fall in the expected default probabilities and improvements in pricing for non-eligible bonds indicates that the announcement of the facilities also acted to improve market participants' beliefs about the prospects for the U.S. economy, primarily through reducing the credit risk premium but also through reducing expected default frequencies, something that may again increase issuance quantities. Finally, an impact on improved access to capital markets finance is suggested by the large differential impact on issuers with maturing bonds, which differentially decreased both risk premia and EDFs.

One challenge to interpreting the results is that there are many other reasons bonds of different ratings and maturity may see different price patterns. This suggests that some of the estimated coefficients for the differential impact on eligible bonds may be biased down, if the other announcements increased the prospects for economic growth by stabilizing financial markets, as this should differentially improve the prospects for lower rated firms. While the impact of changes in risk should be captured by looking at the impact of changes in EDFs, this may be seen in the changing price of risk as well. It is harder to know what the effect of the changing term slope should be. While the reversal of the inversion of the term spread that occurred in March is consistent with an impact of the facilities on eligible bonds (short maturity), similar reversals of term spread inversions have also been seen at the start of the financial crisis and again after the collapse of Lehman Brothers.

Table 5 looks at the impact of the subsequent announcement on April 9 which clarified the facility eligibility. Newly eligible bonds experience additional falls in spreads when their eligibility is clarified, despite EDFs which continued to increase. This clarification should particularly impact industries disproportionately impacted by COVID, as it clarified that fallen angels would remain eligible for the facilities. Accordingly spreads fall more for the most affected borrowers, particularly the BBB-rated eligible ones. This exercise is further supportive of a causal role for the facilities, given how we can tie the impact of the announcement directly to the eligible bonds, and the lack of other announcements on April 9.

5.3 Effect of purchases

Given the strong response to the facilities' announcement, it is natural to wonder if purchases contributed to maintaining the improvements in market conditions. To help answer this question, we examine the response of secondary market spreads and liquidity to the facility purchases. Note that this is a different way of looking at the Facility Operational time period which we explored in the primary market setting in Section 4 as the direct purchases all occur in that time period.

In particular, we modify the announcement date regression (4) and estimate the following specification in stacked windows around the purchases:

$$\Delta\mathcal{M}_{b(f),t-1,t+3} = \alpha + \beta \text{Purchased}_{b(f),t} + \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{b(f),t} \tag{5}$$

$$\begin{aligned}\Delta\mathcal{M}_{b(f),t-1,t+3} = {} & \alpha + \beta_{\text{ETF}} \text{Indirectly purchased}_{b(f),t} + \beta_{\text{bond}} \text{Directly purchased}_{b(f),t} \\ & + \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{b(f),t}\end{aligned} \tag{6}$$

where $\Delta\mathcal{M}_{b(f),t-1,t+3}$ is the change in metric $\mathcal{M}$ for bond b of firm f around purchase date t; $\text{Purchased}_{b(f),t}$ is a 0/1 indicator for bond $b(f)$ bought on date t through either direct (cash-bond) purchases or indirect (ETF) purchases; $\text{Indirectly purchased}_{b(f),t}$ is a 0/1 indicator for bond $b(f)$ bought on date t indirectly through ETF purchases; and $\text{Directly purchased}_{b(f),t}$ is a 0/1 indicator for bond $b(f)$ bought on date t directly through cash-bond purchases. As above, bond characteristics include log age, log amount outstanding, log offering amount, shelf registration dummy, callable dummy, and secured dummy. That is, we estimate the purchase effect by comparing whether market conditions have improved differentially for bonds purchased directly in the cash market and for bonds purchased indirectly through ETFs purchases. We include date fixed effects in these specifications to control for differences in the timing of ETF purchases.

Table 6 shows that despite the very large announcement date effects, individual purchases also matter. On average, facility purchases decrease spreads by about 6 basis points, or approximately 3% percent of the average duration-matched spread in 2020. This fall in spreads is over and above the average fall in spreads of almost 5 basis points that happens on purchase dates, some of which may also be due to the presence of the facilities in the market. The spread impact seems to be occurring through changes in the price of risk as there is no differential change in EDFs for purchased bonds, but a similar, statistically significant fall in the default adjusted spreads of purchased bonds (see panels (b) and (c)).

Since the SMCCF purchased bonds both directly and indirectly through ETFs, it is important to understand the differential impact of cash bond and ETF purchases. Since the ETF purchases occur earlier in calendar time than the loose bond purchases, we add date fixed effects to control for differences in the path of the pandemic and other changes over time. Controlling for date fixed effects, it appears that most of the direct effect of the purchases is through direct bond purchases. We estimate a negative statistically significant impact on spreads for cash bond purchases but not ETFs. Curiously this seems to impact the EDFs in addition to the price of risk. The effect of purchases on bid-ask spreads is relatively small, slightly more than 1 basis point, and seems to be seen across both types of purchases, results that are not always statistically significant.

In summary, we document an ongoing effect of the facility through purchases, particularly on spreads although less so on bid-ask spreads. This continuing support in the secondary markets was particularly important given the slow pace of normalization of the primary markets we documented in Section 4. Bonds purchased through eligible ETFs have smaller differential improvements. This may be because purchases of ETF shares from dealers may not necessarily correspond to new ETF share creations; without new ETF share creation, which necessitates purchases of portfolios of the underlying bonds, transactions in the ETF market have limited pass-through to the corporate bond market. In Appendix Table A.9, we look at the impact of the share of the bond issue that is purchased and find similar results. ETF purchases may, however, still support the primary market as more than 60 percent of ETFs purchase new issuances within one day of issuance.

5.4 Effect of closure announcement

On November 19, 2020 Treasury Secretary Steven Mnunchin sent a letter to Chairman of the Federal Reserve Board of Governors Jerome Powell, stating "With respect to the facilities that used CARES Act funding (PMCCF, SMCCF, MLF, MSLP, and TALF), I was personally involved in drafting the relevant part of the legislation and believe the Congressional intent as outlined in Section 4029 was to have the authority to originate new loans or purchase new assets (either directly or indirectly) expire on December 31, 2020. As such, I am requesting that the Federal Reserve return the unused funds to the Treasury". The letter was acknowledged by Chair Powell on the following day. Subsequent to that letter, the PMCCF and SMCCF ceased purchasing assets on December 31, 2020. We examine the impact of the letter from Secretary Mnunchin as well as the impact of the end of year facility.

To the extent that the facilities served as a backstop and markets had resumed functioning, it is unclear what effect these announcements should have. Table 7 examines the impact of the November 19 announcement. While overall corporate bond spreads fall in the three days after the announcement, we find a statistically significant increase in spreads for SMCCF eligible bonds. The effect is small, however, less than 2 basis points, and only one basis point looking within issuers. There is no statistically significant effect at the end of the year when purchases cease. As with the initial announcement effect, the effect of the Treasury announcement appears to come mostly through the price of risk, with default adjusted spreads increasing similarly. There is little effect on issuers with debt maturing within two years.

Liquidity as measured by bid-ask spreads also appears mostly unaffected, with no statistically significant impact on the announcement date. If anything, bid-ask spreads for SMCCF eligible issues appear to fall by 1 basis point, although the effect is not statistically significant on the Treasury announcement dates.

These non-effects are consistent with the facilities no longer having an important role as a backstop by the end of 2020. The result is perhaps not surprising, given the historically low credit and bid-ask spreads in bond markets by 2020 indicative of ample intermediation and trading. However, we cannot rule out an alternative interpretation that given one intervention, bond markets would expect future shocks to be met with future interventions.

6 Dealer intermediation and the facilities

Having established the impact of the facilities on primary and secondary markets, in this section we examine the relevance of the intermediary constraints channel in these improvements. Similar to the approach in Section 4, we look at the impact on intermediation over the same three sub periods, comparing the beginning of 2020 to the pandemic onset, the post-announcement implementation period and the operational period.

From the perspective of intermediary asset pricing, the facilities act by providing a "buyer of last resort", relaxing balance sheet constraints of marginal intermediaries in the corporate bond market. Improvements in balance sheet constraints of the marginal intermediary lead to a reduction in the intermediary's effective risk aversion, explaining the change in willingness to underwrite offerings, and substantial improvement in credit spreads and liquidity conditions. In addition to differentiating between issues that are eligible for the facilities (SMCCF eligible), as we did in the previous section, we also consider intermediation activity across different classifications of dealers. Comparing dealers that are affiliated with U.S. bank-holding companies (U.S. BHCs) to those not affiliated with U.S. BHCs allows us to examine the role that balance sheet constraints played in March 2020 dislocations and subsequent normalization in corporate bond markets.

We also look at dealers that were eligible to sell to the facility. While 41 dealers ultimately became eligible to sell to the facility, eligibility required the submission of legal documentation to the New York Fed. This was submitted over a few weeks or even months depending on the dealer, which adds some time variation in dates at which dealers became eligible sellers, but means that we focus on the secondary market given the narrow time window. Table A.4 provides the list of eligible sellers to the facility, together with an indicator of whether these institutions underwrite corporate bonds in our sample.

6.1 Extensive margin: Does intermediation become more likely?

We begin by examining the probability of intermediation by different types of dealers in the market over 2020. Starting with the question of whether regulatory constraints played a role in corporate bond market dislocations, we estimate a probit regression for the probability of dealer d buying bond b on day t from non-dealer customers as a function of the eligibility of the bond for direct purchases by the facility, the sub-period, whether the dealer is affiliated with a U.S. bank holding company (BHC) and standard bond characteristics:

$$
\begin{aligned}
\mathbb{P}_t\left(\text{Buy}_{d,b}\right) = \alpha_0 &+ \sum_{i=1}^{3}\alpha_i \text{Subperiod}_{it} + \varphi_0 \text{SMCCF-eligible}_{b,t} + \sum_{i=1}^{3}\varphi_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \\
&+ \beta_0 \text{BHC-affiliated}_{d,t} + \sum_{i=1}^{3}\beta_i \text{Subperiod}_{it} \times \text{BHC-affiliated}_{d,t} \\
&+ \eta_0 \text{BHC-affiliated}_{d,t} \times \text{SMCCF-eligible}_{b,t} \\
&+ \sum_{i=1}^{3}\eta_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \times \text{BHC-affiliated}_{d,t} \\
&+ \vec{\gamma}_t \text{Bond characteristics}_{d,b,t} + \epsilon_{b,t}.
\end{aligned} \tag{7}
$$

Subperiod_{it} is a dummy equal to 1 if the issuance occurs during the pandemic on-set period ($i = 1$), or during the facility implementation period ($i = 2$), or during the facility operational period ($i = 3$), $\text{SMCCF-eligible}_{b,t}$ is a dummy equal to 1 if the bond is eligible for direct purchases by the SMCCF, and $\text{BHC-affiliated}_{d,t}$ is a dummy equal to 1 if the dealer is U.S. BHC-affiliated on date t. While all dealers are driven by risk management considerations, bank-affiliated dealers are more likely to reflect regulatory balance sheet constraints associated with consolidated regulation of the bank holding company. The probit regression also includes week fixed effects to control for seasonalities in trading.

Table 8 summarizes the results. Column (1) illustrates the dynamics of the dash for cash in the overall market, with the probability of a dealer buying a particular bond from non-dealer customers on a particular day rising by 30 percent (from 1.2% in the pre-pandemic period to 1.5% in the pandemic onset period). Column (2) shows that on average stand-alone dealers are less active in the market, with a pre-pandemic probability of 0.8% of buying from non-dealer customers relative to the BHC-affiliated dealer average probability of 2%. The positive impact of the facility announcement is clear, as the probability of dealer purchases from customers starts decreasing after announcement, highlighting the attenuation of selling pressure for customers, so that by the time the facility becomes fully operational, the probability of buying from customers is even lower than the pre-pandemic levels.

Turning next to the question of why the facilities had differential effects on eligible collateral, in columns (3) and (4) we add the interaction effects with the SMCCF eligible dummy, and uncover differential behavior by BHC-affiliated and stand-alone dealers once the facility is announced. Bank-affiliated dealers reduced their buying activity in the market for SMCCF-eligible collateral following the announcement of the facilities, with the probability of buying SMCCF-eligible collateral dropping from 2.2% during the pandemic on-set period to 2% during the facility implementation period. In contrast, stand-alone dealers continued buying these safer assets during the facility implementation period, with the probability of buying SMCCF-eligible collateral remaining at 1.2% during both the pandemic on-set period and the facility implementation period. This points to a potential "flight to intermediation safety" on the part of stand-alone dealers as the overall selling pressures from non-dealer customers were abating at the same time. These results are robust to the inclusion of dealer fixed effects, as shown in column (4).

The results in Table 8 suggest that bank regulatory constraints are unlikely to have played a role in the corporate market dislocations in March 2020 as BHC-affiliated dealers did not differentially decrease intermediation activity during the pandemic onset period and returned to the market for non-SMCCF eligible collateral more quickly than did stand-alone dealers. An alternative hypothesis is that, by standing as a "buyer of last resort", the facilities relaxed balance sheet constraints more broadly for counterparties to the facilities. We follow the approach in equation (7), replacing the bank-affiliated dummy with an indicator for facilities' counterparties (dubbed "eligible sellers"). Since dealers that may ultimately become eligible may be systematically different, we include both a dummy variable for all dealers that ever become eligible as well as a dummy for those dealers who register after the facilities are fully operational.[12]

[12] Table A.4 in the Appendix lists the SMCCF counterparties together with their registration dates.

Table 9 summarizes the results. Column (2) illustrates the dynamics of the dash for cash, and the expansion in dealer intermediation required to facilitate increased demand for trading. The probability of dealers buying from non-dealers increases from 1.2% to 1.5% (a coefficient of 0.10). Dealers who ultimately become eligible sellers are generally the most active buyers in this market, and they are buying more from their customers in the pandemic onset. The positive impact of the facility announcement is clear, as the probability of dealer purchase from customers increases after announcement, an effect that lessens by the time the facility becomes operational.

In columns (3)-(4) we add interactions with eligible collateral and find a more complicated story. In the pandemic onset, dealers were more likely to buy SMCCF-eligible collateral, perhaps as their customers sell off of higher credit quality assets accelerated. Eligible dealers were particularly less likely to buy these IG assets in the pandemic onset (3.4% probability of buying ineligible collateral vs 2.9% probability of buying eligible collateral) and in the time period overall (2.7% probability of buying ineligible collateral vs 2.5% probability of buying eligible collateral). The real difference is seen when the facility is operational – once eligible dealers were registered, they were differentially likely to buy SMCCF eligible collateral, suggesting that the operations of the facility were necessary to change their participation. This result is robust to the addition of individual dealer fixed effects (instead of just a fixed effect for eligibility), which we add in the final column of the table.

6.2 Intensive margin: Does the amount of intermediation increase?

In addition to the extensive margin of the probability of buying from non-dealer customers, constrained dealers can adjust on the intensive margin, buying more or less of the same securities over time. We investigate the intensive margin by estimating how the quantity of bonds bought from non-dealer customers changes across sub-periods:

$$
\begin{aligned}
\text{Amount bought}_{d,b,t} = {} & \alpha_0 + \sum_{i=1}^{3} \alpha_i \text{Subperiod}_{it} + \varphi_0 \text{SMCCF-eligible}_{b,t} \\
& + \sum_{i=1}^{3} \varphi_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \\
& + \beta_0 \text{BHC-affiliated}_{d,t} + \sum_{i=1}^{3} \beta_i \text{Subperiod}_{it} \times \text{BHC-affiliated}_{d,t} \\
& + \eta_0 \text{BHC-affiliated}_{d,t} \times \text{SMCCF-eligible}_{b,t} \\
& + \sum_{i=1}^{3} \eta_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \times \text{BHC-affiliated}_{d,t} \\
& + \lambda \text{Mills ratio}_{d,b,t} + \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{d,b,t},
\end{aligned} \tag{8}
$$

where the Mills ratio is the Mills ratio from the corresponding probit in Table 8.

The results in column (5) of Table 8 point to the importance of the facility on dealer actions. Consistent with the extensive margin results above, BHC-affiliated dealers reduce the extent of their buying of SMCCF-eligible collateral already in the pandemic onset period and continue buying at a reduced intensity once the facility is announced and operational. In contrast, the stand-alone dealers increase differentially their purchases of SMCCF-eligible collateral after the facility is announced, once again illustrating the flight to intermediation safety we documented above. These effects are economically, as well as statistically significant. Relative to the pre-pandemic period, bank-affiliated dealers reduced their purchase volumes of SMCCF-eligible collateral by \$1.3 million par during the facility implementation period and by \$0.5 million par during the facility operational period. At the same time, standalone dealers increased purchases of the average SMCCF-eligible bond by \$0.7 million par during the facility implementation period and by \$0.2 million par during the facility operational period.

Column (5) of Table 9 highlights the role that being a counterparty to the facilities plays in the intensive margin of intermediation. Column (5) illustrates that, while dealers that become facility counterparties buy fewer SMCCF-eligible securities on average – by \$2.3 million par less on an average day – they buy even fewer SMCCF-eligible securities during the pandemic onset and the facility implementation periods. Thus, dealers that eventually become counterparties to the facilities do not appear to build up their inventory of eligible securities ahead of time and instead serve as intermediaries for securities that the non-eligible sellers shy away from. During the facility operational period, the amount bought by eligible sellers of SMCCF-eligible securities increases but such increases are driven by the later registrants to the facility, which tended to be smaller dealers and electronic platforms. Furthermore, the differential activity by late registrants in SMCCF-eligible securities persists even after we include dealer fixed effects, suggesting a direct impact of facility registration on intermediation decisions at the intensive margin.

Taken together, the results in this section suggest that, for larger dealers, the announcement of the facilities was sufficient to incentivize greater intermediation activity, at both the extensive and the intensive margin, especially in securities not eligible for direct purchases by the SMCCF. For such dealers, the SMCCF thus acts through an increase in the overall intermediation capacity, which these dealers use to intermediate in securities that are less attractive to smaller, stand-alone dealers. For smaller dealers, the announcement of the facilities alone was not sufficient to incentivize intermediation in riskier, non-eligible securities, and becoming a registered counterparty to the facility and the start of active facility purchases more broadly was needed to restore such dealers' confidence in the market.

6.3 Primary market spillovers

Finally, we turn to the underwriting profits earned by dealers. For each dealer in an underwriting syndicate, we compute the net dollar trading profit earned on the offering day from secondary market re-trading of under- and overallocated issues.[13] We estimate a linear regression for the net profit of dealer d underwriting bond b on date t as a function of the

[13] Note that trading profit does not include the gross fees earned, if any.

eligibility of the bond for direct purchases by the facility, the sub-period, whether the dealer is affiliated with a U.S. bank holding company (BHC) and standard bond characteristics:

$$\begin{aligned}
\text{Net profit}_{d,b,t} = \alpha_0 &+ \sum_{i=1}^{3} \alpha_i \text{Subperiod}_{it} + \varphi_0 \text{SMCCF-eligible}_{b,t} \\
&+ \sum_{i=1}^{3} \varphi_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \\
&+ \beta_0 \text{BHC-affiliated}_{d,t} + \sum_{i=1}^{3} \beta_i \text{Subperiod}_{it} \times \text{BHC-affiliated}_{d,t} \\
&+ \eta_0 \text{BHC-affiliated}_{d,t} \times \text{SMCCF-eligible}_{b,t} \\
&+ \sum_{i=1}^{3} \eta_i \text{Subperiod}_{it} \times \text{SMCCF-eligible}_{b,t} \times \text{BHC-affiliated}_{d,t} \\
&+ \vec{\gamma}_t \text{Bond characteristics}_{b,t} + \epsilon_{d,b,t}.
\end{aligned} \tag{9}$$

Consistent with the asynchronous recovery between the primary and secondary markets, column (1) of Table 10 shows that average underwriter compensation increased during the facility implementation period, rising from a negative \$222 million during the pre-pandemic period to a negative \$9 million during the facility implementation period on average. While the average profitability of underwriting is not statistically significantly different during the pandemic onset period, column (1) of Table 11 shows that the number of trading days until the dealer generates a positive profit rises during the pandemic on-set period, so that the underwriter bears underwriting risk longer. Column (2) of Table 10 and of Table 11 highlight the extraordinary dislocation in the primary market for short maturity (below 5 year), investment grade bonds – those bonds that would become eligible for direct purchases by the facilities – during the onset of the pandemic, with the net underwriting profit on the offering day declining to negative \$246 million on average and the average time to profitability increasing to more than 14 days from a pre-pandemic average of less than 5.

Turning to the role that dealer constraints play, we see in columns (3)-(5) of Table 10 that bank-affiliated dealers in particular had lower profits when underwriting SMCCF-eligible collateral during both the pandemic onset and the facility implementation period, while dealers not affiliated with U.S. BHCs saw rising profits. This is consistent with the secondary market "flight to intermediation safety" we documented above. Dealers not affiliated with U.S. BHC were both more willing to intermediate in the secondary market for SMCCF-eligible collateral and demanded more compensation for underwriting risk during the pandemic onset and especially during the facilities implementation period.

7 Conclusion

With corporate bonds an ever growing fraction of U.S. non-financial corporate debt, understanding the impact of 13(3) facilities and policy choices on businesses' ability to fund themselves through the primary market for corporate debt gains in importance. Yet most of the literature to date, including evaluations of both monetary policy and extraordinary interventions, has focused on the impact of policy changes on credit spreads in secondary markets. In this paper, we document that, although improvements in the primary market do follow decreases in secondary market credit spreads, the normalization in primary market offering spreads is much slower, highlighting the importance of evaluating the impact of policy interventions in a holistic manner. Generally, other official sector interventions such as lower risk free rates and fiscal spending should disproportionally benefit riskier (non-eligible) issuers, suggesting that our results of a disproportional impact on eligible issuers may underestimate the direct impact of the facilities.

We also highlight the key role of dealers who are both making markets in secondary markets and underwriting debt securities. Underwriters appear to be demanding higher profits in the wake of the pandemic, with underwriter profits on new issuance growing sharply, and falling only as the facility began purchasing bonds. The effect on dealer intermediation in secondary markets is complex, and we find a key role for the actual operations of the facility, with differential purchases by the subset of dealers eligible to transact with the facility.

However, we do not find evidence to support balance sheet constraints of BHC-affiliate dealers as an important contributor to the March 2020 corporate bond market dislocations.

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Table 1: Summary statistics. This table reports the summary statistics for the secondary-market sample and the offering terms sample used in the paper (January 1, 2020 – December 31, 2020). Secondary market spreads, 1y EDFs, bid-ask spreads, offering spreads and gross spreads are reported in basis point terms. Offering amount in USD million (log offering amount in log USD million) and offering maturity is reported in years.

(a) Primary market

	Mean	Median	P25	P75	Std. Dev.
Offering amount	260	50	10	300	505
Log offering amount	4	4	2	6	2
Offering maturity	9	6	3	10	8
Offering spread	112	90	57	145	108
Gross spread	6	5	3	7	5

(b) Secondary market

	Mean	Median	P25	P75	Std. Dev.
Duration-matched spread	232	141	82	259	322
Default-adjusted spread	88	1	-39	110	277
1y EDF	83	18	10	58	288
Bid-ask spread	117	96	57	160	88

Table 2: Access to primary credit markets. This table reports the estimated coefficients from the probit regression of the probability of issuer f issuing a fixed rate bond in week t (columns 1 and 2), together with the estimated coefficients from the regression of offering terms of bond b issued by issuer f in week t on bond characteristics and sub-period dummies. "IG" is a dummy equal to 1 if the issuer is investment grade rated in week t. "Pandemic onset" is a dummy equal to 1 if issuance occurs between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if issuance occurs between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if issuance occurs between June 30, 2020 and December 31, 2020. "R-sqr" is the pseudo R^2 for the probit regressions, and the adjusted R^2 for the intensive margin regression. All regressions include the other offering terms, standard bond characteristics and month-of-year fixed effects. Standard errors clustered at the issuer level reported in parentheses below point estimates. Reference period is January 1, 2017 – February 21, 2020. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	Probit		Amount		Maturity		Offering spread		Gross spread	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	-4.69	-3.82	-32.25	-12.71	329.04	655.44	-1652.47	-9775.88	184.62	91.24
	(0.14)***	(0.18)***	(23.62)	(26.37)	(265.32)	(328.97)**	(4100.39)	(3820.17)**	(82.52)**	(84.07)
Pandemic onset	-0.38	-0.50	-2.98	-1.29	26.73	73.00	-275.26	-1291.55	9.47	3.05
	(0.32)	(0.37)	(1.89)	(2.81)	(21.38)	(35.21)**	(337.66)	(418.22)***	(6.69)	(9.23)
Facility implementation	0.08	0.12	1.01	0.13	-12.02	-26.89	237.96	558.56	-3.38	-1.74
	(0.11)	(0.12)	(0.62)	(0.70)	(5.50)**	(9.05)***	(119.75)**	(114.01)***	(1.77)*	(2.03)
Facility operational	-0.16	-0.10	-1.35	-0.55	4.77	7.50	87.87	-80.74	7.55	2.99
	(0.10)	(0.10)	(0.81)*	(0.59)	(9.01)	(7.28)	(144.90)	(96.71)	(2.91)***	(2.27)
IG	0.11	0.11	1.00	0.57	-4.88	-9.99	-102.37	83.51	-7.79	-5.87
	(0.05)**	(0.06)*	(0.59)*	(0.63)	(6.74)	(7.81)	(99.01)	(88.23)	(2.11)***	(1.91)***
IG × Pandemic onset	0.41	0.16	3.38	0.96	-26.24	-23.98	362.54	442.09	-10.50	2.04
	(0.33)	(0.35)	(2.04)*	(0.90)	(22.64)	(11.62)**	(361.02)	(139.08)***	(7.16)	(3.11)
IG × Facility implementation	0.36	0.39	2.38	1.69	-19.75	-49.80	42.79	649.97	-11.84	-6.26
	(0.11)***	(0.13)***	(1.77)	(2.17)	(19.72)	(27.32)*	(323.55)	(340.51)*	(6.18)*	(7.11)
IG × Facility operational	-0.05	-0.09	-0.14	-0.05	7.03	14.93	-154.55	-284.44	0.66	0.28
	(0.11)	(0.14)	(0.27)	(0.54)	(3.26)**	(7.04)**	(56.30)***	(80.13)***	(1.19)	(1.68)
Log EDF		-0.04		-0.22		5.08		-61.13		0.87
		(0.02)**		(0.22)		(2.78)*		(30.64)**		(0.68)
Pandemic onset × Log EDF		-0.15		-0.21		20.78		-405.67		2.23
		(0.08)*		(0.85)		(10.75)*		(129.95)***		(2.79)
Facility implementation × Log EDF		0.04		0.17		-7.16		97.84		-0.65
		(0.03)		(0.22)		(2.70)***		(37.73)**		(0.66)
Facility operational × Log EDF		0.01		0.05		-2.66		37.36		-0.55
		(0.05)		(0.10)		(1.46)*		(19.49)*		(0.28)*
Mills ratio			8.67	4.08	-77.49	-155.45	406.67	2302.56	-40.17	-18.73
			(5.42)	(6.15)	(61.10)	(76.64)**	(946.10)	(894.60)**	(19.04)**	(19.67)
Issuer characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bond characteristics			✓	✓	✓	✓	✓	✓	✓	✓
R.-sqr.	0.12	0.10	0.41	0.45	0.14	0.16	0.56	0.67	0.59	0.64
N. of obs	158900	112822	910	876	910	876	910	876	856	826
N. of clusters	923	789	236	223	236	223	236	223	229	215

Table 3: Access to primary credit markets by refinancing need. This table reports the estimated coefficients from the probit regression of the probability of issuer f issuing a fixed rate bond in week t (columns 1 and 2), together with the estimated coefficients from the regression of offering terms of bond b issued by issuer f in week t on bond characteristics and sub-period dummies. "IG" is a dummy equal to 1 if the issuer is investment grade rated in week t. "Pandemic onset" is a dummy equal to 1 if issuance occurs between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if issuance occurs between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if issuance occurs between June 30, 2020 and December 31, 2020. "Refi" are issuers with debt maturity within 2 years; "Opp." are those that don't have any debt maturing within 2 years. "R-sqr" is the pseudo R^2 for the probit regressions, and the adjusted R^2 for the intensive margin regression. All regressions include the other offering terms, standard bond characteristics and month-of-year fixed effects. Standard errors clustered at the issuer level reported in parentheses below point estimates. Reference period is January 1, 2017 – February 21, 2020. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	Probit		Amount		Maturity		Offering spread		Gross spread	
	(1) Refi	(2) Opp.	(3) Refi	(4) Opp.	(5) Refi	(6) Opp.	(7) Refi	(8) Opp.	(9) Refi	(10) Opp.
Constant	-4.52	-3.89	4.41	-22.56	367.21	907.80	-4675.09	-9371.30	5.25	85.15
	(0.33)***	(0.20)***	(40.26)	(26.78)	(345.48)	(458.03)**	(5534.00)	(4175.18)**	(84.42)	(95.05)
Pandemic onset	-3.50	-0.37	0.92	-1.93	41.98	78.34	-1170.07	-1067.40	0.14	1.72
	(0.27)***	(0.34)	(6.13)	(2.13)	(53.90)	(36.51)**	(850.67)	(340.90)***	(13.48)	(7.75)
Facility implementation	0.49	0.04	-0.50	0.18	-51.26	-18.50	819.18	310.27	4.55	-0.41
	(0.23)**	(0.15)	(4.02)	(0.34)	(35.31)	(5.55)***	(559.32)	(65.48)***	(8.84)	(1.23)
Facility operational	0.17	-0.14	0.18	-1.13	-25.69	22.76	357.37	-228.04	4.87	3.37
	(0.21)	(0.11)	(1.37)	(0.77)	(13.65)*	(13.44)*	(207.25)*	(137.49)*	(3.74)	(3.22)
IG	0.23	0.11	0.37	0.74	-15.29	-15.55	57.30	90.20	1.14	-6.52
	(0.17)	(0.06)*	(1.91)	(0.65)	(17.21)	(10.84)	(262.98)	(100.60)	(4.53)	(2.33)***
IG × Pandemic onset	2.74	0.13		1.49		-21.28		402.67		3.65
	(0.22)***	(0.37)		(0.80)*		(14.26)		(122.34)***		(2.91)
IG × Facility implementation	0.15	0.43	0.26	2.51	-3.11	-77.93	21.84	749.22	-4.24	-6.16
	(0.26)	(0.17)**	(1.31)	(2.37)	(12.90)	(40.53)*	(219.18)	(392.69)*	(2.85)	(8.55)
IG × Facility operational	-0.45	-0.02	-0.22	0.34	40.19	2.97	-574.23	-114.51	-7.64	-0.52
	(0.28)	(0.16)	(3.75)	(0.25)	(32.63)	(4.45)	(537.06)	(37.03)***	(8.12)	(1.05)
Log EDF	-0.06	-0.04	-0.09	-0.27	3.89	7.47	-40.84	-56.57	0.57	0.59
	(0.04)	(0.02)**	(0.46)	(0.23)	(4.07)	(4.00)*	(64.85)	(35.07)	(1.02)	(0.78)
Pandemic onset × Log EDF	-0.30	-0.11	0.41	-0.33	16.80	26.21	-490.33	-361.04	-0.32	2.99
	(0.11)***	(0.07)	(2.45)	(0.65)	(21.42)	(11.81)**	(339.02)	(107.76)***	(5.35)	(2.50)
Facility implementation × Log EDF	0.11	0.02	0.01	0.09	-10.98	-4.68	160.11	35.66	-0.34	-0.11
	(0.06)**	(0.04)	(0.92)	(0.11)	(8.09)	(1.91)**	(133.45)	(27.21)	(1.99)	(0.34)
Facility operational × Log EDF	0.03	0.00	-0.12	0.09	-4.48	-1.27	52.28	-1.19	-1.52	0.03
	(0.09)	(0.06)	(0.22)	(0.07)	(2.40)*	(1.87)	(40.74)	(15.57)	(0.51)***	(0.26)
Mills ratio			-0.01	6.30	-85.00	-212.92	1070.83	2227.63	0.39	-17.05
			(9.12)	(6.18)	(77.82)	(105.76)**	(1261.56)	(968.73)**	(18.98)	(22.00)
Issuer characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bond characteristics			✓	✓	✓	✓	✓	✓	✓	✓
R.-sqr.	0.11	0.10	0.45	0.48	0.06	0.23	0.75	0.66	0.65	0.66
N. of obs	27035	85787	401	473	401	473	401	473	365	458
N. of clusters	370	737	93	175	93	175	93	175	88	171

Table 4: Facility announcement effects. This table reports the estimated coefficients from the regression of average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 3 days around the announcement of the facilities on March 22, 2020. "AAA/AA/A eligible" ("BBB eligible") is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and is rated at least A- (rated BBB+, BBB or BBB-) on a plurality rating basis. "Debt maturing" is a dummy equal to 1 if the issuer has any bonds maturing within the next 2 years. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Credit and bid-ask spreads

	Duration-matched spread			Bid-ask spread		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-30.66	-14.44	-29.69	1.45	22.34	1.35
	(11.24)***	(13.49)	(11.77)**	(20.67)	(14.76)	(20.54)
AAA/AA/A eligible	-17.22	-14.89	-17.11	-16.01	-18.24	-15.47
	(5.76)***	(4.94)***	(5.79)***	(3.12)***	(2.74)***	(3.39)***
BBB eligible	-24.57	-17.68	-6.34	-12.37	-8.91	-23.58
	(6.18)***	(6.12)***	(7.35)	(6.57)*	(3.72)**	(7.26)***
Debt maturing w/in 2 year			-2.45			1.03
			(4.22)			(4.37)
AAA/AA/A eligible × Debt maturing w/in 2 year			0.78			-1.03
			(9.03)			(5.05)
BBB eligible × Debt maturing w/in 2 year			-25.22			19.07
			(11.07)**			(9.10)**
Issuer FE		✓			✓	
Adj. R-sqr.	0.03	0.15	0.04	0.01	0.44	0.01
N. of obs	1062	878	1062	538	435	538
N. of clusters	372	188	372	209	106	209

(b) Components of credit spreads

	Default-adjusted spread			1 year EDF		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-27.31	-18.24	-25.91	-7.12	-7.78	-8.69
	(12.02)**	(16.74)	(12.42)**	(2.93)**	(3.87)**	(3.17)***
AAA/AA/A eligible	-18.59	-15.52	-18.39	4.35	0.29	5.87
	(5.93)***	(5.26)***	(6.18)***	(0.98)***	(0.27)	(1.48)***
BBB eligible	-26.06	-17.66	-8.58	1.29	-1.75	3.51
	(6.22)***	(6.06)***	(7.40)	(1.41)	(1.01)*	(1.93)*
Debt maturing w/in 2 year			-4.02			3.35
			(4.30)			(1.90)*
AAA/AA/A eligible × Debt maturing w/in 2 year			1.18			-3.16
			(9.47)			(1.72)*
BBB eligible × Debt maturing w/in 2 year			-23.52			-4.18
			(11.19)**			(2.53)*
Issuer FE		✓			✓	
Adj. R-sqr.	0.05	0.15	0.06	0.00	0.71	0.00
N. of obs	1041	859	1041	1041	859	1041
N. of clusters	367	185	367	367	185	367

Table 5: Facility expansion effects. This table reports the estimated coefficients from the regression of average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 3 days around the expansion of the facilities on April 9, 2020. "AAA/AA/A eligible" ("BBB eligible")("Fallen angel eligible") is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and is rated at least A- (rated BBB+, BBB or BBB-) (investment grade rated as of March 22 and was subsequently downgraded no lower than BB-) on a plurality rating basis. "Debt maturing" is a dummy equal to 1 if the issuer has any bonds maturing within the next 2 years. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Credit and bid-ask spreads

	Duration-matched spread			Bid-ask spread		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-22.37	-8.27	-24.57	13.32	3.88	14.07
	(10.14)**	(10.60)	(10.58)**	(8.79)	(12.70)	(8.85)
AAA/AA/A eligible	13.59	-0.83	12.81	-3.67	-0.70	-2.68
	(3.55)***	(2.54)	(3.07)***	(2.22)*	(2.90)	(2.21)
BBB eligible	6.21	2.84	-2.43	-2.62	-2.66	-3.56
	(7.23)	(7.50)	(6.58)	(2.76)	(2.31)	(5.11)
Fallen angels eligible	-47.85	-11.29	-16.79	-34.33	-18.42	-62.34
	(21.79)**	(3.20)***	(2.16)***	(7.36)***	(0.83)***	(1.48)***
Debt maturing w/in 2 year			5.23			-2.73
			(3.06)*			(2.25)
AAA/AA/A eligible × Debt maturing w/in 2 year			-0.85			-0.40
			(5.62)			(3.63)
BBB eligible × Debt maturing w/in 2 year			11.45			2.14
			(11.97)			(5.97)
Fallen angels eligible × Debt maturing w/in 2 year			-38.85			33.84
			(27.55)			(8.48)***
Issuer FE		✓			✓	
Adj. R-sqr.	0.02	0.36	0.02	0.03	0.24	0.03
N. of obs	1075	886	1075	829	689	829
N. of clusters	391	202	391	291	151	291

(b) Components of credit spreads

	Default-adjusted spread			1 year EDF		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-21.12	-8.40	-23.58	-0.23	2.05	-0.14
	(10.35)**	(10.72)	(10.81)**	(1.58)	(1.74)	(1.58)
AAA/AA/A eligible	13.08	-0.42	12.81	0.22	-0.14	0.09
	(3.60)***	(2.62)	(3.19)***	(0.59)	(0.15)	(0.69)
BBB eligible	6.01	3.27	-1.78	1.39	0.43	0.64
	(7.45)	(7.62)	(6.87)	(0.78)*	(0.39)	(0.95)
Fallen angels eligible	-47.90	-9.69	-16.57	13.86	14.70	-2.68
	(21.76)**	(3.19)***	(2.17)***	(5.37)**	(0.10)***	(0.73)***
Debt maturing w/in 2 year			5.78			-0.04
			(3.09)*			(1.37)
AAA/AA/A eligible × Debt maturing w/in 2 year			-1.78			0.21
			(5.68)			(1.53)
BBB eligible × Debt maturing w/in 2 year			9.86			1.15
			(12.25)			(1.77)
Fallen angels eligible × Debt maturing w/in 2 year			-39.40			19.30
			(27.58)			(4.09)***
Issuer FE		✓			✓	
Adj. R-sqr.	0.02	0.35	0.02	0.01	0.77	0.00
N. of obs	1036	854	1036	1041	858	1041
N. of clusters	377	195	377	380	197	380

Table 6: Purchase effects. This table reports the estimated coefficients from average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 3 days around facility purchases. "Purchased" is the 0/1 indicator for the bond being purchased either directly (as a cash bond) or indirectly (through ETF purchases). "ETF" is the 0/1 indicator for the bond purchased indirectly through ETFs; "Cash bond" is the 0/1 indicator for the bond purchased directly. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Duration-matched spreads

	(1)	(2)	(3)	(4)	(5)
Constant	-1.87	-2.23	-2.23	-2.10	-4.54
	(0.40)***	(0.39)***	(0.39)***	(0.49)***	(2.94)
Purchased	-2.00	-0.08			
	(0.13)***	(0.34)			
ETF			-0.07	0.22	-0.00
			(0.35)	(0.36)	(0.43)
Cash bond			-0.58	-0.81	-0.93
			(0.28)**	(0.27)***	(0.26)***
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.01	0.07	0.07	0.09	0.13
N. of obs	179150	179150	179150	179127	179065
N. of clusters	673	673	673	650	648

(b) Default-adjusted spreads

	(1)	(2)	(3)	(4)	(5)
Constant	-1.16	-1.46	-1.46	-0.84	-3.53
	(0.68)*	(0.70)**	(0.70)**	(1.13)	(2.88)
Purchased	-2.03	-0.28			
	(0.14)***	(0.41)			
ETF			-0.29	0.01	-0.11
			(0.43)	(0.43)	(0.45)
Cash bond			-0.47	-0.69	-0.82
			(0.28)*	(0.26)***	(0.26)***
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.05	0.05	0.06	0.09
N. of obs	176170	176170	176170	176153	176097
N. of clusters	633	633	633	616	614

(c) 1 year EDF

	(1)	(2)	(3)	(4)	(5)
Constant	-0.24	-0.37	-0.37	-0.63	-1.19
	(0.23)	(0.20)*	(0.20)*	(0.23)***	(0.71)*
Purchased	0.11	0.42			
	(0.09)	(0.29)			
ETF			0.44	0.45	0.45
			(0.30)	(0.35)	(0.40)
Cash bond			-0.31	-0.39	-0.37
			(0.14)**	(0.14)***	(0.14)***
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.02	0.02	0.03	0.02
N. of obs	176400	176400	176400	176382	176324
N. of clusters	634	634	634	616	614

(d) Bid-ask spread

	(1)	(2)	(3)	(4)	(5)
Constant	0.10	0.13	0.13	0.11	0.31
	(0.25)	(0.25)	(0.25)	(0.31)	(0.35)
Purchased	-0.41	-0.46			
	(0.09)***	(0.32)			
ETF			-0.45	-0.56	-0.35
			(0.33)	(0.37)	(0.47)
Cash bond			-0.62	-0.54	-0.54
			(0.36)*	(0.35)	(0.34)
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.00	0.00	0.01	0.00
N. of obs	227320	227320	227320	227314	227296
N. of clusters	543	543	543	537	537

Table 7: Facility closure announcement effects. This table reports the estimated coefficients from the regression of average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 3 days around Secretary Mnuchin's letter requesting the return of CARES Act funds on November 19, 2020 and in 3 days around the closure of the facilities on December 31, 2020. "SMCCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. "Debt maturing" is a dummy equal to 1 if the issuer has any bonds maturing within the next 2 years. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Credit and bid-ask spreads

	Duration-matched spread						Bid-ask spread					
	November 19			December 29			November 19			December 29		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-4.89	-5.55	-5.64	-1.90	-2.89	-1.58	-0.84	-2.99	-0.57	5.25	4.89	4.90
	(3.86)	(2.82)**	(3.99)	(2.53)	(2.16)	(2.78)	(2.76)	(2.81)	(2.82)	(5.06)	(5.54)	(5.26)
SMCCF eligible	1.66	0.77	1.08	-0.41	0.15	-1.16	0.62	0.02	0.28	-1.24	-0.02	-1.62
	(0.87)*	(0.35)**	(1.44)	(0.60)	(0.63)	(1.04)	(0.60)	(0.73)	(0.78)	(0.89)	(1.61)	(1.17)
Debt maturing w/in 2 year			1.32			-0.47			-0.51			0.52
			(1.02)			(0.73)			(0.88)			(1.56)
Debt maturing w/in 2 year× eligible			0.70			1.29			0.64			0.43
			(1.60)			(1.52)			(1.16)			(1.77)
Issuer FE		✓			✓			✓			✓	
Adj. R-sqr.	0.02	0.52	0.03	0.05	0.21	0.05	0.00	0.31	-0.00	0.01	0.11	0.01
N. of obs	1159	969	1159	865	672	865	1198	1033	1198	806	668	806
N. of clusters	417	227	417	354	161	354	402	237	402	298	160	298

(b) Components of credit spreads

	Default-adjusted spread						1 year EDF					
	November 19			December 29			November 19			December 29		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-4.48	-5.57	-5.32	-0.87	-2.28	-0.64	1.64	-0.50	1.27	1.81	0.22	2.20
	(3.82)	(2.84)*	(3.89)	(2.38)	(2.00)	(2.60)	(3.39)	(0.76)	(3.68)	(1.04)*	(0.68)	(1.21)*
SMCCF eligible	1.60	0.81	1.12	-0.42	0.14	-1.15	0.44	-1.46	1.67	0.20	0.08	-0.08
	(0.83)*	(0.34)**	(1.43)	(0.61)	(0.65)	(1.05)	(0.95)	(0.86)*	(0.69)**	(0.27)	(0.09)	(0.26)
Debt maturing w/in 2 year			1.41			-0.34			0.64			-0.55
			(0.98)			(0.72)			(0.98)			(0.49)
Debt maturing w/in 2 year× eligible			0.53			1.21			-2.24			0.57
			(1.56)			(1.53)			(1.54)			(0.62)
Issuer FE		✓			✓			✓			✓	
Adj. R-sqr.	0.02	0.54	0.02	0.04	0.20	0.04	0.01	0.89	0.01	0.05	0.86	0.05
N. of obs	1143	956	1143	856	665	856	1143	956	1143	858	667	858
N. of clusters	410	223	410	350	159	350	410	223	410	350	159	350

Table 8: Dealer constraints and secondary market intermediation. This table reports the estimated probit model coefficients for the probability of dealer d buying bond b on date t from non-dealer customers (columns 1-4), as well as the corresponding intensive margin (column 5). "SMCCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. "Bank affiliated" is a dummy equal to 1 if the dealer is affiliated with a U.S. BHC. "Pandemic onset" is a dummy equal to 1 if trade occurs between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if trade occurs between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if trade occurs between June 30, 2020 and December 31, 2020. Reference period is January 1, 2019 – February 21, 2020. "R-sqr" is the pseudo R^2 for the probit regressions, and the adjusted R^2 for the intensive margin regression. All regressions control for standard bond characteristics. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	(1)	(2)	(3)	(4)	(5)
Constant	-2.09	-2.22	-2.22	-2.64	-30.90
	(0.03)***	(0.03)***	(0.03)***	(0.07)***	(6.22)***
Pandemic onset	0.11	0.12	0.11	0.12	1.64
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.32)***
Facility implementation	0.08	0.10	0.09	0.09	1.14
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.23)***
Facility operational	0.01	0.02	0.02	0.01	-0.04
	(0.01)	(0.01)***	(0.01)***	(0.01)	(0.02)*
Bank-affiliated		0.35	0.36		
		(0.01)***	(0.01)***		
Bank-affiliated × Pandemic onset		-0.02	0.00	-0.00	-0.03
		(0.01)***	(0.01)	(0.01)	(0.06)
Bank-affiliated × Facility implementation		-0.03	-0.01	-0.01	-0.01
		(0.01)***	(0.01)	(0.01)*	(0.08)
Bank-affiliated × Facility operational		-0.02	-0.01	-0.02	-0.46
		(0.01)***	(0.01)**	(0.01)***	(0.08)***
SMCCF eligible			0.01	0.01	0.09
			(0.02)	(0.02)	(0.03)***
SMCCF eligible × Pandemic onset			0.02	0.03	0.49
			(0.01)**	(0.01)***	(0.09)***
SMCCF eligible × Facility implementation			0.04	0.05	0.73
			(0.01)***	(0.01)***	(0.13)***
SMCCF eligible × Facility operational			0.00	0.01	0.18
			(0.01)	(0.01)	(0.04)***
Bank-affiliated × SMCCF eligible			-0.05	0.01	-0.25
			(0.01)***	(0.01)	(0.05)***
Bank-affiliated × SMCCF eligible			-0.07	-0.08	-1.01
× Pandemic onset			(0.01)***	(0.01)***	(0.20)***
Bank-affiliated × SMCCF eligible			-0.09	-0.10	-1.30
× Facility implementation			(0.01)***	(0.01)***	(0.27)***
Bank-affiliated × SMCCF eligible			-0.04	-0.05	-0.46
× Facility operational			(0.01)***	(0.01)***	(0.12)***
Mills ratio					16.14
					(3.05)***
Bond chars	✓	✓	✓	✓	✓
Dealer FE				✓	✓
R.-sqr.	0.02	0.04	0.04	0.16	0.12
N. of obs	86,330,397	86,330,397	86,330,397	80,183,928	1,065,724
N. of clusters	834	834	834	834	832

Table 9: Facility counterparties and secondary market intermediation. This table reports the estimated probit model coefficients for the probability of dealer d buying bond b on date t from non-dealer customers. "SMCCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. "Eligible seller" is a dummy equal to 1 if the dealer becomes a facility counterparty during facility purchases; "registration date post operational" is a dummy equal to 1 if the dealer's registration date with the facility is post June 29, 2020. "Pandemic onset" is a dummy equal to 1 if trade occurs between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if trade occurs between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if trade occurs between June 30, 2020 and December 31, 2020. Reference period is January 1, 2019 – February 21, 2020. "R-sqr" is the pseudo R^2 for the probit regressions, and the adjusted R^2 for the intensive margin regression. All regressions control for standard bond characteristics. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	(1)	(2)	(3)	(4)	(5)
Constant	-2.23	-2.24	-2.24	-2.63	-30.87
	(0.03)***	(0.03)***	(0.03)***	(0.07)***	(6.24)***
Pandemic onset	0.10	0.09	0.09	0.10	1.33
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.26)***
Facility implementation	0.05	0.05	0.05	0.05	0.69
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.14)***
Facility operational	-0.01	-0.01	-0.01	-0.01	-0.29
	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)***
Eligible seller	0.47	0.49	0.49		
	(0.01)***	(0.02)***	(0.02)***		
Eligible seller × Pandemic onset	0.02	0.04	0.04	0.03	-0.52
	(0.01)**	(0.01)***	(0.01)***	(0.03)	(0.21)**
Eligible seller × Facility implementation	0.05	0.05	0.05	0.03	-0.25
	(0.01)***	(0.01)***	(0.01)***	(0.03)	(0.25)
Eligible seller × Facility operational	0.02	0.01	0.02	-0.02	-1.36
	(0.01)*	(0.01)	(0.01)**	(0.03)	(0.22)***
SMCCF eligible		0.03	0.03	0.03	0.41
		(0.02)	(0.02)	(0.03)	(0.09)***
SMCCF eligible × Pandemic onset		0.03	0.03	0.04	0.59
		(0.01)**	(0.01)**	(0.01)***	(0.11)***
SMCCF eligible × Facility implementation		0.01	0.01	0.02	0.29
		(0.01)	(0.01)	(0.02)	(0.05)***
SMCCF eligible × Facility operational		-0.02	-0.02	-0.01	-0.17
		(0.01)	(0.01)	(0.02)	(0.04)***
Eligible seller × SMCCF eligible		-0.05	-0.05	-0.05	-1.02
		(0.02)***	(0.02)***	(0.02)**	(0.16)***
Eligible seller × SMCCF eligible		-0.08	-0.08	-0.10	-1.29
× Pandemic onset		(0.02)***	(0.02)***	(0.02)***	(0.25)***
Eligible seller × SMCCF eligible		-0.02	-0.02	-0.02	-0.12
× Facility implementation		(0.02)	(0.02)	(0.02)	(0.09)
Eligible seller × SMCCF eligible		0.01	-0.02	-0.01	-0.04
× Facility operational		(0.02)	(0.02)	(0.02)	(0.06)
Eligible seller			-0.04	0.09	1.50
× registration date post operational × Facility operational			(0.01)***	(0.01)***	(0.25)***
Eligible seller × SMCCF eligible			0.10	0.11	1.77
× registration date post operational × Facility operational			(0.01)***	(0.02)***	(0.28)***
Mills ratio					16.19
					(3.07)***
Bond chars	✓	✓	✓	✓	✓
Dealer FE				✓	✓
R.-sqr.	0.05	0.05	0.05	0.17	0.12
N. of obs	86,330,397	86,330,397	86,330,397	80,183,928	1,065,724
N. of clusters	834	834	834	834	832

Table 10: Dealer constraints and offering day underwriting profits. This table reports the estimated coefficients from the regression of profits of dealer d underwriting bond b on date t on bond characteristics, sub-period dummies and bank characteristics. "SMCCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. "Bank affiliated" is a dummy equal to 1 if the dealer is affiliated with a U.S. BHC. "Pandemic onset" is a dummy equal to 1 if issued between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if issued between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if issued between June 30, 2020 and December 31, 2020. Reference period is January 1, 2017 – February 21, 2020. All regressions control for standard bond characteristics. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

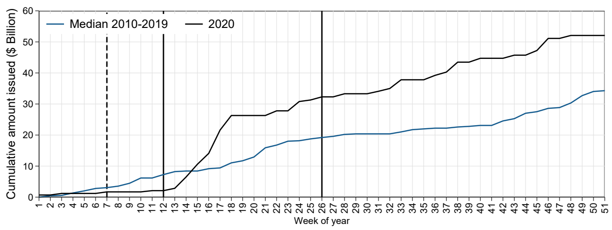
	(1)	(2)	(3)	(4)	(5)
Constant	1.91	1.74	21.03	19.21	8.58
	(0.30)***	(0.28)***	(4.00)***	(5.54)***	(4.41)*
Pandemic onset	0.07	0.09	2.94	-1.04	0.14
	(0.14)	(0.14)	(2.97)	(2.27)	(2.30)
Facility implementation	0.13	0.12	-0.35	-1.47	-0.84
	(0.06)**	(0.06)**	(2.30)	(2.33)	(2.60)
Facility operational	-0.00	0.00	0.80	-1.48	-0.21
	(0.07)	(0.08)	(1.71)	(1.80)	(1.83)
SMCCF eligible		0.20	-0.51	-3.25	-3.49
		(0.04)***	(1.64)	(1.61)**	(1.79)*
SMCCF eligible × Pandemic onset		-0.29	6.28	11.63	11.49
		(0.15)*	(3.21)*	(2.71)***	(3.71)***
SMCCF eligible × Facility implementation		0.14	11.55	11.97	12.78
		(0.12)	(3.94)***	(4.88)**	(4.65)***
SMCCF eligible × Facility operational		-0.15	-2.51	-0.14	-1.11
		(0.08)*	(3.12)	(3.36)	(3.51)
Bank-affiliated			-14.46		
			(1.69)***		
Bank-affiliated × Pandemic onset			-3.29	4.46	7.11
			(4.19)	(3.05)	(3.09)**
Bank-affiliated × Facility implementation			2.22	5.09	4.74
			(2.98)	(2.83)*	(3.18)
Bank-affiliated × Facility operational			-2.80	-0.31	-1.07
			(2.50)	(2.49)	(2.66)
Bank-affiliated × SMCCF eligible			-1.00	2.55	3.31
			(2.66)	(2.62)	(2.74)
Bank-affiliated × SMCCF eligible × Pandemic onset			-20.59	-28.11	-30.40
			(4.65)***	(5.13)***	(5.51)***
Bank-affiliated × SMCCF eligible × Facility implementation			-19.60	-19.43	-21.26
			(7.62)**	(8.17)**	(7.89)***
Bank-affiliated × SMCCF eligible × Facility operational			4.54	0.94	0.59
			(5.23)	(5.49)	(5.85)
Bond chars	✓	✓	✓	✓	✓
Dealer FE				✓	✓
Issuer FE					✓
Adj. R.-sqr.	-0.00	-0.00	0.03	0.10	0.07
N. of obs	8857	8857	8857	8837	8814
N. of clusters	485	485	485	485	462

Table 11: Dealer constraints and time to profitability. This table reports the estimated coefficients from the censored regression of number of days to profitability dealer d underwriting bond b on date t on bond characteristics, sub-period dummies and bank characteristics. "SMCCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. "Bank affiliated" is a dummy equal to 1 if the dealer is affiliated with a U.S. BHC. "Pandemic onset" is a dummy equal to 1 if issued between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if issued between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if issued between June 30, 2020 and December 31, 2020. Reference period is January 1, 2017 – February 21, 2020. All regressions control for standard bond characteristics. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

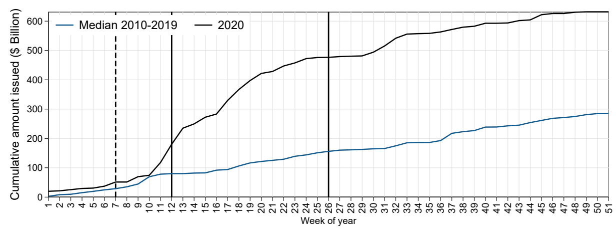
	(1)	(2)	(3)	(4)	(5)
Constant	18.12	18.74	12.53	7.65	2.77
	(1.80)***	(1.82)***	(1.81)***	(1.63)***	(1.45)*
Pandemic onset	0.98	0.89	-0.21	1.10	1.52
	(0.59)*	(0.58)	(0.98)	(0.64)*	(0.74)**
Facility implementation	0.45	0.43	-0.26	0.30	0.45
	(0.27)*	(0.28)	(0.52)	(0.47)	(0.58)
Facility operational	-0.08	-0.07	-0.57	0.41	0.37
	(0.32)	(0.34)	(0.39)	(0.38)	(0.44)
SMCCF eligible		-0.62	-0.43	0.53	1.04
		(0.19)***	(0.46)	(0.40)	(0.44)**
SMCCF eligible × Pandemic onset		6.79	-2.46	-1.72	-5.70
		(0.56)***	(1.05)**	(0.82)**	(1.20)***
SMCCF eligible × Facility implementation		0.31	-1.01	-1.34	-2.34
		(0.44)	(0.75)	(0.77)*	(1.00)**
SMCCF eligible × Facility operational		0.21	0.92	0.00	-0.28
		(0.62)	(1.03)	(0.82)	(0.95)
Bank-affiliated			4.50		
			(0.33)***		
Bank-affiliated × Pandemic onset			1.35	-1.49	-1.91
			(1.39)	(0.96)	(1.04)*
Bank-affiliated × Facility implementation			0.41	-0.67	-0.87
			(0.81)	(0.67)	(0.76)
Bank-affiliated × Facility operational			1.34	0.25	0.19
			(0.64)**	(0.64)	(0.72)
Bank-affiliated × SMCCF eligible			0.36	-0.77	-0.97
			(0.71)	(0.64)	(0.67)
Bank-affiliated × SMCCF eligible × Pandemic onset			61.74	57.82	61.10
			(2.86)***	(2.53)***	(2.52)***
Bank-affiliated × SMCCF eligible × Facility implementation			2.71	2.81	3.62
			(1.42)*	(1.37)**	(1.48)**
Bank-affiliated × SMCCF eligible × Facility operational			-1.36	-0.11	0.12
			(1.60)	(1.46)	(1.57)
Bond chars	✓	✓	✓	✓	✓
Dealer FE				✓	✓
Issuer FE					✓
Pseudo R.-sqr.	0.00	0.00	0.01	0.03	0.04
N. of obs	8857	8857	8857	8857	8857
N. of clusters	485	485	485	485	485

Figure 2. Primary market issuance improved since CCF announcement. This figure plots the year-to-date cumulative USD amount of fixed coupon bonds issued by non-financial issuers in 2020 and the corresponding median cumulative issuance from 2010 to 2019. Event lines at March 22 (initial CCF announcement) and June 29 (PMCCF operational).

(a) Investment grade, below 5 year



(b) Investment grade, above 5 year



(c) High yield

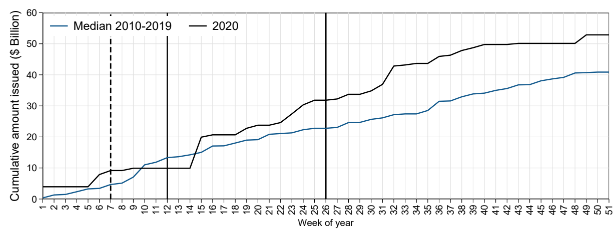
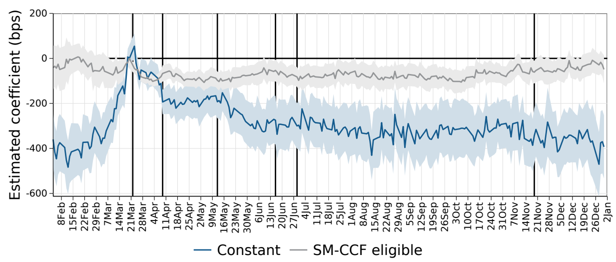
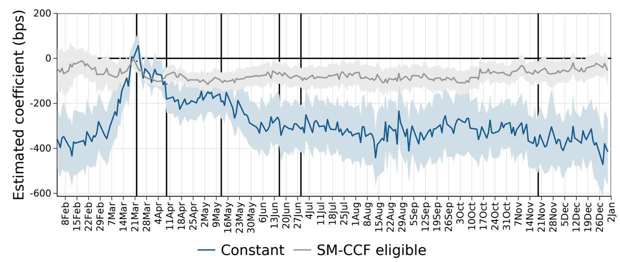


Figure 3. Spreads have retraced from March 22 highs. This figure plots the estimated coefficients from the regression of cumulative bond-level changes in duration-matched spreads, default-adjusted spreads, 1 year expected default frequency and bid-ask spread on SMCCF eligibility dummy and standard bond and issuer characteristics. 95% confidence bands based on standard errors clustered at the issuer level reported as shaded areas around the point estimate. Regressions estimated as repeated cross-sections for each trading date in the sample. Event lines at: March 22 (initial CCF announcement); April 9 (first term sheet update); May 12 (commencement of ETF purchases); June 16 (commencement of cash bond purchases); June 29 (PMCCF operational); November 19 (facility closure announcement).

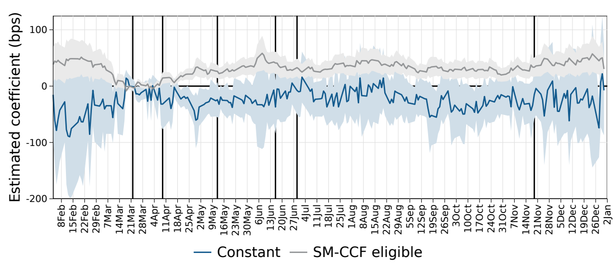
(a) Duration-matched spreads



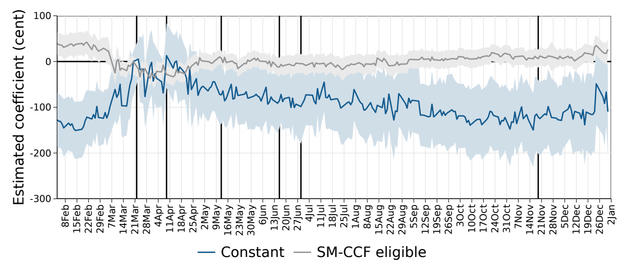
(b) Default-adjusted spreads



(c) 1 year EDF



(d) Bid-ask spreads



A Technical appendix

A.1 TRACE data cleaning

In our analysis, we use TRACE data provided by FINRA at the end of each business day. Starting in July 2002, each registered FINRA member that is a party to a reportable transaction in a TRACE-eligible security has a reporting obligation. The reporting is done in real-time. The set of TRACE-eligible securities has changed throughout the years. We start our sample in 2005, when all investment-grade and high-yield U.S. corporate bonds were included in the TRACE-eligible securities definition (except for 144A). A trade report includes the security identifier, date, time, size (par value), and price of the transaction. A report also identifies the member firm's side of the transaction (buy or sell), their capacity as a principal or agent, and the other parties to the transaction. The required reporting time varies between categories of TRACE-eligible securities. Member firms must report a secondary corporate bond transaction as soon as practicable, no later than within 15 minutes of the time of execution. There a few issues that needs to be addressed:

1. **Correction and Cancellations.** A trade record that is corrected or cancelled at a later time because of misreporting remains on the tape, and additional records indicate its current status.

   What do we do? We keep the most recent status of each trade record based on the system control number and the record type.

2. **Interdealer Trades.** The reporting requirements require all registered broker-dealers (BDs) to report to TRACE. Hence, a trade between two BDs is reported twice, while a trade between a client and a BD is reported once.

   What do we do? To keep one record of each trade, we keep the sell side of an interdealer trade.

3. **Non-Member Affiliates.** While BDs are identified in trade records, clients' identities are masked, and all clients are reported as "C". Effective on November 2, 2015, firms are required to identify transactions with non-member affiliates , entering "A" instead of "C" if the affiliate is a non-FINRA member.

   The reporting rule amendment also requires firms to use an indicator to identify certain trades that typically are not economically distinct and, as such, would not provide investors useful information for pricing, valuation or risk evaluation purposes if disseminated publicly. Specifically, FINRA is requiring firms to identify trades with non-member affiliates that occur within the same day and at the same price as a trade between the firm and another contra-party in the same security. Thus, firms are required to use "non-member affiliate—principal transaction indicator" when reporting a transaction to TRACE in which both the member and its non-member affiliate act in a principal capacity, and where such trade occurs within the same day, at the same price and in the same security as a transaction between the member and another counterparty. A firm is not required to append the indicator if it does not reasonably expect to engage in a same day, same price transaction in the same security with another counterparty as with a non-member affiliate.

What do we do? We exclude records where the field SPCL_PRCSG_CD is non-missing. In addition, for volume calculations, we break down dealer-to-client (DC) and dealer-to-affiliate (DA) trading activity. We exclude non-member affiliate trades with the same price and the same size that happen within 60 seconds of each other.

4. **Trades on Electronic Platforms.** With the growth of electronic trading platforms, we see more transactions being executed through such platforms. Electronic platforms may or may not have a reporting obligation. The reporting obligation of an electronic platform is dependent on whether the platform is a party to the trade, and a registered alternative trading system (ATS) with the SEC. An ATS platform is a party to all transactions executed through its system, and therefore has a reporting obligation. An electronic platform that is not an ATS is not necessarily a party to all trades executed through its system so may not always have a reporting obligation.

   Trades on an electronic platform which also has a reporting obligation increases the number of observations in the TRACE data. For example, a trade between two member firms on an electronic platform with a reporting obligation results in four observations in the TRACE data: a sell by the first member firm to the platform, a purchase by the platform from the first member firm, a sell by the platform to the second member firm, and a purchase by the second member firm from the platform. This needs to be addressed to avoid an upward-bias of trading activity, and a downward bias of price-based liquidity measures.

   What do we do? Depending on the analysis, one might want to flag such trades. We use the counterparties identities and FINRA's TRACE ATS identifiers list to flag such trades. We also construct an additional trade size variable that reset to 0 if the seller is an ATS platform. For trading volume calculations, for example, we use the ATS-adjusted volume variable. If we do not account for multiple trade reports, then we would include some trades more than once depending on whether the counterparties are FINRA members and whether an electronic platform also had a reporting obligation. This would result in an overestimation of the trading activity on electronic platforms with a reporting obligation (e.g., non-6732 ATSs), and an inaccurate comparison of the trading activity between platforms with different reporting obligations (e.g., 6732 ATSs and non-6732 ATSs). Overall, the filter that we apply to the TRACE data ensures that we include each trade only once in our sample.

A.2 Spreads calculation

We begin by computing duration-matched spreads at the bond-trade level. As in Gilchrist and Zakrajšek (2012), define the Treasury-implied yield $y^f_{b,t}$ on bond b on trade date t as

$$\sum_{s=1}^{2T} \frac{C_b}{2} Z_t\left(\frac{s}{2}\right) + 100 Z_t(T) = \sum_{s=1}^{2T} \frac{\frac{C_b}{2}}{\left(1+\frac{y^f_{b,t}}{2}\right)^s} + \frac{100}{\left(1+\frac{y^f_{b,t}}{2}\right)^{2T}},$$

where T is the time-to-maturity of the bond, C_b is the coupon on the bond, and $Z_t(s)$ is the Treasury zero-coupon bond price for time-to-maturity s. The trade-level duration-matched spread on bond b on trade date t is then

$$z_{b,k,t} = y_{b,k,t} - y^f_{b,t},$$

where $y_{b,k,t}$ is the yield on bond b priced in trade k on trade date t. We aggregate to the bond-trade day level by averaging using trading volume weights:

$$z_{b,t} = \frac{\sum_{k \in \mathcal{K}_{b,t}} z_{b,k,t} V_{b,k,t}}{\sum_{k \in \mathcal{K}_{b,t}} V_{b,k,t}},$$

where $\mathcal{K}_{b,t}$ is the set of all trades in bond b in on trading day t and $V_{b,k,t}$ is the volume of the k^{th} trade in bond b on trade date t.

Duration-matched spreads measure the spread differential between corporate bonds and Treasuries with similar duration, capturing risk premia for both the differential credit and liquidity risk between Treasuries and corporate bonds. To separate these two components, similar to Gilchrist and Zakrajšek (2012), we estimate the duration-matched spread that would be predicted based on bond and issuer characteristics using the following regression

$$\log z_{b,t} = \alpha + \beta \text{EDF}_{b,t} + \vec{\gamma} F_{b,t} + \epsilon_{b,t},$$

where $\text{EDF}_{b,t}$ is the one year expected default probability for bond b on day t estimated by Moody's KMV, and $F_{b,t}$ is a vector of bond and issuer characteristics: log duration, log amount outstanding, log age of the bond, log coupon rate, a dummy for call provision, and a 3-digit NAICS industry fixed effect. When bond-level EDFs are not available, we use the issuer-level EDF instead and include a dummy variable for whether bond- or issuer-level is used in the specification.

We estimate this regression separately for each credit rating category, allowing different credit ratings to have a different relationship between expected duration-matched spreads and bond characteristics. Table A.3 reports the estimated coefficients for the above regression for the full sample January 1, 2005 – June 30, 2020. The default-adjusted spread for bond b on date t is then calculated as the difference between the priced and the predicted duration-matched spread on bond b on date t

$$d_{b,t} = z_{b,t} - \exp\left\{\alpha + \beta \text{EDF}_{b,t} + \vec{\gamma} F_{b,t} + \frac{\sigma^2}{2}\right\},$$

where σ^2 is the estimated variance of the idiosyncratic error $\epsilon_{b,t}$.

A.3 Credit ratings

For secondary market functioning, we classify bonds into investment-grade and speculative grade (high yield) categories based on the issue-level credit ratings reported in Mergent FISD. We coalesce bond-level ratings by multiple rating agencies into a single number based on the plurality rule: if a bond is rated by more than one agency, we use the rating agreed upon by at least two rating agencies and use the lowest available rating otherwise. For our purposes, a bond is identified as investment-grade if its plurality rating is BBB- or higher on the S&P ratings scale, or equivalent, and as high yield if its plurality rating is between BB+ and C, inclusive, on the S&P ratings scale, or equivalent. In our sample, few bonds that were investment-grade as of March 22, 2020, and have subsequently been downgraded to BB+/BB/BB-; to keep our definitions consistent with facility eligibility, we include those bonds in the investment-grade category. Bonds that were investment-grade as of March 22, 2020, and have subsequently been downgraded to below BB- on the S&P scale or equivalent but remain rated are included in the high yield category.

Similarly, for primary market functioning, we classify issuers into investment-grade and speculative grade (high yield) categories based on the issuer-level plurality rating, with S&P, Moody's and Fitch issuer-level ratings collected from Thompson Reuters Eikon.

A.4 Nearest maturity Treasury spreads

Primary market issuances are priced as a spread to nearest-maturity on-the-run Treasury yields. In particular, we use the following maturity matches in computing the offering spread to the on-the-run Treasury:

- For bonds with less that 4.5 month maturity, spread to the 3 month Treasury bill
- For bonds with maturity of 4.5 months or more and less than 9 months, spread to the 6 month Treasury bill
- For bonds with maturity of 9 months or more and less than 1.5 years, spread to the 1 year Treasury note
- For bonds with maturity of [1.5, 2.5) years, spread to the 2 year Treasury note
- For bonds with maturity of [2.5, 4) years, spread to the 3 year Treasury note
- For bonds with maturity of [4, 6) years, spread to the 5 year Treasury note
- For bonds with maturity of [6, 8.5) years, spread to the 7 year Treasury note
- For bonds with maturity of [8.5, 20) years, spread to the 10 year Treasury bond
- For bonds with 20 years maturity or more, spread to the 20 year Treasury bond

Note that we exclude bonds with more than 40 years maturity (including perpetual bond) from the offering spread summary statistics.

Table A.1: PMCCF Timeline of Major Events. This table summarizes the major events as of the time of writing for the Primary Market Corporate Credit Facility (PMCCF).

Date	**Event**
March 22, 2020	PMCCF approved unanimously by the Board of Governors and the Secretary of the Treasury[a]
March 23, 2020	Public announcement and initial Term Sheet published[b] *Keys*:[c] • The PMCCF and SMCCF are designed to work together to support the flow of credit to large investment-grade U.S. corporations so that they can maintain business operations and capacity during the period of dislocations relative to COVID-19.
April 9, 2020	Updated Term Sheet Published[d] *Key Facts*: • Treasury capital increased from $10B to $50B • Extended eligibility to firms that were rated IG as of March 22, 2020 and downgraded to no lower than BB- at the time of accessing the facility ("fallen angels") • The PMCCF will buy bonds and syndicated loans with maturities up to four years via two different mechanisms: 1. As the sole investor in newly issued corporate bonds 2. As a participant in a loan or bond syndication at issuance. Facility may purchase no more than 25 percent of any loan syndication or bond issuance.
June 29, 2020	Launch date[e] Updated Term Sheet Published[f] *Key Facts*: • Pricing of individual corporate bonds will be issuer specific, informed by market conditions, plus a 100 bps fee, and subject to minimum and maximum yield spreads over comparable U.S. Treasury Securities • Pricing of syndicated loans will be the same as that of other syndicate members, plus a 100 bps fee
November 19, 2020	Letter from Secretary Mnuchin requesting that the Federal Reserve return the unused funds from CARES Act-funded facilities (PMCCF, SMCCF, MLF, MSLP, and TALF)[g]
December 31, 2020	Authority to purchase eligible assets expired

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Table A.1 – *Continued from previous page*

Date	Event

[a] Federal Reserve Board: https://www.federalreserve.gov/publications/files/primary-market-corporate-credit-facility-3-29-20.pdf

[b] Federal Reserve Board: https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200323b1.pdf

[c] Federal Reserve Board: https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm

[d] Federal Reserve Board: https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200409a5.pdf

[e] Federal Reserve Bank of New York: https://www.newyorkfed.org/newsevents/news/markets/2020/20200629

[f] Federal Reserve Board: https://www.federalreserve.gov/newsevents/pressreleases/monetary20200629a.htm

[g] U.S. Department of the Treasury: https://home.treasury.gov/news/press-releases/sm1190

Table A.2: SMCCF Timeline of Major Events. This table summarizes the major events as of the time of writing for the Secondary Market Corporate Credit Facility (SMCCF).

Date	Event
March 23, 2020	Initial Term Sheet published[a] *Key Facts*: • The PMCCF and SMCCF are designed to work together to support the flow of credit to large investment-grade U.S. corporations so that they can maintain business operations and capacity during the period of dislocation related to COVID-19.[b] • The SMCCF can purchase ETFs or individual corporate bonds
April 9, 2020	Updated Term Sheet published[c] *Key Facts*: • Treasury capital increased from $10B to $25B • Extended eligibility to bonds issued by firms that were rated IG as of March 22, 2020 and no lower than BB- when purchased by facility ("fallen angels"). • Extended eligibility to high yield ETFs, with a "preponderance" in investment-grade ETFs • Concentration limits apply (max 1.5% of CCFs; max 10% of issuers' bonds)
May 12, 2020	Began purchasing ETFs[d]
June 15, 2020	Updated Term Sheet published[e] Updated FAQs released[f] *Key Facts*: • The SMCCF will purchase corporate bonds to construct a corporate bond portfolio that tracks a broad market index developed for the SMCCF • The facility can purchase a broad market index of individual bonds from corporations that satisfy a few simple criteria: maturity of under 5 years, domiciled in the U.S., not an insured depository institution, and meets the issuer rating requirements for Eligible Individual Corporate Bonds • Individual issuer weights will form the basis of sector weights, with each issuer mapped to one of twelve sectors. Purchases of corporate bonds will track as closely as possible the sector weights in the index.
June 16, 2020	Began purchasing individual corporate bonds[g]
November 19, 2020	Letter from Secretary Mnuchin requesting that the Federal Reserve return the unused funds from CARES Act-funded facilities (PMCCF, SMCCF, MLF, MSLP, and TALF)[h]
December 31, 2020	Authority to purchase eligible assets expired
June 3, 2021	Announces the start of ETF sales[i] Updated FAQs released[j] *Key Facts*: • Sales to commence on June 7, 2021 • Sales gradual and orderly, with aim to minimize any adverse impact on market functioning

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Table A.2 – *Continued from previous page*

Date	Event
July 8, 2021	Announces the start of bond sales[k] Updated FAQs released[l] *Key Facts*: • Sales to commence on July 12, 2021 • Sales gradual and orderly, with aim to minimize any adverse impact on market functioning
August 31, 2021	All holdings of corporate bonds and ETFs have either matured or have been sold.

[a] Federal Reserve Board: `https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200323b2.pdf`
[b] Federal Reserve Board: `https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm`
[c] Federal Reserve Board: `https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200409a2.pdf`
[d] Federal Reserve Bank of New York: `https://www.newyorkfed.org/newsevents/news/markets/2020/20200511`
[e] Federal Reserve Board: `https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200615a1.pdf`
[f] Federal Reserve Bank of New York: `https://www.newyorkfed.org/markets/primary-and-secondary-market-faq/archive/corporate-credit-facility-faq-200615`
[g] Federal Reserve Bank of New York: `https://www.newyorkfed.org/newsevents/news/markets/2020/20200615`
[h] U.S. Department of the Treasury: `https://home.treasury.gov/news/press-releases/sm1190`
[i] Federal Reserve Bank of New York: `https://www.newyorkfed.org/newsevents/news/markets/2021/20210603`
[j] Federal Reserve Bank of New York: `https://www.newyorkfed.org/markets/primary-and-secondary-market-faq/archive/corporate-credit-facility-faq-210603`
[k] Federal Reserve Bank of New York: `https://www.newyorkfed.org/newsevents/news/markets/2021/20210708`
[l] Federal Reserve Bank of New York: `https://www.newyorkfed.org/markets/primary-and-secondary-market-faq/corporate-credit-facility-faq`

Table A.3: Estimated relationship between duration-matched spreads and characteristics. This table reports the estimated coefficients from the regression of log duration-matched spreads on bond-level 1 year expected default frequency (EDF) and bond issuer characteristics. Standard errors clustered at the issuer level reported in parentheses below the point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

	AAA,AA	A+,A,A-	BBB+, BBB	BBB-	BB+, BB, BB-	B+ and Lower	All
Constant	-5.19***	-5.39***	-4.92***	-4.25***	-3.99***	-5.09***	-5.05***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Log duration	0.34***	0.44***	0.45***	0.48***	0.42***	0.06***	0.29***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Log coupon	0.53***	0.46***	0.43***	0.51***	0.53***	1.22***	0.77***
	(0.03)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)
Log amount outstanding	-0.07***	-0.05***	-0.06***	-0.11***	-0.09***	-0.05***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Log age	-0.06***	-0.05***	-0.05***	-0.02***	-0.03***	-0.08***	-0.08***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Callable	-0.28***	-0.21***	-0.17***	-0.01	-0.10***	-0.25***	-0.19***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)
$EDF_{1y}\times$ Firm EDF dummy	0.03***	0.05***	0.04***	0.23***	0.08***	0.08***	0.07***
	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)
$EDF_{1y}\times$ Bond EDF dummy	-0.07*	-0.04***	0.08***	0.10***	0.08***	0.06***	0.08***
	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)
N. obs.	794,284	3,296,510	3,476,717	1,285,831	1,070,938	3,715,628	13,639,908
N. clusters	4,085	20,170	25,738	12,791	12,247	54,234	114,110
Adj. R^2	0.30	0.31	0.32	0.34	0.24	0.42	0.44

Table A.4: List of eligible sellers. This table reports the SMCCF eligible sellers together with the seller registration date with the facility. An eligible seller is considered to be an underwriter if any subsidiary of the corporate parent of the eligible seller is reported as a lead underwriter in any corporate bond issuance in either 2019 or 2020 in Mergent FISD. Source: Federal Reserve Bank of New York, `https://www.newyorkfed.org/medialibrary/media/markets/secondary-market-corporate-credit-facility-eligible-sellers`.

Eligible seller	Registration date	Underwriter?
BMO Capital Markets Corp.	May 7, 2020	Y
Cantor Fitzgerald & Co.	May 7, 2020	Y
Jefferies LLC	May 7, 2020	Y
NatWest Markets Securities Inc.	May 7, 2020	N
UBS Securities LLC	May 7, 2020	Y
Wells Fargo Securities, LLC	May 7, 2020	Y
Goldman Sachs & Co. LLC	May 8, 2020	Y
Barclays Capital Inc.	May 11, 2020	Y
BofA Securities, Inc.	May 11, 2020	Y
Morgan Stanley & Co. LLC	May 11, 2020	Y
BNP Paribas Securities Corp.	May 12, 2020	Y
Mizuho Securities U.S.A LLC	May 12, 2020	Y
TD Securities (U.S.A) LLC	May 12, 2020	Y
Amherst Pierpont Securities LLC	May 13, 2020	N
Deutsche Bank Securities Inc.	May 13, 2020	Y
Citigroup Global Markets Inc.	May 14, 2020	Y
Daiwa Capital Markets America Inc.	May 14, 2020	N
HSBC Securities (U.S.A) Inc.	May 15, 2020	Y
J.P. Morgan Securities LLC	May 22, 2020	Y
RBC Capital Markets, LLC	May 22, 2020	Y
Scotia Capital (U.S.A) Inc.	June 10, 2020	Y
Credit Suisse Securities (U.S.A) LLC	June 11, 2020	Y
SG Americas Securities, LLC	June 26, 2020	Y
Academy Securities, Inc	September 9, 2020	Y
Jane Street Execution Services, LLC	September 9, 2020	N
Loop Capital Markets LLC	September 9, 2020	Y
MarketAxess Corporation	September 9, 2020	N
R. Seelaus&Co., LLC	September 9, 2020	Y
SumRidge Partners, LLC	September 9, 2020	N
Tradeweb Direct LLC	September 9, 2020	N
FHN Financial Securities Corp	October 23, 2020	Y
Flow Traders U.S. Institutional Trading LLC	October 23, 2020	N
Guzman & Company	October 23, 2020	Y
Imperial Capital, LLC	October 23, 2020	N
Mischler Financial Group, Inc.	October 23, 2020	N

Continued on next page

Table A.4 – *Continued from previous page*

Eligible seller	**Registration date**	**Underwriter?**
MUFG Securities Americas Inc.	October 23, 2020	Y
Samuel A. Ramirez & Co., Inc.	October 23, 2020	Y
CastleOak Securities, L.P., Inc.	November 6, 2020	N
Great Pacific Securities	November 6, 2020	N
SMBC Nikko Securities America, Inc.	November 6, 2020	Y
U.S. Bancorp Investments, Inc.	November 6, 2020	Y

Table A.5: Probability of issuance for different cut-offs. This table reports the estimated coefficients from the probit regression of issuer f issuing a fixed rate bond in week t. "IG" is a dummy equal to 1 if the issuer is investment grade rated in week t. "WAM" is the amount-outstanding weighted average maturity of bonds outstanding of the issuer. "Pandemic onset" is a dummy equal to 1 if issuance occurs between February 22, 2020 and March 21, 2020; "Facility implementation" is a dummy equal to 1 if issuance occurs between March 22, 2020 and June 29, 2020; "Facility operational" is a dummy equal to 1 if issuance occurs between June 30, 2020 and December 31, 2020. "Opportunistic issuers" are those that don't have any debt maturing within 1 year (panel a)/3 years (panel b). All regressions include month fixed effects. Reference period is January 1, 2017 – February 21, 2020. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) 1 year cut-off

	Non-financial				Financial			
	(1) Mat. w/in 1 year	(2) Mat. w/in 1 year	(3) Opportunistic	(4) Opportunistic	(5) Mat. w/in 1 year	(6) Mat. w/in 1 year	(7) Opportunistic	(8) Opportunistic
issued								
Constant	-6.26	-6.34	-5.61	-5.76	-0.27	-1.26	-5.54	-5.46
	(0.59)***	(0.75)***	(0.26)***	(0.28)***	(0.81)	(0.85)	(0.49)***	(0.50)***
Feb 22, 2020 – Mar 21, 2020	-12.37	-12.56	-0.96	-1.12	0.61	0.84	-13.21	-13.35
	(0.75)***	(0.65)***	(1.01)	(1.04)	(0.38)	(0.53)	(0.45)***	(0.45)***
Mar 22, 2020 – Jun 29, 2020	0.29	0.51	0.61	0.63	0.63	1.11	-0.24	0.03
	(1.10)	(1.15)	(0.33)*	(0.35)*	(0.38)*	(0.44)**	(0.99)	(0.98)
Jun 30, 2020 – Dec 31, 2020	0.50	0.21	-0.27	-0.15	-0.07	0.43	0.62	0.82
	(0.78)	(0.98)	(0.34)	(0.35)	(0.59)	(0.69)	(0.57)	(0.57)
Jan 1, 2021 –	-11.91	-11.78	-12.94	-13.88	0.01	0.62	-13.04	-13.23
	(0.47)***	(0.74)***	(0.42)***	(2.70)***	(0.70)	(0.86)	(.)	(0.73)***
WAM	-0.04	-0.02	-0.06	-0.04	-0.23	-0.13	-0.06	-0.04
	(0.01)***	(0.01)*	(0.01)***	(0.01)***	(0.11)**	(0.07)*	(0.01)***	(0.01)***
IG	1.38	0.95	0.78	0.53	-1.29	-1.07	1.14	0.96
	(0.41)***	(0.50)*	(0.16)***	(0.18)***	(0.34)***	(0.65)	(0.36)***	(0.36)***
IG × Feb 22, 2020 – Mar 21, 2020	11.95	11.38	1.30	0.71	-0.93	-0.94	13.50	13.66
	(0.97)***	(0.88)***	(1.05)	(1.05)	(0.53)*	(0.67)	(.)	(.)
IG × Mar 22, 2020 – Jun 29, 2020	0.80	0.70	0.71	0.78	0.02	-0.40	0.58	0.34
	(1.13)	(1.28)	(0.34)**	(0.38)**	(0.53)	(0.59)	(1.02)	(1.01)
IG × Jun 30, 2020 – Dec 31, 2020	-1.71	-2.18	0.09	-0.17	0.66	-0.00	-0.97	-1.11
	(0.91)*	(0.87)**	(0.39)	(0.41)	(0.75)	(0.94)	(0.69)	(0.69)
IG × Jan 1, 2021 –	10.12	9.16	11.29	11.67	0.57	0.01	11.50	11.78
	(0.79)***	(0.90)***	(.)	(1.89)***	(0.83)	(0.98)	(0.74)***	(.)
Log EDF		-0.30		-0.15		-0.26		-0.02
		(0.12)**		(0.04)***		(0.22)		(0.07)
Feb 22, 2020 – Mar 21, 2020 × Log EDF		-0.23		-0.30		0.02		0.13
		(0.23)		(0.13)**		(0.36)		(0.29)
Mar 22, 2020 – Jun 29, 2020 × Log EDF		0.13		0.09		0.27		-0.10
		(0.18)		(0.07)		(0.33)		(0.20)
Jun 30, 2020 – Dec 31, 2020 × Log EDF		-0.31		-0.07		-0.01		0.05
		(0.30)		(0.11)		(0.33)		(0.20)
Jan 1, 2021 – × Log EDF		-0.39		-0.40		0.30		0.28
		(0.25)		(0.47)		(0.24)		(0.12)**
Pseudo R.-sqr.	0.08	0.08	0.06	0.05	0.13	0.08	0.04	0.03
N. of obs	21689	14816	156894	106412	14525	11028	41812	30249
N. of clusters	396	310	960	801	157	136	291	254

(b) 3 year cut-off

	Non-financial				Financial			
	(1) Mat. w/in 3 years	(2) Mat. w/in 3 years	(3) Opportunistic	(4) Opportunistic	(5) Mat. w/in 3 years	(6) Mat. w/in 3 years	(7) Opportunistic	(8) Opportunistic
issued								
Constant	-6.13	-6.06	-5.54	-5.74	-0.94	-2.31	-5.96	-5.79
	(0.40)***	(0.44)***	(0.31)***	(0.33)***	(0.89)	(0.78)***	(0.64)***	(0.67)***
Feb 22, 2020 – Mar 21, 2020	-13.10	-13.82	-0.77	-0.92	0.49	1.14	-11.93	-12.07
	(0.37)***	(0.54)***	(1.02)	(1.06)	(0.29)*	(0.42)***	(0.86)***	(0.56)***
Mar 22, 2020 – Jun 29, 2020	1.16	1.35	0.18	0.07	0.60	1.36	0.52	0.68
	(0.45)**	(0.45)***	(0.46)	(0.51)	(0.31)*	(0.34)***	(1.07)	(1.07)
Jun 30, 2020 – Dec 31, 2020	0.31	0.37	-0.36	-0.27	-0.12	0.63	0.87	0.98
	(0.50)	(0.54)	(0.39)	(0.40)	(0.56)	(0.67)	(0.72)	(0.75)
Jan 1, 2021 –	-12.77	-13.45	0.00	0.00	-0.11	0.51	-11.77	-12.03
	(0.36)***	(2.17)***	(.)	(.)	(0.65)	(0.80)	(0.53)***	(0.55)***
WAM	-0.05	-0.03	-0.06	-0.04	-0.22	-0.10	-0.06	-0.04
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.11)*	(0.06)*	(0.01)***	(0.02)***
IG	1.34	0.84	0.63	0.49	-1.04	-0.53	1.23	1.00
	(0.29)***	(0.35)**	(0.18)***	(0.19)**	(0.37)***	(0.62)	(0.44)***	(0.46)**
IG × Feb 22, 2020 – Mar 21, 2020	13.20	13.34	1.05	0.36	-0.77	-1.05	12.31	12.42
	(.)	(.)	(1.07)	(1.08)	(0.44)*	(0.51)**	(0.99)***	(0.77)***
IG × Mar 22, 2020 – Jun 29, 2020	0.07	0.29	1.15	1.09	-0.32	-0.94	0.47	0.22
	(0.46)	(0.52)	(0.47)**	(0.54)**	(0.46)	(0.43)**	(1.10)	(1.10)
IG × Jun 30, 2020 – Dec 31, 2020	-0.96	-1.28	0.22	-0.05	0.38	-0.46	-0.70	-0.79
	(0.57)*	(0.57)**	(0.45)	(0.49)	(0.73)	(0.87)	(0.80)	(0.85)
IG × Jan 1, 2021 –	11.81	12.29	0.00	0.00	0.48	-0.14	10.58	10.80
	(.)	(2.03)***	(.)	(.)	(0.79)	(0.91)	(1.01)***	(0.98)***
Log EDF		-0.20		-0.14		-0.25		0.02
		(0.07)***		(0.05)***		(0.18)		(0.08)
Feb 22, 2020 – Mar 21, 2020 × Log EDF		-0.23		-0.31		0.22		-0.02
		(0.17)		(0.14)**		(0.24)		(0.69)
Mar 22, 2020 – Jun 29, 2020 × Log EDF		0.23		-0.08		0.16		-0.03
		(0.08)***		(0.11)		(0.27)		(0.15)
Jun 30, 2020 – Dec 31, 2020 × Log EDF		-0.10		-0.10		-0.00		0.06
		(0.14)		(0.14)		(0.24)		(0.25)
Jan 1, 2021 – × Log EDF		-0.18		0.00		0.23		0.37
		(0.32)		(.)		(0.20)		(0.10)***
Pseudo R.-sqr.	0.06	0.05	0.05	0.05	0.10	0.05	0.06	0.04
N. of obs	59221	41940	111297	74479	25174	19585	31163	21692
N. of clusters	543	452	863	717	206	187	242	197

Table A.6: Offering terms and underwriters. This table reports the estimated coefficients from the regression of offering terms of bond b issued by issuer f in week t. "IG" is a dummy equal to 1 if the issuer is investment grade rated in week t. "Opportunistic issuers" are those that don't have any debt maturing within 2 years. "At least 1 bank eligible seller" is an indicator equal to 1 if any underwriter of the bond is affiliated with a U.S. BHC and becomes an eligible seller at some point during the life of the facility. "At least 1 bank eligible seller" is an indicator equal to 1 if any underwriter of the bond is not affiliated with a U.S. BHC and becomes an eligible seller at some point during the life of the facility. All regressions include week fixed effects. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Full sample

	Amount		Maturity		Offering spread		Gross spread	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	2.49	5.44	3.55	-22.23	-459.23	-80.18	24.48	25.87
	(3.18)	(1.72)***	(37.46)	(36.65)	(805.25)	(703.07)	(10.78)**	(7.72)***
IG	0.15	0.21	5.11	7.09	-165.79	-173.33	-4.22	-4.56
	(0.14)	(0.13)	(2.11)**	(2.00)***	(32.32)***	(25.69)***	(0.79)***	(0.61)***
At least 1 bank eligible seller	-0.16	-0.17	0.03	0.32	1.60	-5.85	0.29	0.36
	(0.13)	(0.13)	(2.93)	(2.91)	(18.91)	(15.97)	(0.88)	(0.84)
At least 1 bank eligible seller × post registration	-0.08	0.03	-6.34	-5.52	-40.07	-53.57	0.99	1.10
	(0.21)	(0.24)	(4.16)	(4.35)	(35.75)	(34.03)	(0.56)*	(0.55)**
At least 1 non-bank eligible seller	-0.04	-0.05	-0.76	-0.26	-24.99	-18.35	-0.05	-0.03
	(0.09)	(0.09)	(1.34)	(1.45)	(11.06)**	(12.27)	(0.22)	(0.24)
At least 1 non-bank eligible seller × post registration	0.42	0.59	-4.82	-3.95	-43.56	-72.22	-0.37	-0.40
	(0.24)*	(0.23)**	(4.15)	(5.02)	(31.87)	(38.59)*	(0.63)	(0.75)
Log EDF		-0.04		-1.18		33.45		0.20
		(0.04)		(0.57)**		(9.05)***		(0.11)*
Mills ratio	0.81	-0.08	-3.11	1.35	156.18	77.45	-3.53	-3.71
	(0.75)	(0.41)	(8.83)	(8.50)	(187.10)	(164.86)	(2.46)	(1.79)**
Issuer characteristics	✓	✓	✓	✓	✓	✓	✓	✓
Bond characteristics	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓
Adj. R.-sqr.	0.47	0.50	0.11	0.11	0.60	0.68	0.64	0.67
N. of obs	883	848	883	848	883	848	827	796
N. of clusters	234	221	234	221	234	221	226	212

(b) By refinancing need

	Amount		Maturity		Offering spread		Gross spread	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Refi	Opp.	Refi	Opp.	Refi	Opp.	Refi	Opp.
Constant	7.35	7.43	-100.29	10.00	1963.50	-770.35	12.83	17.35
	(3.21)**	(2.71)***	(58.72)*	(48.02)	(498.92)***	(680.06)	(8.27)	(10.85)
IG	0.02	0.05	10.73	5.67	-296.17	-108.15	-3.52	-4.77
	(0.29)	(0.16)	(6.56)	(2.90)*	(58.41)***	(33.86)***	(0.81)***	(0.80)***
At least 1 bank eligible seller	-0.19	-0.04	11.65	-2.52	70.56	-9.08	2.32	-0.94
	(0.30)	(0.19)	(4.13)***	(3.25)	(38.14)*	(21.28)	(1.51)	(1.40)
At least 1 bank eligible seller × post registration	-0.35	0.20	-5.22	-5.20	-54.82	12.43	0.13	0.80
	(0.44)	(0.25)	(6.28)	(7.13)	(36.96)	(34.40)	(0.91)	(0.64)
At least 1 non-bank eligible seller	-0.24	-0.06	1.17	-0.93	-8.82	-25.12	0.82	-0.58
	(0.22)	(0.10)	(2.05)	(1.97)	(14.88)	(20.11)	(0.49)*	(0.42)
At least 1 non-bank eligible seller × post registration	0.48	0.62	-1.92	-1.99	-66.77	-39.54	0.29	0.26
	(0.59)	(0.21)***	(9.45)	(5.73)	(83.31)	(39.96)	(1.29)	(0.88)
Log EDF	-0.08	-0.03	-2.30	-1.13	49.44	27.66	0.29	0.02
	(0.05)	(0.04)	(1.14)**	(0.91)	(9.04)***	(10.93)**	(0.13)**	(0.19)
Mills ratio	-0.57	-0.58	16.66	-10.05	-408.53	281.28	-0.50	-1.40
	(0.73)	(0.63)	(12.52)	(10.94)	(109.98)***	(157.43)*	(1.89)	(2.36)
Issuer characteristics	✓	✓	✓	✓	✓	✓	✓	✓
Bond characteristics	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓
Adj. R.-sqr.	0.56	0.52	0.01	0.22	0.83	0.71	0.76	0.65
N. of obs	380	439	380	439	380	439	348	425
N. of clusters	90	171	90	171	90	171	85	166

Table A.7: Facility announcement effects across event horizons. This table reports the estimated coefficients from the regression of average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 1, 3 or 5 days around the announcement of the facilities on March 22, 2020 and the expansion of the facilities on April 9, 2020. "AAA/AA/A eligible" ("BBB eligible") is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and is rated at least A- (rated BBB+, BBB or BBB-) on a plurality rating basis. "Fallen angel eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. All regressions include issuer FEs. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Duration-matched spreads

	March 22			April 9		
	1D	3D	5D	1D	3D	5D
Constant	-25.14	-14.58	-12.57	-45.10	-8.47	-3.04
	(25.21)	(13.48)	(7.66)	(20.37)**	(10.58)	(10.64)
AAA/AA/A eligible	-36.31	-14.93	-9.70	2.61	-0.83	-2.25
	(11.80)***	(4.94)***	(2.19)***	(6.00)	(2.53)	(1.49)
BBB eligible	-26.84	-17.71	-16.75	-0.87	2.84	-2.61
	(16.61)	(6.12)***	(2.92)***	(10.54)	(7.50)	(2.09)
Fallen angels eligible				-192.24	-11.31	-19.09
				(5.26)***	(3.18)***	(2.23)***
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.27	0.16	0.21	0.49	0.37	0.39
N. of obs	824	880	885	800	888	903
N. of clusters	178	189	190	182	203	208

(b) Default-adjusted spreads

	March 22			April 9		
	1D	3D	5D	1D	3D	5D
Constant	-29.01	-18.50	-14.37	-42.85	-8.60	-4.16
	(25.36)	(16.72)	(9.77)	(20.70)**	(10.71)	(11.26)
AAA/AA/A eligible	-37.70	-15.56	-10.01	3.08	-0.42	-1.99
	(12.52)***	(5.25)***	(2.31)***	(6.20)	(2.62)	(1.52)
BBB eligible	-28.62	-17.69	-16.62	-0.10	3.27	-2.39
	(16.62)*	(6.06)***	(2.87)***	(10.71)	(7.62)	(2.16)
Fallen angels eligible				-188.34	-9.70	-18.50
				(5.05)***	(3.17)***	(2.21)***
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.27	0.16	0.19	0.49	0.36	0.38
N. of obs	808	861	866	768	856	868
N. of clusters	176	186	187	175	196	200

(c) 1y EDF

	March 22			April 9		
	1D	3D	5D	1D	3D	5D
Constant	-12.36	-7.85	-3.09	2.54	2.14	2.14
	(6.15)**	(3.88)**	(1.27)**	(2.51)	(1.74)	(1.89)
AAA/AA/A eligible	0.56	0.29	0.09	-0.25	-0.14	-0.12
	(0.53)	(0.27)	(0.09)	(0.28)	(0.15)	(0.16)
BBB eligible	-3.15	-1.76	-0.65	0.21	0.43	0.20
	(1.76)*	(1.01)*	(0.47)	(0.54)	(0.39)	(0.33)
Fallen angels eligible				6.90	14.71	7.39
				(0.17)***	(0.10)***	(0.08)***
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.78	0.71	0.80	0.86	0.79	0.55
N. of obs	808	861	866	772	860	874
N. of clusters	176	186	187	177	198	203

(d) Bid-ask spread

	March 22			April 9		
	1D	3D	5D	1D	3D	5D
Constant	6.32	6.52	4.26	11.37	3.66	0.76
	(25.74)	(7.78)	(4.56)	(22.35)	(7.86)	(2.71)
AAA/AA/A eligible	-30.42	-13.08	-6.97	-11.88	-1.19	-2.85
	(3.13)***	(6.87)*	(0.87)***	(6.15)*	(2.37)	(1.53)*
BBB eligible	-15.85	-12.89	-7.31	-19.47	0.07	-0.41
	(20.77)	(5.94)**	(2.88)**	(8.21)**	(2.16)	(1.74)
Fallen angels eligible				-44.22	-16.57	-4.33
				(1.01)***	(0.32)***	(0.20)***
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.37	0.46	0.32	0.27	0.25	0.29
N. of obs	456	465	465	862	907	912
N. of clusters	118	122	122	189	199	201

Table A.8: Facility closure announcement effects across event horizons. This table reports the estimated coefficients from the regression of average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 1, 3 or 5 days around Secretary Mnuchin's letter requesting the return of CARES Act funds on November 19, 2020 and in 1, 3 or 5 days around the closure of the facilities on December 31, 2020. "SM-CCF eligible" is a dummy equal to 1 if the bond matures with 5 years, is not issued by a bank or a bank-subsidiary and was investment grade rated as of March 22 and was subsequently downgraded no lower than BB- on a plurality rating basis. All regressions include issuer FEs. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Duration-matched spreads

	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	-50.37	-5.73	-0.75	-0.85	-3.39	0.60
	(37.86)	(2.78)**	(4.32)	(7.39)	(2.25)	(1.30)
SMCCF eligible	0.40	0.76	0.04	0.57	0.14	-0.44
	(0.98)	(0.35)**	(0.53)	(1.56)	(0.63)	(0.72)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.41	0.52	0.50	0.19	0.21	0.57
N. of obs	845	970	982	577	673	689
N. of clusters	202	227	230	141	161	164

(b) Default-adjusted spreads

	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	-51.34	-5.75	1.86	-1.67	-2.79	0.92
	(40.58)	(2.80)**	(3.83)	(7.65)	(2.09)	(1.40)
SMCCF eligible	0.55	0.80	0.05	0.60	0.12	-0.46
	(1.00)	(0.34)**	(0.56)	(1.57)	(0.65)	(0.73)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.45	0.54	0.35	0.20	0.20	0.54
N. of obs	841	957	969	570	666	682
N. of clusters	202	223	226	139	159	162

(c) 1y EDF

	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	1.63	-0.59	-0.18	-3.20	-0.32	-0.57
	(0.82)**	(0.77)	(0.56)	(2.35)	(0.96)	(1.03)
SMCCF eligible	-1.05	-1.46	-0.77	-0.34	0.06	-0.13
	(0.56)*	(0.86)*	(0.49)	(0.19)*	(0.09)	(0.09)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.96	0.89	0.91	0.61	0.84	0.86
N. of obs	841	957	969	572	668	684
N. of clusters	202	223	226	139	159	162

(d) Bid-ask spread

	Nov 19			Dec 29		
	1D	3D	5D	1D	3D	5D
Constant	1.16	-1.79	-1.38	-5.59	5.38	2.73
	(6.16)	(1.82)	(1.61)	(9.74)	(4.53)	(2.71)
SMCCF eligible	-0.13	-0.65	1.03	2.81	-1.01	-0.69
	(2.04)	(0.68)	(0.55)*	(3.09)	(1.18)	(0.62)
Issuer FE	✓	✓	✓	✓	✓	✓
Adj. R-sqr.	0.31	0.29	0.28	0.03	0.14	0.11
N. of obs	1265	1439	1441	767	854	854
N. of clusters	266	288	288	184	199	199

Table A.9: Purchase effects. This table reports the estimated coefficients from average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 3 days around facility purchases. "Pct purchased" is the percent of amount outstanding purchased. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Duration-matched spreads

	(1)	(2)	(3)	(4)	(5)
Constant	-2.57	-2.25	-2.26	-2.06	-4.56
	(0.39)***	(0.39)***	(0.39)***	(0.51)***	(2.94)
Pct purchased	-1.90	-0.48			
	(0.93)**	(0.83)			
ETF pct purchased			47.24	38.77	63.90
			(93.69)	(80.84)	(97.41)
Cash bond pct purchased			-0.58	-1.60	-2.18
			(0.84)	(0.83)*	(0.84)***
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.07	0.07	0.09	0.13
N. of obs	179150	179150	179150	179127	179065
N. of clusters	673	673	673	650	648

(b) Default-adjusted spreads

	(1)	(2)	(3)	(4)	(5)
Constant	-1.88	-1.52	-1.55	-0.85	-3.58
	(0.68)***	(0.65)**	(0.65)**	(1.09)	(2.88)
Pct purchased	-2.10	-0.09			
	(0.93)**	(0.83)			
ETF pct purchased			73.15	52.02	96.32
			(97.74)	(83.17)	(102.45)
Cash bond pct purchased			-0.24	-1.14	-1.76
			(0.82)	(0.81)	(0.82)**
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.05	0.05	0.06	0.09
N. of obs	176170	176170	176170	176153	176097
N. of clusters	633	633	633	616	614

(c) 1y EDF

	(1)	(2)	(3)	(4)	(5)
Constant	-0.20	-0.28	-0.24	-0.48	-1.03
	(0.24)	(0.23)	(0.23)	(0.25)**	(0.69)
Pct purchased	0.53	-1.60			
	(0.31)*	(0.62)***			
ETF pct purchased			-108.15	-120.67	-161.40
			(70.27)	(64.13)*	(80.11)**
Cash bond pct purchased			-1.38	-1.68	-1.70
			(0.52)***	(0.52)***	(0.52)***
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.02	0.02	0.03	0.02
N. of obs	176400	176400	176400	176382	176324
N. of clusters	634	634	634	616	614

(d) Bid-ask spread

	(1)	(2)	(3)	(4)	(5)
Constant	-0.05	0.04	0.06	-0.00	0.23
	(0.24)	(0.24)	(0.24)	(0.28)	(0.33)
Pct purchased	-3.03	-1.96			
	(1.03)***	(1.02)*			
ETF pct purchased			-60.72	-63.33	-7.22
			(64.91)	(67.18)	(75.46)
Cash bond pct purchased			-1.81	-1.59	-1.61
			(0.99)*	(0.96)*	(0.96)*
Date FE		✓	✓	✓	✓
Issuer FE				✓	✓
Issue FE					✓
Adj. R-sqr.	0.00	0.00	0.00	0.01	0.00
N. of obs	227320	227320	227320	227314	227296
N. of clusters	543	543	543	537	537

Figure A.1. Daily CCF purchase volume. This figure plots the time series of daily CCF purchase volume by asset class.

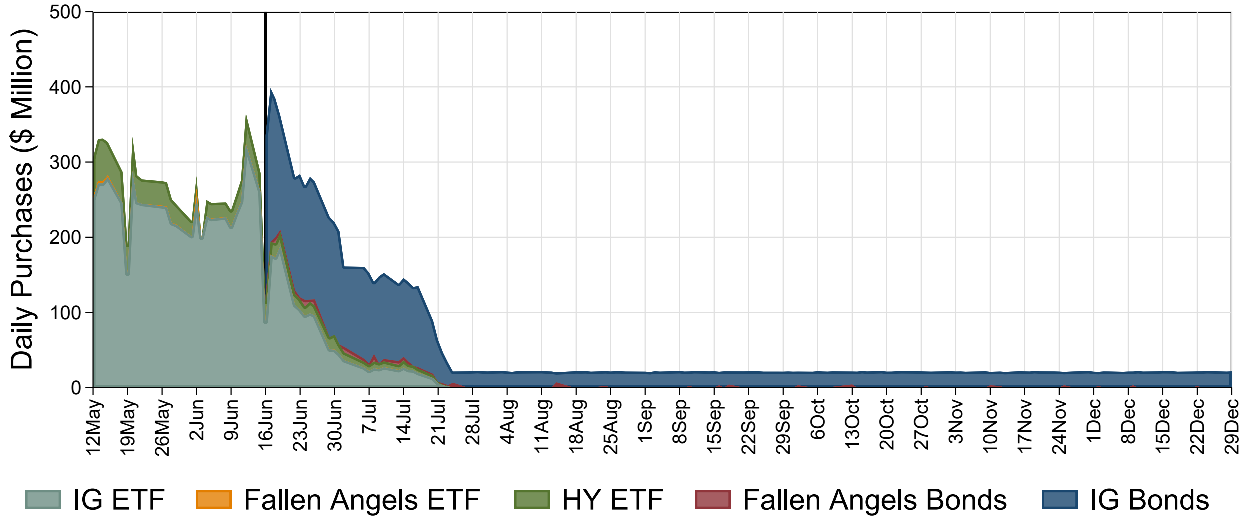

Table A.10: Purchase effects across event horizons. This table reports the estimated coefficients from average daily changes in duration-matched credit spreads, bid-ask spreads, and components of credit spreads in 1,3 or 5 days around facility purchases. "Purchased" is the 0/1 indicator for the bond being purchased either directly (as a cash bond) or indirectly (through ETF purchases). "ETF" is the 0/1 indicator for the bond purchased indirectly through ETFs; "Cash bond" is the 0/1 indicator for the bond purchased directly. "Pct purchased" is the percent of amount outstanding purchased. Standard errors clustered at the issuer level reported in parentheses below point estimates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

(a) Duration-matched spreads

	1D				3D				5D			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-3.27	-6.72	-3.72	-7.07	-1.87	-4.54	-1.99	-4.56	-1.78	-3.85	-1.90	-3.92
	(0.71)***	(3.71)*	(0.70)***	(3.70)*	(0.40)***	(2.94)	(0.40)***	(2.94)	(0.34)***	(2.34)*	(0.34)***	(2.34)*
ETF	-2.65	-1.05			-2.01	-0.00			-1.91	-0.25		
	(0.19)***	(0.78)			(0.13)***	(0.43)			(0.12)***	(0.32)		
Cash bond	0.40	-1.44			0.51	-0.93			0.69	-0.60		
	(0.60)	(0.52)***			(0.29)*	(0.26)***			(0.21)***	(0.18)***		
ETF pct purchased			-817.75	256.02			-933.72	63.90			-873.79	-18.73
			(76.00)***	(164.51)			(61.96)***	(97.41)			(60.90)***	(94.16)
Cash bond pct purchased			0.76	-5.27			2.12	-2.18			2.03	-1.93
			(1.63)	(1.56)***			(0.79)***	(0.84)***			(0.59)***	(0.57)***
Issuer FE		✓		✓		✓		✓		✓		✓
Date FE		✓		✓		✓		✓		✓		✓
Issue FE		✓		✓		✓		✓		✓		✓
Adj. R-sqr.	0.00	0.09	0.00	0.09	0.01	0.13	0.01	0.13	0.01	0.17	0.01	0.17
N. of obs	160462	160371	160462	160371	179150	179065	179150	179065	181743	181663	181743	181663
N. of clusters	645	627	645	627	673	648	673	648	679	654	679	654

(b) Default-adjusted spreads

	1D				3D				5D			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-1.45	-5.03	-1.90	-5.38	-1.17	-3.53	-1.30	-3.58	-1.36	-3.22	-1.50	-3.32
	(1.85)	(3.53)	(1.85)	(3.51)	(0.68)*	(2.88)	(0.69)*	(2.88)	(0.38)***	(2.28)	(0.39)***	(2.28)
ETF	-2.71	-1.05			-2.04	-0.11			-1.93	-0.31		
	(0.20)***	(0.83)			(0.14)***	(0.45)			(0.13)***	(0.36)		
Cash bond	0.27	-1.29			0.46	-0.82			0.65	-0.52		
	(0.58)	(0.52)**			(0.28)	(0.26)***			(0.21)***	(0.17)***		
ETF pct purchased			-858.99	247.13			-946.33	96.32			-876.30	41.46
			(81.91)***	(166.89)			(64.35)***	(102.45)			(62.23)***	(99.77)
Cash bond pct purchased			0.18	-4.73			1.94	-1.76			1.88	-1.63
			(1.62)	(1.54)***			(0.78)**	(0.82)**			(0.59)***	(0.55)***
Issuer FE		✓		✓		✓		✓		✓		✓
Date FE		✓		✓		✓		✓		✓		✓
Issue FE		✓		✓		✓		✓		✓		✓
Adj. R-sqr.	0.00	0.06	0.00	0.06	0.00	0.09	0.00	0.09	0.01	0.13	0.01	0.13
N. of obs	158137	158054	158137	158054	176170	176097	176170	176097	178600	178533	178600	178533
N. of clusters	610	595	610	595	633	614	633	614	637	619	637	619

(c) 1y EDF

	1D				3D				5D			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	-0.56	-1.73	-0.52	-1.70	-0.24	-1.19	-0.19	-1.03	-0.15	-0.58	-0.14	-0.53
	(0.96)	(0.95)*	(0.96)	(0.91)*	(0.23)	(0.71)*	(0.24)	(0.69)	(0.16)	(0.57)	(0.17)	(0.56)
ETF	0.29	-0.10			0.11	0.45			0.04	0.03		
	(0.17)*	(0.60)			(0.09)	(0.40)			(0.06)	(0.27)		
Cash bond	0.39	-0.52			0.19	-0.37			0.10	-0.32		
	(0.14)***	(0.26)**			(0.09)**	(0.14)***			(0.07)	(0.10)***		
ETF pct purchased			109.04	-273.75			-7.65	-161.40			5.32	-179.93
			(43.40)**	(123.01)**			(23.11)	(80.11)**			(19.35)	(74.34)**
Cash bond pct purchased			1.12	-2.93			0.57	-1.70			0.33	-1.38
			(0.40)***	(0.93)***			(0.30)*	(0.52)***			(0.20)	(0.38)***
Issuer FE		✓		✓		✓		✓		✓		✓
Date FE		✓		✓		✓		✓		✓		✓
Issue FE		✓		✓		✓		✓		✓		✓
Adj. R-sqr.	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02
N. of obs	158350	158265	158350	158265	176400	176324	176400	176324	178832	178761	178832	178761
N. of clusters	610	595	610	595	634	614	634	614	638	619	638	619

(d) Bid-ask spread

	1D				3D				5D			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	0.49	-0.05	0.39	-0.19	0.11	0.31	0.05	0.23	0.04	0.33	0.01	0.29
	(0.29)*	(0.77)	(0.28)	(0.75)	(0.25)	(0.35)	(0.24)	(0.33)	(0.22)	(0.16)**	(0.22)	(0.15)*
ETF	-0.33	-0.61			-0.41	-0.35			-0.29	-0.18		
	(0.15)**	(0.70)			(0.09)***	(0.47)			(0.08)***	(0.29)		
Cash bond	-0.42	0.20			-0.75	-0.54			-0.28	-0.05		
	(0.62)	(0.65)			(0.37)**	(0.34)			(0.16)*	(0.16)		
ETF pct purchased			-36.12	-27.87			-158.58	-7.22			-133.91	21.63
			(99.40)	(145.54)			(39.41)***	(75.46)			(32.05)***	(55.54)
Cash bond pct purchased			-2.08	-0.39			-2.26	-1.61			-0.75	-0.03
			(2.26)	(2.41)			(0.98)**	(0.96)*			(0.49)	(0.52)
Issuer FE		✓		✓		✓		✓		✓		✓
Date FE		✓		✓		✓		✓		✓		✓
Issue FE		✓		✓		✓		✓		✓		✓
Adj. R-sqr.	0.00	-0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
N. of obs	220774	220761	220774	220761	227320	227296	227320	227296	228349	228322	228349	228322
N. of clusters	541	534	541	534	543	537	543	537	549	539	549	539